Installation Guide

Pluribus NETWORKS

E68-M Hardware Platform

April 2018

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- Move the equipment to one side or the other of the television or radio.
- Move the equipment farther away from the television or radio.
- Plug the equipment into an outlet that is on a different circuit from the television or radio. (That is, make certain the equipment and the television or radio are on circuits controlled by different circuit breakers or fuses.)

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Preface

This preface describes the audience, organization, and conventions of this installation guide, and provides information on how to obtain related documentation.

Audience

To use this installation guide, you must be familiar with electronic circuitry and wiring practices and preferably be an electronic or electromechanical technician.

Document Conventions

This document uses the following conventions for notes, cautions, and safety warnings.

Informational Note: Indicates important Information.

Caution! This situation or condition can lead to data loss or damage to the product or other property

Warning: Alerts you to the risk of personal injury or death.

TIP! Timesaving information or problem solving assistance.

Related Documentation

The Pluribus Networks documentation set includes the following guides:

- *Pluribus Networks nvOS® Configuration Guide*
- *Pluribus Networks nvOS® Command Line Interface Reference*
- *Pluribus Networks nvOS® Release Notes*
- *Pluribus Networks vManage Administration Guide*

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E68-M Overview

This chapter provides an overview of the Pluribus Networks Freedom Series switches including information on the power supplies and fan modules included with the product.

This chapter includes the following sections:

- Features
- Chassis
- Ports
- Power Supplies
- Fan Modules
- Transceivers

Features

E68-M

The Pluribus Networks Freedom Series E68 switch is a top-of-rack, 40-Gigabit Ethernet switch with 44 ports and up to 1.36 Tbps throughput. As a top-of-rack switch, all the servers in the rack connect to the Pluribus Networks Freedom Series switch.

The Pluribus Networks Freedom Series switch has the following features:

- 44 10G/1G SFP+ Ethernet ports
- 6 40G/4x10G (QSFP+) Ethernet ports
- Non-blocking Layer 2 forwarding and Layer 3 routing
- Two disk drive bays, two shared 10/100/1000 Ethernet management port (RJ45), one console port (RJ45)and one IPMI port (RJ45) on the back of the switch
- Four slots on the front of the switch for hot swap-capable fan modules, which provide front-to-back airflow for cooling
- Two slots on the back of the switch for hot swap-capable power supplies

Chassis

The Pluribus Networks Freedom E68-M Series chassis is 1RU or 1.7 inches (4.4 cm) tall, 17 inches (43.2 cm) wide, and 22 inches (55.9 cm) deep. It weighs 30 lbs (25 kg).

The front panel of the Pluribus Networks Freedom E68 Series has two external drive bays, one USB port, one console port, and one VGA port.

Figure 1: Front View of the Pluribus Networks E68-M Series switch

The Freedom E68-M Series front panel has 44 fixed 1/10-Gigabit Ethernet and six fixed 40-Gigabit Ethernet data ports. Each port on the Pluribus Networks Freedom Series switch is numbered, and groups of ports are numbered based on their function. The ports are numbered from left to right. The 6 QSFP+ ports support 40-Gigabit Ethernet transceivers. The 44 fixed SFP+ ports support10-Gigabit Ethernet transceivers.

The management, and IPMI ports are in 2x side-by-side RJ-45 jacks.

Figure 2: Rear View of the Freedom E68-M Series switch

The rear panel of the Freedom E68-M Series switches has two USB ports, one 10/100/1000 Ethernet management port, and also four hot swappable fans, and two power supplies. Standard console and VGA ports are also provided on the rear of the switch.

Power Supplies

The Pluribus Networks Freedom Series uses rear-facing power supplies. The chassis supports configurations with up to two power supplies. The Pluribus Networks Freedom Series switch is fully functional with a single operational power supply, but you can install a second power supply for power redundancy (in high availability configuration).

Table 1-1 lists the power supplies that you can order with the Pluribus Networks Freedom Series.

Table 1: Power Supplies for the Pluribus Networks Freedom Series

Power Source	Description	Power Supply Part Number
AC	Power Supply Unit (AC 105-240V 50/60Hz)	E68-PSU
AC (RAF) Reverse Air Flow	Power Supply Unit (AC 105-240V 50/60Hz) RAF	E68-PSUR

Figure 3: Power Supply for the F64 Server-Switch

Caution! Never leave a power supply slot empty. If you remove a power supply, replace it with another one. If you don't have a replacement power supply, leave the nonfunctional one in place until you receive a new one or replace it with a filler blank module.

Fan Modules

The Pluribus Networks Freedom Series switch has four fan modules. The switch can function normally with one fan module inoperable. Fan modules are hot swappable.

The red failure (FAIL) LED indicates fan module health. Green indicates normal operation, while amber indicates a fan failure. Fore more information about LEDs, see Appendix D — LED Descriptions on page 43.

Table 2: Fan Modules for the Pluribus Networks Freedom Series

Description	Power Supply Part Number
E68 Fan Module	E68-FAN
E68 Fan Module, RAF	E68-FANR

Transceivers

The Pluribus Networks Freedom Series switch supports both SFP and SFP+QSFP+ Ethernet transceivers in its 44 fixed 40-Gigabit Ethernet ports. The switch supports QSFP+ Ethernet transceivers in its 6 fixed 40-Gigabit Ethernet ports.

This section includes the following topics:

- SFP Transceivers
- SFP+ Transceivers
- SFP+ Copper Cables
- QSFP+ Transceivers
- QSFP+ Copper Cables

SFP Transceivers

The SFP 1-Gigabit Ethernet transceiver module is a bidirectional device with a transmitter and a receiver in the same physical package. It has a 20-pin connector on the electrical interface and either a RJ45 or a duplex LC connector on the optical interface. The Pluribus Networks Freedom Series supports the following SFP transceivers:

Model	Description
SFP-T	1-Gigabit Ethernet 1000BASE-T SFP transceiver (Cat5)
SFP-SGMII-T	100/1000BASE-T, Transceiver
SFP-SX	1-Gigabit Ethernet 1000BASE-SX SFP transceiver (multimode fiber [MMF])
SFP-LX	1-Gigabit Ethernet 1000BASE-LX SFP transceiver (single-mode fiber [SMF])

SFP+ Transceivers

The enhanced SFP+ 10-Gigabit Ethernet transceiver module is a bidirectional device with a transmitter and a receiver in the same physical package. It has a 20-pin connector on the electrical interface and duplex LC connector on the optical interface. The Pluribus Networks Freedom Series supports the following SFP+ transceivers:

Table 3: Supported SFP+ Transceivers

Model	Description
SFP10-SR	10-Gigabit Ethernet short range SFP+ transceiver for up to 300m
SFP10-LR	10-Gigabit Ethernet short range SFP+ transceiver for up to 300m
SFP10-ER	10-Gigabit Ethernet, 1550nm Wavelength, 40 Kilometer, Transceiver

SFP+ Copper Cables

Copper cables are available for use with the 10-Gigabit Ethernet SFP+ ports. The cables come in the following lengths:

- 1 meter, 30 AWG
- 2 meters, 28 – 30 AWG
- 3 meters, 26 – 28 AWGs

Informational Note: For the latest list of supported transceivers, contact your local reseller or partner. Or you may contact support@pluribusnetworks.com.

Table 4: Supported SFP+ Copper Cables

Model	Description
SFP10-CU05M	10-Gigabit Ethernet, Passive Copper Direct Attach, 0.5 Meter, Cable
SFP10-CU1M	10-Gigabit Ethernet twinax SFP+ copper cable (1 meter)
SFP10-CU2M	10-Gigabit Ethernet twinax SFP+ copper cable (2 meters)
SFP10-CU3M	10-Gigabit Ethernet twinax SFP+ copper cable (2 meters)

QSFP+ Transceivers

The enhanced QSFP+ 40-Gigabit Ethernet transceiver module is a bidirectional device with a transmitter and a receiver in the same physical package. It has a 38-pin connector on the electrical interface and duplex LC connector on the optical interface. The Pluribus Networks Freedom Series supports the following QSFP+ transceivers:

Table 5: Supported QSFP+ Transceivers

Model	Description
QSFP40-SR4	40-Gigabit Ethernet short range SR4 QSFP+ transceiver for up to 300m (multimode fiber [MMF])
QSFP40-LR4	40-Gigabit Ethernet, LR4, 10 Kilometer, Transceiver
QSFP40-UNIVLM4	40-Gigabit Ethernet, LM4, Universal, 140m on OM3, 160m on OM4, and 1km on SMF, Transceiver
QSFP40-BIDI	40-Gigabit Ethernet, Bi-Directional, Duplex LC, Transceiver

QSFP+ Copper Cables

Copper cables are available for use with the 40-Gigabit Ethernet QSFP+ ports either as twinax copper ribbons (CR4) or as “octopus” cables with termination to four individual 10-Gigabit Ethernet QSFP+ ports. The cables come in the following lengths:

- 1 meter, 30 AWG
- 2 meters, 28 – 30 AWG
- 3 meters, 26 – 28 AWG

Table 6: Supported QSFP+ Copper Cables

Model	Description
QSFP10-CU1M	40-Gigabit Ethernet QSFP+ to 4 10-Gigabit Ethernet SFP+ twinax copper cable (1 meter)
QSFP10-CU2M	40-Gigabit Ethernet QSFP+ to 4 10-Gigabit Ethernet SFP+ twinax copper cable (2 meters)
QSFP10-CU3M	40-Gigabit Ethernet QSFP+ to 4 10-Gigabit Ethernet SFP+ twinax copper cable (3 meters)
QSFP40-CU1M	40-Gigabit Ethernet twinax CR4 QSFP+ copper cable (1 meter)
QSFP40-CU2M	40-Gigabit Ethernet twinax CR4 QSFP+ copper cable (2 meters)
QSFP40-CU3M	40-Gigabit Ethernet twinax CR4 QSFP+ copper cable (3 meters)
QSFP40-CU5M	40-Gigabit Ethernet Passive Copper Direct Attach, 5 Meter, Cable

Chapter 1 - Installing the Server-Switches

This chapter describes how to install the Pluribus Networks Freedom Series switchesThis chapter includes the following sections:

- Preparing for Installation
- Grounding the Switch
- Powering On the Server-Switch

Warning: **IMPORTANT SAFETY INSTRUCTIONS**
This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents.

SAVE THESE INSTRUCTIONS

*Warning:*This unit contains multiple power supplies.
To reduce the risk of electrical shock, disconnect all power supplies before servicing the unit.

*Warning:*This unit contains a replaceable battery.
CAUTION: Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions.

Warning: This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.

*Warning:*Only trained and qualified personnel must be allowed to install, replace, or service this equipment.

Informational Note: The rail installation kit for the Freedom E68 Series switch is optional. Instructions, PN15-006, for installing the rails are included in the package.

Preparing for Installation

This section describes how to prepare the Pluribus Networks F64, E68-M, and E28Q-L switches for installation. This section includes the following topics:

- Installation Options with Racks and Cabinets
- Airflow DirectionInstallation Guidelines
- Unpacking and Inspecting the Server-Switch

Installation Options with Racks and Cabinets

The Pluribus Networks Freedom Series switches can be installed in the following types of racks using a rail-kit shipped with the switch:

- Open EIA rack
- Perforated EIA cabinet

The rack or cabinet that you use must meet the requirements listed in Appendix A – Cabinet and Rack Specifications on page 43.

The rail-kit enables you to install the switch into racks of varying depths. You can use the rail-kit parts to position the switch with easy access to either the port connections end of the chassis or the end of the chassis with the fan modules. For instructions on how to use the rail-kit, see the **Rack Mounting Instructions**, PN15-002, available separately.

Airflow Direction

Airflow enters the chassis through the bezel and fan modules and exits through the port connections at the end of the chassis. You must install the Pluribus Networks Freedom Series switches with the bezel and fan modules in a cold aisle location.

Mechanical Loading

Warning: Mounting of the switch chassis in the rack should be such that a hazardous condition is not created due to uneven mechanical loading.

With the help of another person, follow these guidelines:

- Disconnect all power and external cables before lifting the switch.
- Ensure that your footing is solid and the weight of the switch is evenly distributed between your feet.
- Lift the switch slowly, keeping your back straight. Lift with your legs, not with your back. Bend at the knees, not at the waist.

Installation Guidelines

When installing the Pluribus Networks Freedom Series switches, follow these guidelines:

- Record the information listed in Appendix G – Site Planning and Maintenance Records on page 63 as you install and configure the switch.
- Ensure that there is adequate space around the switch to allow for servicing the switch and for adequate airflow. Appendix B – Technical Specifications on page 45 lists the service and airflow requirements.

- Ensure that the air conditioning meets the heat dissipation requirements list in Appendix B – Technical Specifications on page 45.
- Ensure that the switch is going to be positioned so that it takes air from a cold aisle and exhausts air to a hot aisle. The end of the chassis with the bezel and fan modules must be positioned in a cold aisle.
- Ensure that the cabinet or rack meets the requirements listed in Appendix A – Cabinet and Rack Specifications on page 43
- Ensure that the chassis can be adequately grounded. If the switch is not mounted in a grounded rack, it is recommended to connect both the system ground on the chassis and the power supply ground directly to an earth ground.
- Ensure that the site power meets the power requirements listed in Appendix B – Technical Specifications on page 45. If available, you can use an uninterruptable power supply (UPS) to protect against power failures.

Caution! Avoid UPS types that use ferroresonant technology. These UPS types can become unstable with systems such as the Pluribus Networks Freedom Series switches, which can have substantial current draw fluctuations because of dynamic data traffic patterns.

- Ensure that circuits are sized according to local and national codes. For North America, the power supply requires a 15 Amp or 20 Amp circuit.

Caution! To prevent loss of input power, ensure the total maximum loads on the circuits supplying power to the switch are within the current ratings for the wiring and breakers.

- Use the following screw torques when installing the switch:
  - M4 screws: 12 in-lb (1.36 N·m)
  - M5 screws: 20 in-lb (2.26 N·m)

Grounding the Switch

This section describes the need for system grounding for all of the Pluribus Networks Freedom Series switches and explains how to prevent damage from electrostatic discharge.

This section includes the following topics:

- Proper Grounding Practices
- Establishing the System Ground
- Required Tools and Equipment
- Grounding the Pluribus Networks Freedom Series Chassis
- Preventing Electrostatic Discharge Damage

Proper Grounding Practices

Grounding is one of the most important parts of equipment installation. Proper grounding practices ensure that the buildings and the installed equipment within them have low-impedance connections and low-voltage differentials between chassis. When you properly ground systems during installation, you reduce or prevent shock hazards, equipment damage due to transients, and data corruption. Table 2-2 lists some general grounding practice guidelines.

Table 1: Proper Grounding Guidelines

Environment	Electromagnetic Noise Severity Level	Grounding Recommendations
Commercial building is subjected to direct lightning strikes. For example, some places in the United States, such as Florida, are subject to more lightning strikes than other areas.	High	All lightning protection devices must be installed in strict accordance with manufacturer recommendations. Conductors carrying lightning current should be spaced away from power and data lines in accordance with applicable recommendations and codes. Best grounding recommendations must be closely followed.
Commercial building is located in an area where lightning storms frequently occur but is not subject to direct lightning strikes.	High	Best grounding recommendations must be closely followed.
Commercial building contains a mix of information technology equipment and industrial equipment, such as welding.	Medium to High	Best grounding recommendations must be closely followed.
Existing commercial building is not subject to natural environmental noise or man-made industrial noise. This building contains a standard office environment. This installation has a history of malfunctions due to electromagnetic noise.	Medium	Determine source and cause of noise if possible, and mitigate as closely as possible at the noise source or reduce coupling from the noise source to the affected equipment. Best grounding recommendations must be closely followed.
New commercial building is not subject to natural environmental noise or man-made industrial noise. This building contains a standard office environment.	Low	Electromagnetic noise problems are not anticipated, but installing a grounding system in a new building is often the least expensive route and the best way to plan for the future. Best grounding recommendations should be followed as much as possible.

Table 1: Proper Grounding Guidelines

Environment	Electromagnetic Noise Severity Level	Grounding Recommendations
Existing commercial building is not subject to natural environmental noise or man-made industrial noise. This building contains a standard office environment.	Low	Electromagnetic noise problems are not anticipated, but installing a grounding system is always recommended. Best grounding recommendations should be followed as much as possible.

Informational Note: In all situations, grounding practices must comply with local National Electric Code (NEC) requirements or local laws and regulations.

Informational Note: Always ensure that all of the power supplies and fan modules are completely installed. In addition, ensure that all I/O cables and power cords are properly seated. These practices are normal installation practices and must be followed in all installations.

Establishing the System Ground

This section describes how to connect a system ground to the Pluribus Networks Freedom Series switch.

You must use the system ground if you are installing this equipment in a North American or European Central Office (CO).

The system ground provides additional grounding for EMI shielding requirements and grounding for the low-voltage supplies (DC-DC converters) inside the chassis and is intended to satisfy the Telcordia Technologies requirements for supplemental bonding and grounding connections. You must observe the following system grounding guidelines for your chassis:

- You must install the system ground connections with any other rack or system power ground connections that you make. The system ground connection is required if this equipment is installed in a North American or European CO.
- You must connect both the system ground connection and the power supply ground connection to an earth ground. The system ground connection is required if this equipment is installed in a North American or European CO.
- You do not need to power down the chassis.

Required Tools and Equipment

To connect the system ground, you need the following tools and materials:

- Grounding lug: a two-hole (F64), one-hole (E68 and E28) standard barrel lug supporting up to 6 AWG wire. This lug is supplied in the accessory kit.
- Grounding screws: two #10-32 pan-head screws (F64) or one M3x6mm (E68 and E28) pan-head screw. These screws are supplied in the accessory kit.

- Grounding wire: not supplied in the accessory kit. The grounding wire should be sized according to local and national installation requirements. Depending on the power supply and system, a 12 AWG to 6 AWG copper conductor is required for North American installations. Commercially available 6 AWG wire is recommended. The length of the grounding wire depends on the proximity of the switch to proper grounding facilities.
- Phillips #1 screwdriver.
- Crimping tool to crimp the grounding wire to the grounding lug.
- Wire-stripping tool to remove the insulation from the grounding wire.

Grounding the Pluribus Networks Freedom Series Chassis

- The chassis has a grounding pad with two threaded #10-32 holes (F64) or one 3Mx6mm hole (E68 and E28) for attaching a grounding lug. The system ground is located on the right side of the chassis (bottom right of the rear) on the Pluribus Networks Freedom Series switches.

Warning: When installing or replacing the unit, the ground connection must always be made first and disconnected last.

Caution! It is recommended to ground the chassis, even if the rack is already grounded.

Caution! All power supplies must be grounded. The receptacles of the AC power cables used to provide power to the chassis must be the grounding type, and the grounding conductors should connect to protective earth ground at the service equipment.

Warning: When installing or replacing the unit, the ground connection must always be made first and disconnected last.

Attaching the Ground and Cabling the Chassis

1. Use a wire-stripping tool to remove approximately 0.75 inches (2 cm) of the insulation from the end of the grounding cable.
2. Insert the stripped end of the grounding cable into the open end of the grounding lug.
3. Use the crimping tool to secure the grounding cable in the grounding lug.
4. Remove the adhesive label from the grounding pad on the chassis.

5. Place the grounding lug against the grounding pad so that there is solid metal-to-metal contact, and insert the two #10-32 screws with washers (F64) or one M3x6mm screw with washers (E68 and E28) through the hole(s) in the grounding lug and into the grounding pad (see Figure 2-1).
6. Ensure that the lug and cable do not interfere with other equipment.
7. Prepare the other end of the grounding cable and connect it to an appropriate grounding point in your site to ensure adequate earth ground.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) damage, which can occur when modules and other field-replaceable units (FRUs) are improperly handled, results in intermittent or complete failures. Modules consist of printed circuit boards that are fixed in metal carriers. Electromagnetic interference (EMI) shielding and connectors are integral components of the carrier. Although the metal carrier helps to protect the board from ESD, always use an ESD grounding strap when handling modules.

To prevent ESD damage, follow these guidelines:

- Always use an ESD wrist strap and ensure that it makes maximum contact with bare skin.
- All Pluribus Networks Freedom Series chassis are equipped with a banana plug connector (rear-mounted by the power toggle switch). We recommend that you use a personal ESD grounding strap equipped with a banana plug or an alligator clip or peel-off adhesive strip. A disposable ESD strap is included in the accessory kit of your Pluribus Networks F64Freedom Series switch.
- You must attach the system ground lug to the chassis in order to provide a proper grounding point for the ESD wrist strap.

Informational Note: This system ground is also referred to as the Network Equipment Building System (NEBS) ground.

- If your chassis is not grounded by its connection to a grounded rack, you must connect the switch to an earth ground. See the Grounding the Switch section above for installation instructions and the location of the chassis system ground pads.

Informational Note: You do not need to attach a supplemental system ground wire to the system ground lug. The lug provides a direct path to the bare metal of the chassis.

Attaching an ESD Wrist Strap with Banana Plug or Alligator Clip

1. Place the black conductive loop over your wrist and tighten the strap so that it makes good contact with your bare skin.
2. Grasp the banana plug or alligator clip on the ESD wrist strap and briefly touch it to a bare metal spot (unpainted surface) on a grounded rack. We recommend that you touch the banana plug or alligator clip to an unpainted rack rail so that any built-up static charge is safely dissipated to the entire rack.
3. Attach either the banana plug or the alligator clip on the ESD wrist strap to an earth ground:

a. If you can access the rear of the chassis, we recommend that you use the banana plug.) Insert the banana plug of the ESD wrist strap into the banana plug connector that is rear-mounted by the power toggle switch of your Pluribus Networks Freedom Series switch.
b. If you are using an ESD wrist strap that is equipped with an alligator clip, attach the alligator clip directly over the head of the system ground lug screws or to the system ground lug barrel.

Using the Disposable ESD Strap (E68)

Included with the E68 Accessory Kit is a disposable ESD strap. To use the strap, follow these instructions:

1. Unwrap 12” (30 cm) of the band end and wrap adhesive side around your wrist.
2. Unroll the rest of the strap and remove the liner from the copper tape.
3. Attach the copper tape to the electrical ground or the metal frame of the E68 switch.

Caution! For safety, periodically check the resistance value of the antistatic strap. The measurement should be between 1 and 10 Megaohm (Mohm).

Powering On the Server-Switch

This section provides instructions for powering up the Pluribus Networks Freedom Series switch and verifying the component installation:

Informational Note: Do not connect the Ethernet port to the LAN until the initial switch configuration has been performed. For instructions on configuring the switch, see the *Pluribus Networks nvOS Quick Start Guide*.

Warning: When installing or replacing the unit, the ground connection must always be made first and disconnected last.

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1. Verify that empty power supply slots have blank panels installed.
2. Verify that a power supply and fan modules are installed.

Informational Note: Depending on the outlet receptacle on your power distribution unit, you may need the optional jumper power cord to connect the switch to your outlet receptacle.

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3. Ensure that the switch is adequately grounded as described in the Grounding the Switch section.
4. Connect the power supply to an AC power source as follows:
   a. Verify that the AC power source is turned off at the circuit breaker.
   b. Plug the power cable into the power receptacle on the power supply.

c. Attach the other end of the power cable to the AC power source.
d. Turn on the power at the circuit breaker.
e. Verify that the power supply is functioning by making sure that the OK LED turns green and the FAULT LED is off.

6. Toggle the power switch (marked PWR) located on the rear of the chassis to the “I” on-position.
7. On initial power-on, all LEDs flash three times to verify operation. Listen for the fans, which begin operating.
8. While the switch boots, verify that the LED operation is as follows:
   - **PWR** – Power LED is blinking green.
   - **STAT** – Status LED is blinking green.
   - **ATTN** – Attention LED is on during the initial self-test and then turns off while the switch firmware boots.
   - **FAIL** – Failure LED is off.
9. After the switch boots, verify that the LED operation is as follows:
   - **PWR** – Power LED is green.
   - **STAT** – Status LED is green.
   - **ATTN** – Attention LED is off.
   - **FAIL** – Failure LED is off.

   If after the switch boots the system attention (ATTN) LED is amber, one or more chassis environmental or diagnostic monitors are reporting a problem.
10. If a power supply or fan module is not operating correctly, try removing it and reinstalling it. See Chapter 3 - Replacing Components on page 39. If it still does not operate correctly, contact the partner from which you purchased the product for a replacement.
11. Complete the worksheets provided in Appendix G – Site Planning and Maintenance Records on page 63s for future reference.

Informational Note: A setup utility automatically launches the first time you access the switch and guides you through the basic configuration. For instructions on how to configure the switch and check connectivity, see the *Pluribus Networks nvOS® Quick Start Guide*.

Rebooting the Server-Switch

This section provides instructions for rebooting the Pluribus Networks Freedom Series switch:

1. Depress and hold down the power button on the front panel (marked PWR and illuminated in green). The ATTN and STAT LEDs now start blinking as the power button is depressed.
2. When the power button has been held depressed for three seconds, watch for the power button (PWR) to also start blinking.

You should now release the power button to engage the reboot sequence.

Informational Note: If you hold the power button depressed for less than three seconds, no action is taken.

---

3. While the switch reboots, verify that the LED operation is as follows:

- **PWR** – Power LED is blinking green.
- **STAT** – Status LED is blinking green.
- **ATTN** – Attention LED is on during the initial self-test and then turns off while the switch firmware boots.
- **FAIL** – Failure LED is off.

4. After the switch reboots, verify that the LED operation is as follows:
   - **PWR** – Power LED is green.
   - **STAT** – Status LED is green.
   - **ATTN** – Attention LED is off.
   - **FAIL** – Failure LED is off.

If after the switch boots the system, the Attention (ATTN) LED is amber, one or more chassis environmental or diagnostic monitors are reporting a problem.

Informational Note: If you hold the power button depressed for longer than five seconds, your switch will engage the shutdown sequence instead.

Shutting Down the Server-Switch

This section provides instructions for shutting down the Pluribus Networks Freedom Series switch:

1. Press and hold down the power button on the front panel (marked PWR and illuminated in green). Notice that the ATTN and STAT LEDs now start blinking as the power button is being held depressed.
2. When the power button is pressed for three seconds, the Power button (PWR) also begins blinking.

   Keep holding the power button depressed.

   When the power button is pressed for five seconds, the ATTN LED stops blinking and turns solid amber. You can now release the Power button.

Informational Note: If you hold the power button depressed for less than three seconds, no action is taken.

If you hold the power button depressed for longer than three seconds but release it before five seconds, the reboot sequence starts instead.

3. While the switch shuts down, verify that the LED operation is as follows:
   - **PWR** – Power LED is blinking green.
   - **STAT** – Status LED is blinking green.
   - **ATTN** – Attention LED is solid amber.
   - **FAIL** – Failure LED is off.
4. After the switch has shut down, verify that the LED operation is as follows:
   - **PWR** – Power LED is off.
   - **STAT** – Status LED is off.
   - **ATTN** – Attention LED is solid amber.

- **FAIL** – Failure LED is off.

Toggle the power switch (marked PWR) located on the rear of the chassis to the “0” off-position.

Chapter 2 — Connecting to the Network

This chapter describes how to connect the following ports on a Pluribus Networks Freedom Series switch:

- Console port — a direct local management connection used to initially configure the switch.
- Management ports — an online management connection to manage the switch.
- Uplink and downlink ports — connections to hosts and servers from the switch.

Caution! When running power and data cables in overhead or subfloor cable trays, we strongly recommend that you locate power cables and other potential noise sources as far away as practical from network cabling. In situations where long parallel cable runs cannot by separated by at least 3.3 feet (1 meter), we recommend that you shield any potential noise sources by housing them in a grounded metallic conduit.

This chapter includes the following sections:

- Preparing for Network Connections
- Connecting to the Console Port
- Connecting to the Management Port
- Connecting to a Server
- Maintaining QSFP and QSFP+ Transceivers and Fiber Optic Cables

Preparing for Network Connections

When preparing your site for network connections to the Pluribus Networks Freedom Series switch, consider the following for each type of interface, and gather all the required equipment before connecting the ports:

- Cabling required for each interface type
- Distance limitations for each signal type
- Additional interface equipment required

Connecting to the Console Port

The console port is an RS-232 port with an RJ-45 interface and is an asynchronous serial port. This means that any device connected to this port must be capable of asynchronous transmission.

It is recommended using this port to create a local management connection to set the IP address and other initial configuration settings before connecting the switch to the network for the first time.

Figure 1 shows the location of the console port on the Pluribus Networks Freedom Series switch.

Figure 1:The Console Port on a Pluribus Networks Freedom Series Server-Switch

You can use the console port to perform the following tasks:

- Configure the Pluribus Networks Freedom Series switch from the CLI.
- Monitor network statistics and errors.
- Configure SNMP agent parameters.
- Download software updates.

Informational Note: To connect the console port to a computer terminal, the computer must support VT100 terminal emulation. The terminal emulation software (such as minicom) enables communication between the Pluribus Networks Freedom Series switch and a computer during setup and configuration.

To connect the console port to a computer, use the following steps:

1. Configure the terminal emulator program to match the following default port characteristics:
    - 9600 baud
    - 8 data bits
    - 1 stop bit
    - no parity

2. Connect the RJ-45 connector of the console cable to the console port and the DB-9 connector to the computer serial port.
3. To continue the configuration, refer to the *Pluribus Networks nvOS® Quick Start Guide*.

Connecting to the Management Port

Caution! To prevent an IP address conflict, do not connect the management port to the network until the initial configuration is complete. For configuration instructions, refer to the *Pluribus Networks nvOS® Quick Start Guide*.

Connecting to a Server

For the Pluribus Networks Freedom Series switch, you must use QSFP transceivers on copper or optical cables or QSFP+ transceivers on copper or optical cables to make the 10-Gigabit Ethernet downlink connections to servers.

This section includes the following topics:

- Installing and Replacing QSFP or QSFP+ Transceivers

Installing and Replacing QSFP or QSFP+ Transceivers

Caution! Excessively removing and installing an QSFP or QSFP+ transceiver can shorten its lifespan. Unless it is necessary, do not remove and insert QSFP or QSFP+ transceivers. To prevent damage to an optical cable and transceiver, we recommend that you disconnect cables before installing or removing transceivers.

To install a QSFP or QSFP+ transceiver, use the following steps:

1. Attach an ESD-preventive wrist strap and follow its instructions for use.
2. Remove the dust cover from the port cage.
3. Remove the dust cover from the port end of the transceiver.
4. Insert the transceiver into the port as follows:
    - If the transceiver has a Mylar tab latch, position the transceiver with the tab on the bottom, and then gently insert the transceiver into the port until it clicks into place.
    - If the transceiver has a bale clasp latch, position the transceiver with the clasp on the bottom, close the clasp by pushing it up over the transceiver, and then gently insert the transceiver into the port until it clicks into place.

Caution! If the transceiver does not install easily, be sure that it is correctly positioned and the tab or clasp are in the correct position before continuing with the task.

Informational Note: If you cannot install the cable into the transceiver, insert or leave the dust plug in the cable end of the transceiver.

Replacing a QSFP or QSFP+ Transceiver

To replace a QSFP or QSFP+ transceiver, use the following steps:

1. Attach an ESD-preventive wrist strap and follow its instructions for use.
2. If a cable is installed in the transceiver, do the following:
   - Record the cable and port connections for later reference.
   - Press the release latch on the cable, grasp the connector near the connection point, and gently pull the connector from the transceiver.
   - Insert a dust plug into the cable end of the transceiver.
3. Remove the transceiver from the port as follows:
   - If the transceiver has a Mylar tab latch, gently pull the tab straight out (do not twist), and then pull the transceiver out of the port.
   - If the transceiver has a bale clasp latch, open the clasp by pressing it downward, and then pull the transceiver out of the port.

Informational Note: If you have difficulty removing a bale clasp QSFP or QSFP+ transceiver, you should reseat it by returning the bale clasp latch to the up position. Press the QSFP or QSFP+ transceiver inward and upward into the cage. Next, lower the bale clasp latch and pull the QSFP or QSFP+ transceiver straight out with a slight upward lifting force. Be careful not to damage the port cage during this process.

4. Insert a dust cover into the port end of the transceiver and place the transceiver on an anti-static mat or into a static shielding bag if you plan to return it to the factory.
5. Install a replacement transceiver. If you are not installing another transceiver, protect the optical cage by inserting a clean cover.

Installing or Replacing Optical Cables into QSFP or QSFP+ Transceivers

Caution! To prevent possible damage to the cable or transceiver, install the transceiver in the port before installing the cable in the transceiver.

To install an optical cable into a transceiver, follow these steps:

1. Attach an ESD-preventive wrist strap and follow its instructions for use.
2. Remove the dust cover from the connector on the cable.
3. Remove the dust cover from the cable end of the transceiver.
4. Align the cable connector with the transceiver and insert the connector into the transceiver until it clicks into place.

Caution!If the cable does not install easily, ensure that it is correctly positioned before continuing with the installation.

Informational Note: If you cannot install the cable into the transceiver, insert or leave the dust plug in the cable end of the transceiver.

Replacing an Optical Cable for a QSFP or QSFP+ Transceiver

Caution!When pulling an optical cable from a transceiver, grip the body of the connector. Do not pull on the jacket sleeve, because this action can compromise the fiber-optic termination in the connector.
Caution!If the cable does not remove easily, ensure that any latch present on the cable has been released before continuing.

To remove an optical cable from a transceiver, follow these steps:

1. Attach an ESD-preventive wrist strap and follow its instructions for use.
2. Press the release latch on the cable, grasp the connector near the connection point, and gently pull the connector from the transceiver.
3. Either install a replacement cable in the QSFP or QSFP+ transceiver (see the Installing or Replacing Optical Cables into QSFP or QSFP+ Transceivers section above) or insert dust plugs into the cable end of the transceiver and the end of the disconnected cable.

Maintaining QSFP and QSFP+ Transceivers and Fiber Optic Cables

QSFP+, and QSFP transceivers and fiber-optic cables must be kept clean and dust-free to maintain high signal quality and prevent damage to the connectors. Attenuation (loss of light) is increased by contamination and should be below 0.35 dB.

Consider the following maintenance guidelines:

- Optical transceivers are static sensitive. To prevent ESD damage, wear an ESD-preventive wrist strap that is connected to the chassis.
- Do not insert and remove a transceiver more often than is necessary. Repeated insertions and removals can shorten its useful life.
- Keep all optical connections covered when not in use. If they become dusty, clean before using to prevent dust from scratching the fiber-optic cable ends.
- Do not touch ends of connectors to prevent fingerprints and other contamination.
- Clean regularly. The required frequency of cleaning depends upon the environment. In addition, clean connectors if they are exposed to dust or accidentally touched. Both wet and dry cleaning techniques can be effective.
- Inspect routinely for dust and damage. If damage is suspected, clean and then inspect fiber ends under a microscope to determine if damage has occurred.

Chapter 4 - Replacing Components

This chapter describes how to replace the field replaceable units (FRUs) onPluribus Networks Freedom Series switch.

This chapter includes the following sections:

- Replacing a Power Supply
- Replacing a Fan Module

Warning: This unit contains multiple power supplies. To reduce the risk of electrical shock, disconnect all power supplies before servicing the unit.

Warning: This unit contains a replaceable battery. Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions

Replacing a Power Supply

Pluribus Networks Freedom Series switches support up to two back-end power supplies that you can replace. The switch requires only one power supply for operations, so you can hot swap the redundant power supplies during operations.

Caution: If you are using the Pluribus Networks Freedom Series switch with one power supply, removing the power supply causes the switch to shut down. If the power supply is functioning, you can install a new power supply in the second power supply slot before removing the original power supply.

To remove an AC power supply, follow these steps:

1. Pull the power cord out from the power receptacle on the power supply.
2. Release the power supply from the chassis by pushing and holding the thumb latch to the left and pull the power supply part way out of the chassis (see Figure 4-1).
3. Place your other hand under the power supply to support it while you slide it out of the chassis.
4. If the power supply bay is to remain empty, install a blank power supply filler panel.

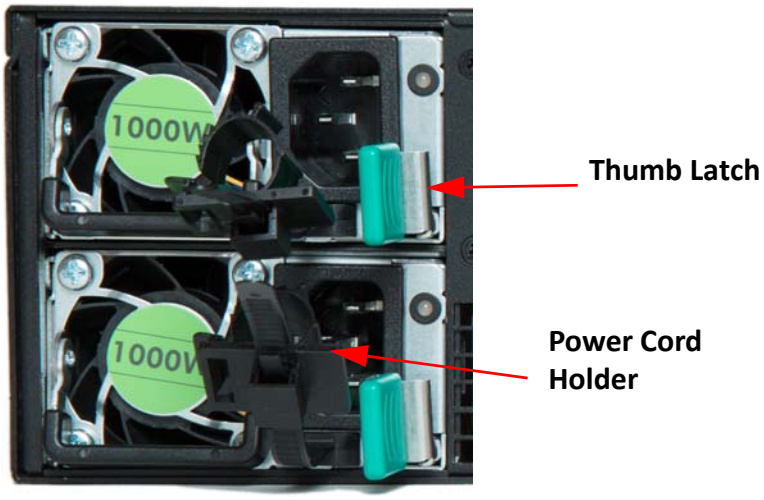

Figure 1:AC Power Supply on a Pluribus Networks Freedom Series Server-Switch

Installing an AC Power Supply

To install an AC power supply, use the following steps:

1. Ensure that the system (earth) ground connection has been made for the chassis. For ground connection instructions, see the Grounding the Switch<TextRegular> on page 7.
2. If the power supply bay has a filler panel, remove it from the slot by pushing the thumb latch to the left and pull the panel out of the chassis.
3. Hold the replacement power supply by the handle and position it so that the captive screw is on the left, and then slide it into the power supply bay, ensuring that the power supply is fully seated in the bay.
4. Secure the power supply to the chassis by making sure that the thumb latch engages with the chassis so that the power supply is held in the slot.

Informational Note: Depending on the outlet receptacle on your power distribution unit, you may need the optional jumper power cord to connect the Pluribus Networks Freedom Series switch to your outlet receptacle.

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5. Connect the other end of the power cable to an AC power source.

Caution: In a system with dual power supplies, connect each power supply to a separate power source. If a power failure occurs, the second source may still be available.

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6. Verify that the power supply is operational by checking that the power supply LED is green.

Replacing a Fan Module

The four fan modules are designed to be removed and replaced while the Pluribus Networks Freedom Series switch is operating without presenting an electrical hazard or damage to the system, if the replacement of one module at a time is performed promptly.

This section includes the following topics:

- Removing a Fan Module
- Installing a Fan Module

Removing a Fan Module

Warning: When removing a fan module, keep your hands and fingers away from the spinning fan blades.

To remove a fan module, use the following steps:

1. Loosen the captive screws on the fan module by turning them counterclockwise, using your fingers or Phillips #2 screwdriver if required.
2. Grasp the handle of the fan module and pull it outward.
3. Pull the fan module clear of the chassis.

Installing a Fan Module

To install a fan module, use the following steps:

1. Hold the fan module with the handle extending towards you.
2. Place the fan module into the front chassis fan slot so it rests on the chassis, and then push the fan module into the chassis as far as it can go until the handle bracket makes contact with the chassis in the bottom corners. Tighten the captive screws using your fingers.
3. If the switch is powered on, listen for the installed fan to spin up. You should immediately hear it operating. If you do not hear it, ensure that the fan module is inserted completely in the chassis and that it is flush with the other fan modules in the chassis.
4. Verify that the status LED (STAT) is green. If the LED is not green, one or more fans are faulty. If this situation occurs, contact the partner from which you purchased the product for the following replacement part: Pluribus Networks Freedom Series fan module.

Appendix A – Cabinet and Rack Specifications

This appendix provides the requirements for cabinet and rack installations and includes the following sections:

- Cabinet and Rack Requirements
- Cable Management Guidelines

Cabinet and Rack Requirements

This section provides the requirements for the following types of cabinets and racks, assuming an external ambient air temperature range of 0 to 104F (0 to 40°C):

- Standard perforated cabinets
- Solid-walled cabinets with a roof fan tray (bottom to top cooling)
- Standard open racks

Informational Note: If you are selecting an enclosed cabinet, a thermally validated type is recommended, either standard perforated or solid-walled with a fan tray.

Informational Note: Do not use racks that have obstructions (such as power strips), because the obstructions could impair access to field-replaceable units (FRUs).

General Requirements for Cabinets and Racks

The cabinet or rack must conform to the following type:

- Standard 19-inch (48.3 cm) (four-post EIA cabinet or rack, with mounting rails that conform to English universal hole spacing per section 1 of ANSI/EIA-310-D-1992).

The cabinet or rack must also meet the following requirements:

- The minimum vertical rack space per chassis must be two rack units (RU), equal to 3.47 inches (8.8 cm). For the F68, a single RU is required.
- The width between the rack-mounting rails must be at least 17.75 inches (45.0 cm).

Four-post EIA cabinets (perforated or solid-walled) must meet the following requirements:

- The distance between the front mounting post and the rear mounting post should be 23.0 to 30.0 inches (58.4 to 76.2 cm) to allow for rail kit installation.
- A minimum of 2.5 inches (6.4 cm) of clearance should exist between the side edge of the chassis and the sidewall of the cabinet. No major flow obstructions should be immediately in the way of chassis air intake or exhaust vents

Requirements Specific to Perforated Cabinets

A perforated cabinet has perforations in its front and rear doors and sidewalls. In addition to the requirements listed in the General Requirements for Cabinets and Racks section above, perforated cabinets must meet the following requirements:

- The front and rear doors must have at least a 60 percent open area perforation pattern, with at least 15 square inches (96.8 cm2) of open area per rack unit of door height.
- The roof should be perforated with at least a 20 percent open area.
- The cabinet floor should be open or perforated to enhance cooling.

Requirements Specific to Standard Open Racks

In addition to the requirements listed in the General Requirements for Cabinets and Racks section above, if you are mounting the chassis in an open rack (no side panels or doors), ensure that the rack meets the following requirements:

- The minimum vertical rack space per chassis must be two rack units (RU), equal to 3.47 inches (8.8 cm).
- The horizontal distance between the chassis and any adjacent chassis should be 6 inches (15.2 cm), and the distance between the chassis air vents and any walls should be 2.5 inches (6.4 cm).

Cable Management Guidelines

To help with cable management, you may want to allow additional space in the rack behind the chassis to make it easier to route all of the fiber optic or copper cables through the rack.

Appendix B – Technical Specifications

This appendix describes the technical specifications for the Pluribus Networks Freedom Series switches.

This appendix includes the following sections:

- Switch Specifications
- Environmental Specifications
- Power Specifications

Switch Specifications

Table 18 lists the physical specifications for the Pluribus Networks Freedom Series.

Table 1: Physical Specifications for the Pluribus Networks Freedom Series

Server-Switch	Height	Width	Depth	Weight
F64-Series	3.47 in (8.8 cm)	17.3 in (43.9 cm)	29.2 in (74.2 cm)	55 lb (25 kg)[1]
E68-M	1.7 in (4.4 cm)	17 in (43.2 cm)	29.43 in (74.74 cm)	30 lb (19 kg)
E28Q-L	3.46 in (8.8 cm)	16.93 in (43 cm)	22 in(55.9 cm)	55 lb (25 kg)

[1] Fully configured weight – includes two power supplies and four fan modules.

Environmental Specifications

Table 19 lists the environmental specifications for the Pluribus Networks Freedom Series.

Table 2: Environmental Specifications for the Pluribus Networks Freedom Series

Attribute	Specification
Temperature	
• Operating	32 to 104°F (0 to 40°C)
Humidity	
• Operating	10 to 85% (non condensing)
• Non operating (storage)	5 to 95% (non condensing)
Altitude	
• Operating	0 to 10,000 ft (0 to 3050 m)

Power Specifications

Table 20 lists the environmental specifications for the Pluribus Networks Freedom Series

Table 3: Power Specifications for the Pluribus Networks Freedom Series

Attribute	AC Power Supply
Maximum output power	• 1200W (F64) • 400W (E68) • 1100W (E28Q-L)

Table 3: Power Specifications for the Pluribus Networks Freedom Series

Attribute	AC Power Supply
Input voltage	90 to 264 VAC
Frequency	50 to 60 Hz
Efficiency	90/92% (110/240 Vin) at typical power draw 88/91% (110/240 Vin) at max power draw
RoHS compliance	RoHS-6 compliant
Hot swap	Yes
Cubic inches	39 in3 (639 cm3)
Power density	10.2 W/in^3
Operating temperature	32 to 104°F (0 to 40°C)
Cooling	Internal fans to cool the power supply
Input connector	AC connector in the power supply face
Output connector	DC output connector at the back of the power supply
Supply indicators	AC good indicator: solid green indicates that AC is present and is within the supply specifications. Supply health: green LED indicates the power supply is operational.

Appendix C – Cable and Connector Specifications

This appendix provides cable and connector specifications for the Pluribus Networks Freedom Series switches.

Console Port and Cable

The console port is an asynchronous RS-232 serial port with a RJ-45 connector.

The console cable has RJ-45, RS-232 connectors on both ends.

Supported Power Cords and Plugs

Each power supply has a separate power cord. Standard power cords or jumper power cords are available for connection to a power distribution unit that has IEC 60320 C19 outlet receptacles. The standard power cords have an IEC C13 connector on the end that plugs into the switch. The optional jumper power cords, for use in cabinets, have an IEC C13 connector on the end that plugs into the switch and an IEC C14 connector on the end that plugs into an IEC C13 outlet receptacle.

Informational Note: Only the regular power cords or jumper power cords provided with the switch are supported.

Table C-1 lists the power cords for the Pluribus Networks F64 E68 Series switches and provides their lengths in feet and meters.

Table 1: Power Cords for the Pluribus Networks Freedom Series Server-Switches

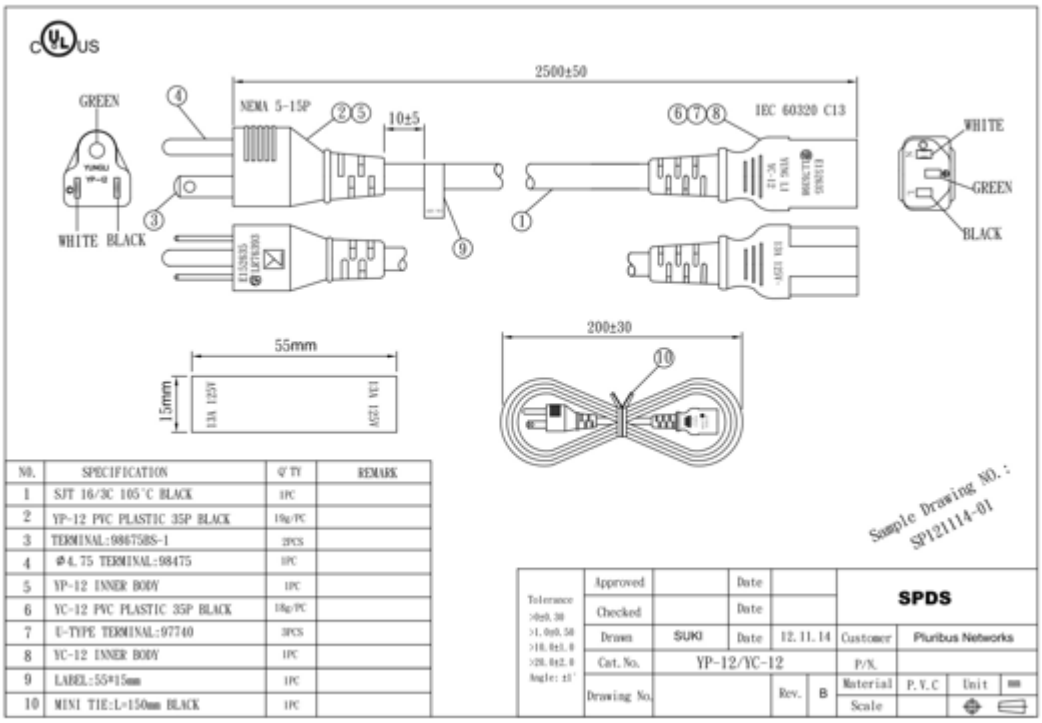
Part Identifier	Length (Feet)	Length (Meters)	
CAB-NA AC Power Cord, North America (13A/125V, 10 Feet)	10	3	Figure 1, “ CAB_NA”
CAB-EU AC Power Cord, Europe (10A/250V, 2.5 Meter)	8	2.5	Figure 2, “ CAB-EU”
CAB-UK AC Power Cord, United Kingdom (10A/250V, 2.5 Meter)	8	2.5	Figure 3, “ CAB-UK”
CAB-IT AC Power Cord, Italy (10A/250V, 2.5 Meter)	8	2.5	Figure 4, “ CAB-IT”
CAB-CH AC Power Cord, Switzerland (10A/250V, 2.5 Meter)	8	2.5	Figure 5, “ CAB-CH”

Table 1: Power Cords for the Pluribus Networks Freedom Series Server-Switches

Part Identifier	Length (Feet)	Length (Meters)	
CAB-JP AC Power Cord, Japan (10A/250V, 2.5 Meter)*	8	2.5	Figure 6, " CAB-JP"
CAB-AU AC Power Cord, Australia (10A/250V, 2.5 Meter)	8	2.5	Figure 7, " CAB-AU"
CAB-CN AC Power Cord, China (10A/250V, 2.5 Meter)	8	2.5	Figure 8, " CAB-CN"
CAB-KR AC Power Cord, Korea (10A/250V, 2.5 Meter)	8	2.5	Figure 9, " CAB-KR"
CAB-BR AC Power Cord, Brazil (10A/500V, 3 Meter)	9.8	3	Figure 10, " CAB-BR"
CAB-JMPR Cabinet Jumper Power Cord, C13-C14 Connectors (13A/250VAC, 2.3 Feet)	2.3	0.7	Figure 11, " CAB-JMPR"

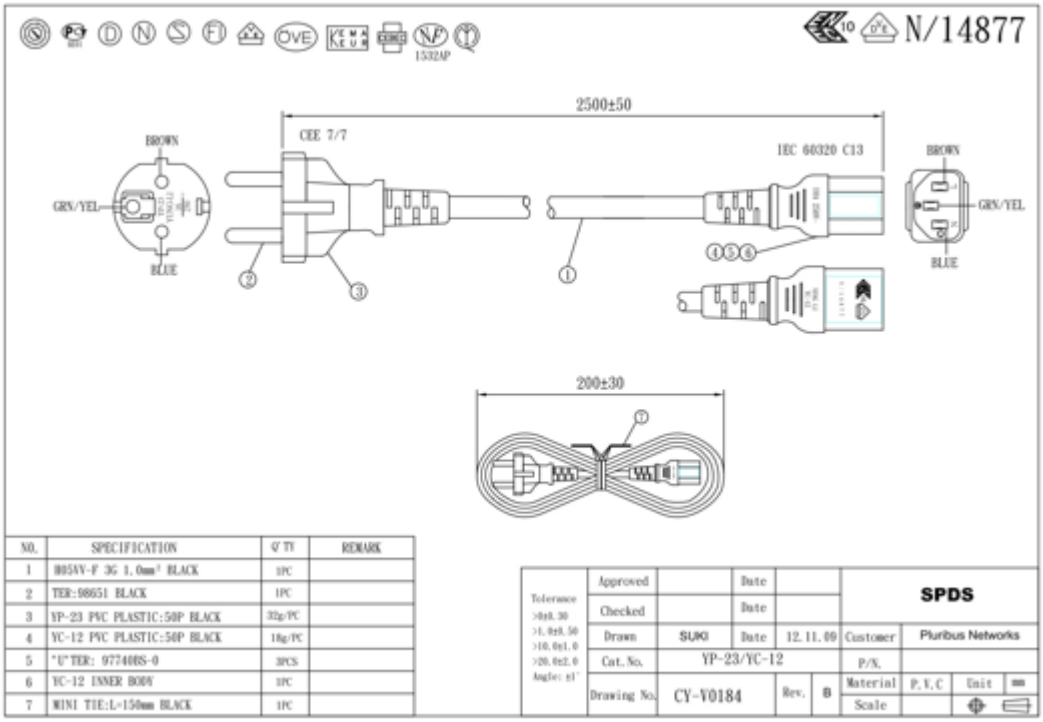
Warning: Japan Power Cord - - The attached cable is only for this product. Do not use the cable for another product.

Figure 1: CAB_NA



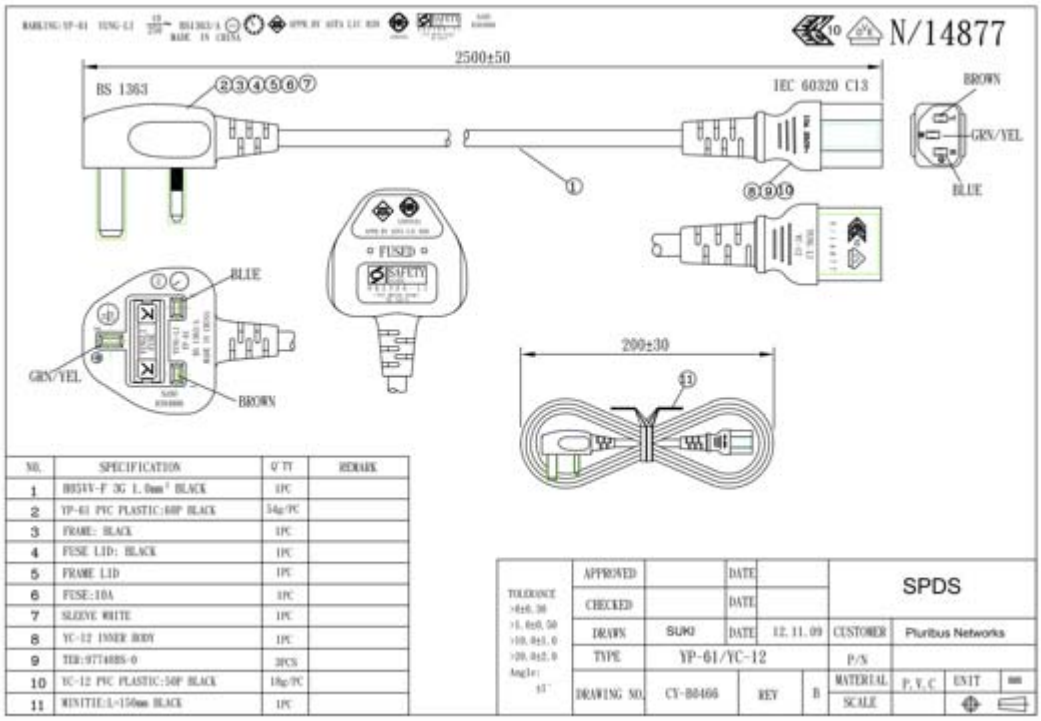
NO.	SPECIFICATION	Q'TY	REMARK
1	SJT 16/3C 105°C BLACK	1PC	
2	YP-12 PVC PLASTIC 3SP BLACK	19g/PC	
3	TERMINAL:98675BS-1	2PCS	
4	Φ4.75 TERMINAL:98475	1PC	
5	YP-12 INNER BODY	1PC	
6	YC-12 PVC PLASTIC 3SP BLACK	18g/PC	
7	U-TYPE TERMINAL:97740	3PCS	
8	YC-12 INNER BODY	1PC	
9	LABEL:55*15mm	1PC	
10	MINI TIE:L=150mm BLACK	1PC	

Figure 2: CAB-EU



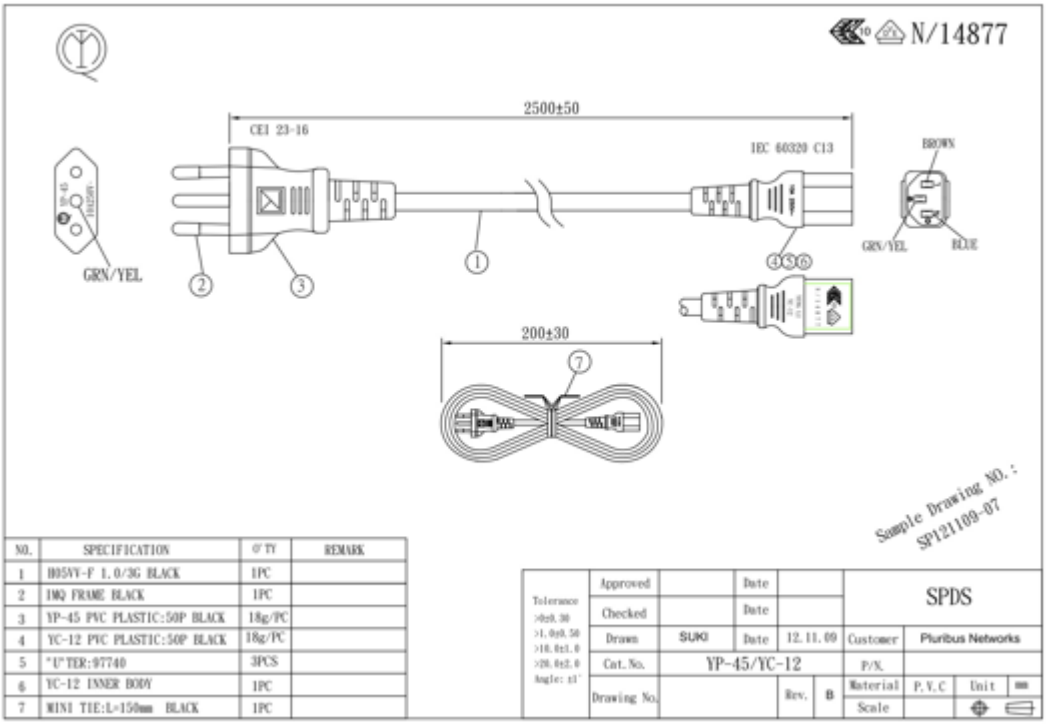
NO.	SPECIFICATION	Q'TY	REMARK
1	H05VV-F 3G 1.0mm² BLACK	1PC	
2	TER:98651 BLACK	1PC	
3	YP-23 PVC PLASTIC:5SP BLACK	32g/PC	
4	YC-12 PVC PLASTIC:5SP BLACK	18g/PC	
5	"U"TER: 97740BS-0	2PCS	
6	YC-12 INNER BODY	1PC	
7	MINI TIE:L=150mm BLACK	1PC	

Figure 3: CAB-UK



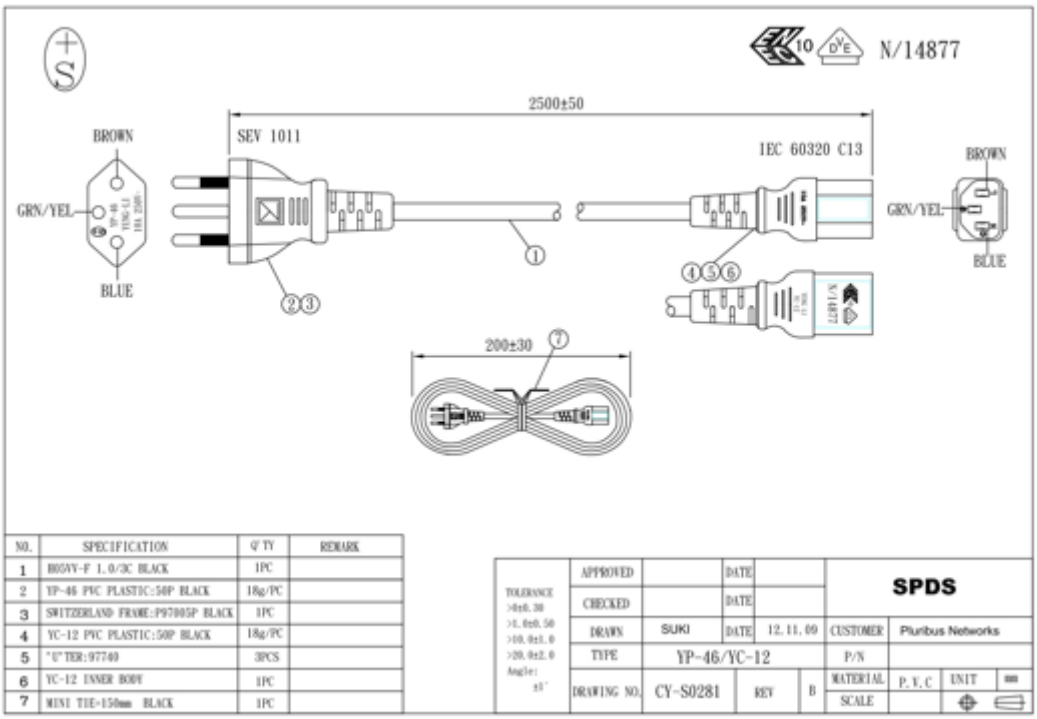
NO.	SPECIFICATION	Q'TY	REMARK
1	H05VV-F 3G 1.0mm² BLACK	1PC	
2	YP-61 PVC PLASTIC:60P BLACK	54g/PC	
3	FRAME: BLACK	1PC	
4	FUSE LID: BLACK	1PC	
5	FRAME LID	1PC	
6	FUSE:10A	1PC	
7	SLEEVE WHITE	1PC	
8	YC-12 INNER BODY	1PC	
9	TER:97740BS-0	2PCS	
10	YC-12 PVC PLASTIC:56P BLACK	18g/PC	
11	MINITIE:L=150mm BLACK	1PC	

Figure 4: CAB-IT



NO.	SPECIFICATION	Q'TY	REMARK
1	H05VV-F 1.0/3G BLACK	1PC	
2	IMQ FRAME BLACK	1PC	
3	YP-45 PVC PLASTIC:50P BLACK	18g/PC	
4	YC-12 PVC PLASTIC:50P BLACK	18g/PC	
5	"U"TER:97740	3PCS	
6	YC-12 INNER BODY	1PC	
7	MINI TIE:L=150mm BLACK	1PC	

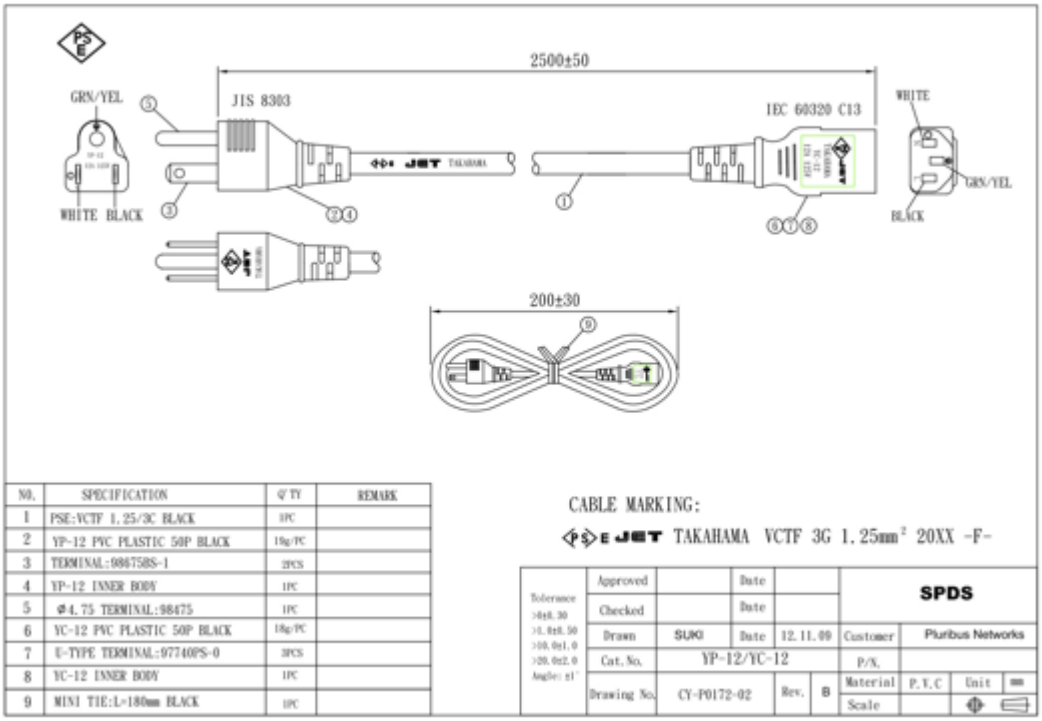
Figure 5: CAB-CH



NO.	SPECIFICATION	Q'TY	REMARK
1	H05VV-F 1.0/3C BLACK	1PC	
2	YP-46 PVC PLASTIC:50P BLACK	18g/PC	
3	SWITZERLAND FRAME:P9700SP BLACK	1PC	
4	YC-12 PVC PLASTIC:50P BLACK	18g/PC	
5	"U"TER:97740	3PCS	
6	YC-12 INNER BODY	1PC	
7	MINI TIE-150mm BLACK	1PC	

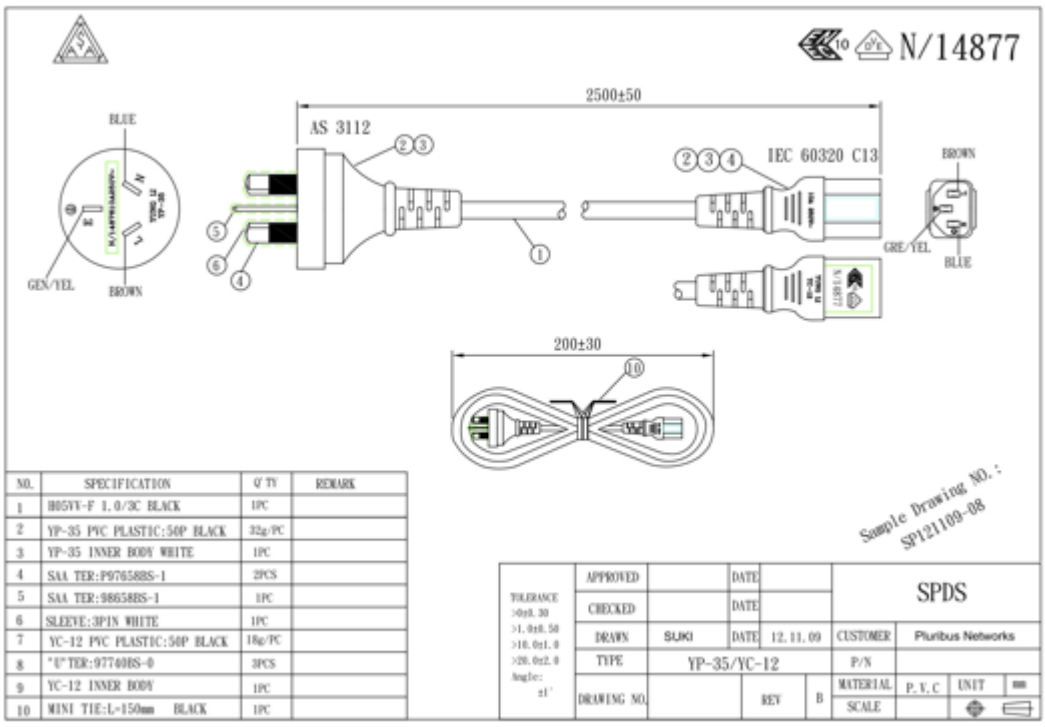
TOLERANCE >0±0.30 >3.0±0.50 >10.0±1.0 >20.0±2.0 Angle: ±1°	APPROVED		DATE		SPDS
	CHECKED		DATE		
	DRAWN	SUKI	DATE	12.11.09	CUSTOMER: Pluribus Networks
	TYPE	YP-46/YC-12			P/N:
	DRAWING NO.	CY-S0281	REV	B	MATERIAL: P.V.C / UNIT: mm
					SCALE:

Figure 6: CAB-JP



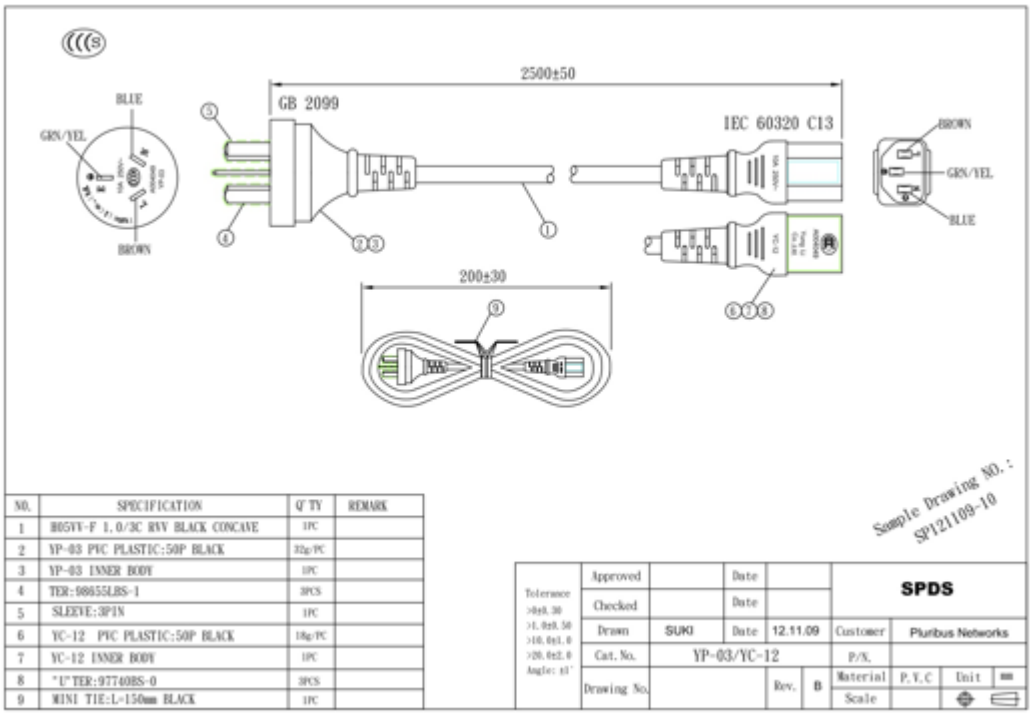
NO.	SPECIFICATION	Q'TY	REMARK
1	PSE:VCTF 1.25/3C BLACK	1PC	
2	YP-12 PVC PLASTIC 50P BLACK	18g/PC	
3	TERMINAL:9867588S-1	2PCS	
4	YP-12 INNER BODY	1PC	
5	ø4.75 TERMINAL:98475	1PC	
6	YC-12 PVC PLASTIC 50P BLACK	18g/PC	
7	U-TYPE TERMINAL:97740PS-0	3PCS	
8	YC-12 INNER BODY	1PC	
9	MINI TIE:L=180mm BLACK	1PC	

Figure 7: CAB-AU



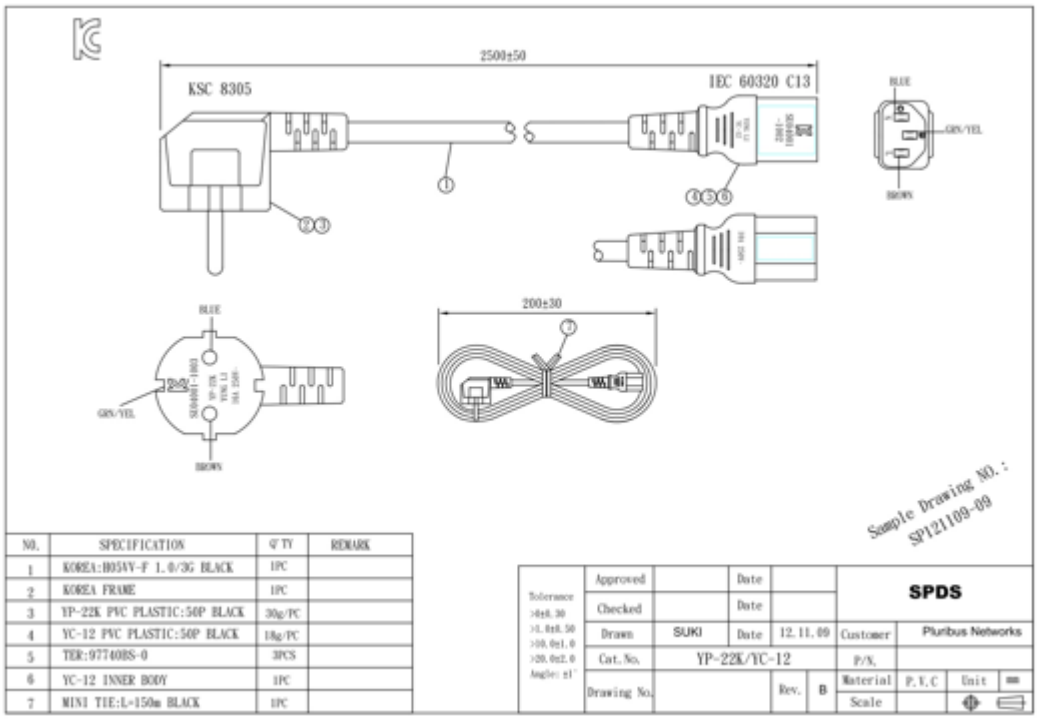
NO.	SPECIFICATION	Q'TY	REMARK
1	H05VV-F 1.0/3C BLACK	1PC	
2	YP-35 PVC PLASTIC:50P BLACK	32g/PC	
3	YP-35 INNER BODY WHITE	1PC	
4	SAA TER:P976588S-1	2PCS	
5	SAA TER:986588S-1	1PC	
6	SLEEVE:3PIN WHITE	1PC	
7	YC-12 PVC PLASTIC:50P BLACK	18g/PC	
8	"U"TER:97740BS-0	3PCS	
9	YC-12 INNER BODY	1PC	
10	MINI TIE:L=150mm BLACK	1PC	

Figure 8: CAB-CN



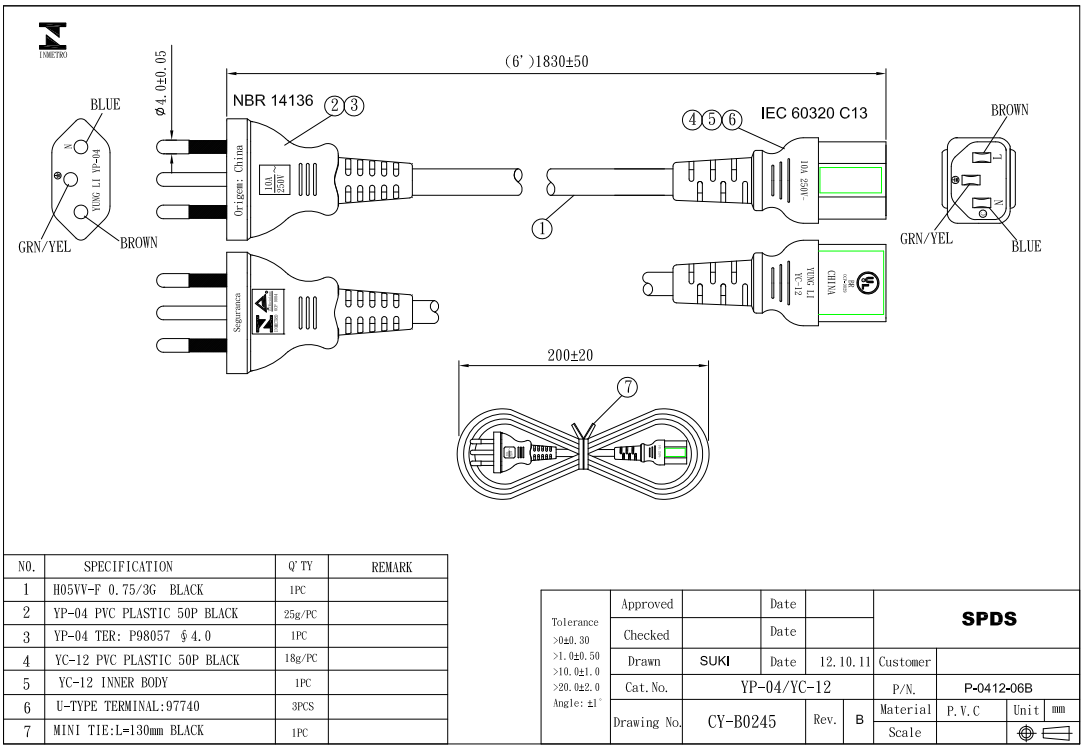
NO.	SPECIFICATION	Q'TY	REMARK
1	H05VV-F 1.0/3C RVV BLACK CONCAVE	1PC	
2	YP-03 PVC PLASTIC:50P BLACK	32g/PC	
3	YP-03 INNER BODY	1PC	
4	TER:98655LBS-1	3PCS	
5	SLEEVE:3P1N	1PC	
6	YC-12 PVC PLASTIC:50P BLACK	18g/PC	
7	YC-12 INNER BODY	1PC	
8	"U"TER:97740BS-0	3PCS	
9	MINI TIE:L=150mm BLACK	1PC	

Figure 9: CAB-KR



NO.	SPECIFICATION	Q'TY	REMARK
1	KOREA:H05VV-F 1.0/3G BLACK	1PC	
2	KOREA FRAME	1PC	
3	YP-22K PVC PLASTIC:50P BLACK	30g/PC	
4	YC-12 PVC PLASTIC:50P BLACK	18g/PC	
5	TER:97740BS-0	3PCS	
6	YC-12 INNER BODY	1PC	
7	MINI TIE:L=150m BLACK	1PC	

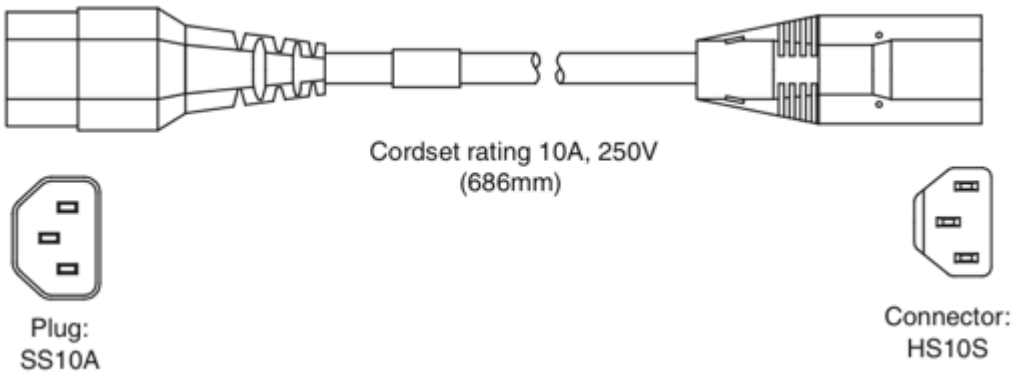
Figure 10: CAB-BR



NO.	SPECIFICATION	Q'TY	REMARK
1	H05VV-F 0.75/3G BLACK	1PC	
2	YP-04 PVC PLASTIC 50P BLACK	25g/PC	
3	YP-04 TER: P98057 φ4.0	1PC	
4	YC-12 PVC PLASTIC 50P BLACK	18g/PC	
5	YC-12 INNER BODY	1PC	
6	U-TYPE TERMINAL:97740	3PCS	
7	MINI TIE:L=130mm BLACK	1PC	

Tolerance >0±0.30 >1.0±0.50 >10.0±1.0 >20.0±2.0 Angle: ±1°	Approved		Date		SPDS		
	Checked		Date				
	Drawn	SUKI	Date	12.10.11	Customer		
	Cat.No.	YP-04/YC-12			P/N.	P-0412-06B	
	Drawing No.	CY-B0245	Rev.	B	Material	P.V.C	Unit mm
					Scale		

Figure 11: CAB-JMPR



Appendix D — LED Descriptions

This appendix describes the conditions indicated by the chassis and module LEDs on the Pluribus Networks Freedom Series switches.

This appendix includes the following sections:

- Chassis LED Descriptions
- Power Supply Status

Chassis LED Descriptions

Table 22 describes the chassis LED indicators for the Pluribus Networks Freedom Series switches.

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Table 1: LED Indicators for the Pluribus Networks Freedom Series switches

Indicator	LED	Status	Description
Power button (front of chassis)	PWR (green)	• Solid on (green) • Blinking (green) • Off	• The switch is operating. • The switch is powering up, rebooting, or shutting down. • The switch is not operating.
Locator beacon (front of chassis)	ID (white)	• Solid on (white) • Off	• Identifies the switch emitting or receiving the beacon signal. • The switch is not emitting or receiving the beacon signal.
Switch status (front of chassis)	STAT (green/amber)	• Solid on (green) • Solid on (amber) • Blinking (amber)	• The switch is operational and all diagnostics have passed. • The switch is booting or running diagnostics; or an overtemperature condition has occurred where the temperature threshold has been exceeded by a small value during environmental monitoring. • An overtemperature condition has occurred where the temperature threshold has been exceeded by a large value during environmental monitoring

Table 1: LED Indicators for the Pluribus Networks Freedom Series switches

Indicator	LED	Status	Description
Switch failure (front of chassis)	FAIL (red	• Solid on (red) • Blinking (red) • Off	• The switch has input power present but is inoperable, The switch has input power present but is inoperable, due to either more than one power supply missing or failed (overvoltage, overcurrent, overtemperature) or more than one fan module missing or failed. • The switch is operable but degraded, meaning there is one power supply missing or failed (overvoltage, overcurrent, overtemperature) and/or there is one fan module missing or failed. • The switch is operable with no component degradation.
Switch attention (front of chassis)	ATTN (amber)	• Solid on (amber) • Blinking (amber) • Off	• The switch is either booting and is running diagnostics or is shutting down. • The power button is being pressed and the blinking rate indicates whether on power button release the switch will initiate a soft reboot or shut down. • The switch is not calling for attention.
For all QSFP ports		• Solid on (green) • Off	• The port is active with a link that is connected and operational. • The port is not active, or the link is not connected, or the port is configured as disabled by nvOS.
Port status (rear of chassis	Per SFP+ port no. 9-32 and 41-64 (green/amber)	• Solid on (green) • Blinking (amber) • Off	• The port is active with a link that is connected and operational. • The port is faulty. • The port is not active, configured in disabled state by software, or the link is not connected.
	Per QSFP+ port no. 11..4 and 33..36 (amber)	• Solid on (amber) • Off	• The port is active with a link that is connected and operational. • The port is not active, the link is not connected, or the port is configured in disabled state by software.
	Per QSFP+ port no. 5..8 and 37..40 (green)	• Solid on (green) • Off	• The port is active with a link that is connected and operational. • The port is not active, the link is not connected, or the port is configured in disabled state by software.

Power Supply Status

This section describes the power supply LED indicators for the Pluribus Networks Freedom Series switches. Each power supply has two LED indicators showing the status of the supply. The upper LED is green and indicates the status of AC power input. The lower LED is bi-color green/amber and indicates the status of DC power output and faults.

Table 23 describes the status indicated by the two LED indicators on each power supply.

Table 2: Power Supply LED Indicators

Condition	Upper LED — AC Status (green)	Lower LED: DC Status and Faults (green/amber)
No AC power to the power supply	Off	Off
Power supply failure (includes overvoltage, overcurrent, overtemperature, and fan failure)	Solid on (green)	Solid on (amber)
Power supply warning events where the power supply continues to operate (high temperature, high power, and slow fan)	Solid on (green)	Blinking (green/amber)
AC present/voltage standby (VSB) on, and power supply off	Solid on (green)	Blinking (amber)
Power supply on and OK	Solid on (green)	Solid on (green)

Appendix E – Troubleshooting Hardware Components

This appendix describes how to identify and resolve problems that might occur with the hardware components of a Pluribus Networks Freedom Series switches.

This appendix includes the following sections:

- General Procedure
- Hardware Best Practices

Warning: This unit contains a replaceable battery. Risk of explosion if battery is replaced with the incorrect battery type. Dispose of used batteries according to the manufacturer's instructions.

General Procedure

The key to success when troubleshooting the system hardware is to isolate the problem to a specific system component. The first step is to compare what the system is doing to what it should be doing. Because a startup problem can usually be attributed to a single component, it is more efficient to isolate the problem to a subsystem rather than troubleshoot each separate component in the system.

Problems with the initial power-up are often caused by a component that is not firmly connected or a power supply that has been disconnected from the power cord connector.

Overheating can also cause problems with the system, though typically only after the system has been operating for an extended period of time. The most common cause of overheating is the failure of a fan module.

Hardware Best Practices

Use the recommendations in this section to ensure the proper installation, initialization, and operation of the switch.

Installation Best Practices

When installing the switch, follow these best practices:

1. Plan your site configuration and prepare the site before installing the switch.
2. Verify that you have the appropriate power and cooling facilities for your chassis configuration.
3. Install the chassis following the rack and airflow guidelines described in this hardware installation guide.
4. Verify that the chassis is adequately grounded.

Initialization Best Practices

When the initial system boot is complete, verify the following:

1. Power supplies are providing power to the system.
2. Fan modules are operating normally.
3. The system software boots successfully and the status LED (STAT) lights up solid green.

Appendix F - Accessory Kit

This appendix describes the contents of the accessory kit that ships with each Pluribus Networks Freedom Series switch.

Pluribus Networks Freedom Series Accessories

This section describes the accessory kit contents for the Pluribus Networks Freedom Series switch and describes how to attach a power cord to the switch.

The Pluribus Networks Freedom Series switch accessory kit includes the following items:

- 2 rack-mount slides
- 12 M4 Phillips flathead screws
- 8 M5 Phillips wide-panhead screws
- 2 M5 Phillips panhead screws
- 2 M5 clip-on nuts
- 1 RS-232 console cable with RJ-45 connectors on both ends
- 1 ground lug kit
- 1 ESD wrist strap

Informational Note: Additional parts can be ordered from your partner if you purchased from a partner or from Pluribus Networks.

Appendix G – Site Planning and Maintenance Records

This appendix provides log sheets that you can use to record information when installing a Pluribus Networks Freedom Series switch.

This appendix includes the following sections:

- Site Preparation Checklist
- Contact and Site Information
- Chassis Information

Site Preparation Checklist

Planning the location and layout of your equipment rack or wiring closet is essential for successful switch operation, ventilation, and accessability. Table 24, “Site Planning Checklist” on page 63 lists the recommended site planning tasks that you should complete before installing a Pluribus Networks Freedom Series switch.

Consider heat dissipation when sizing the air-conditioning requirements for an installation. See Appendix B – Technical Specifications for the environmental requirements and power and heat ratings.

Table 1: Site Planning Checklist

Task No.	Planning Activity	Verified By	Time	Date
1	Space evaluation: • Space and layout • Floor covering • Impact and vibration • Lighting • Maintenance access			
2	Environmental evaluation: Ambient temperature Humidity Altitude Atmospheric contamination Airflow			
3	Power evaluation: • Input power type • Power receptacles[1] • Receptacle proximity to the equipment • Dedicated circuit for power supply • Dedicated (separate) circuits for redundant power supplies • UPS[2] for power failures redundant power supplies			
4	Grounding evaluation: • Circuit breaker size • CO ground			

Table 1: Site Planning Checklist

Task No.	Planning Activity	Verified By	Time	Date
5	Cable and port equipment evaluation: • Cable type • Connector type • Cable distance limitations • Transceivers			
6	EMI[3] evaluation: • Distance limitations for signaling • Site wiring • RFI[4] levels			

[1] Fully configured weight – For the Pluribus Networks Freedom F64 Series, that includes two power supplies and four fan modules.

[2] Uninterruptible power supply

[3] Electromagnetic interference

[4] Radio frequency interference

Contact and Site Information

Use the following worksheet (Table G-2) to record contact and site information.

Contact and Site Information

Use the following worksheet inTable , “Site Planning Checklist” on page 64 to record contact and site information.

Table 2: Contact and Site Information

Contact Person
Contact Phone
Contact E-mail
Building or Site Name
Datacenter Location
Floor Location
Address (line 1)
Address (line 2)
City
State or Province
ZIP or Postal Code
Country

Chassis Information

Use the following worksheet Table 26, “Network Information” on page 65 to record information about the chassis.

Table 3: Network Information

Switch IP Address
Switch IP Netmask
Hostname
Domain Name
IP Multicast Address
Gateway Address
DNS Address

About Pluribus Networks

Pluribus Networks provides data center solutions that allow your business to run unconstrained. Our software-defined, open networking, fabricbased solutions transform existing network infrastructures into flexible and strategic assets fully aligned with today's digital business needs. Our Virtualization-Centric Fabric (VCF™) architecture provides unprecedented insight, agility and security to customers seeking to simplify operations, run more cost effectively and bring new applications online faster.

Learn more at www.pluribusnetworks.com and @pluribusnet.

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