

# Installing Cisco ONS 15454-PP-4-SMR Patch Panel

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## Introduction

This document explains how to install and operate the Cisco ONS 15454-PP-4-SMR patch panel.

The Cisco ONS 15454-PP-4-SMR patch panel interconnects 40-SMR2-C cards in a mesh node.

## Safety Information

Before you install, operate, or service the Cisco ONS 15454-PP-4-SMR patch panel, you must read the [Regulatory Compliance and Safety Information for Cisco Optical Transport Products](#) document for important safety information and warning translations.

The Cisco ONS 15454-PP-4-SMR patch panel is compliant with the following standards:

- GR 1089 Issue 4, UL/CSA 60950-1, 2006
- IEC/EN 60950-1(2001/10) with Amendment 11:2004 to EN 60950-1:2001, 1st Edition and National Differences as per CB Bulletin 112A.



- EN 60950-1:2006
- CE Safety Directive: 2006/95/EC
- IEC 60950-1 (2005/12), 2nd Edition and National Differences as per CB Bulletin 112A
- AS/NZS 60950.1:2003/Am 1:2006
- IEC 60825-1 Consol. Ed. 1.2 (incl. am1+am2) 2001-08
- 21CFR1040 (2008/04) (Accession Letter and CDRH Report)
- Automatic Laser Shutdown and restart (ALS) according to ITU-T G.664 (03/06)
- IEC-60825-2 Edition 3.1, 2007/01, Laser Products Conformance with IEC 60825-1
- IEC 60601-2-22; Guidance for Industry and FDA Staff (Laser Notice No. 50) 2007, June

## Laser Radiation Emission Restrictions

The Class 1M Laser safety and warning label is affixed to the Cisco ONS 15454-PP-4-SMR patch panel and indicates that the product should never be used or installed in an optical network with emissions higher than Class 1M.



Warning

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**Class 1M laser radiation when open. Do not view directly with optical instruments.** Statement 281

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## Laser Safety During Operation



Warning

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**Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.** Statement 1051

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## Electrical Safety

The Cisco ONS 15454-PP-4-SMR patch panel is optically and electrically passive and requires no electrical connections. No electrostatic discharge (ESD) or other electrical safety considerations apply.

## Product Description

The Cisco ONS 15454-PP-4-SMR patch panel interconnects up to four 40-SMR2-C cards in a mesh node.

The patch panel can be used in mesh nodes up to 4 degrees, equipped with 40-SMR2-C cards.

## Features

The patch panel splits light coming from each direction into four and forwards it to the 40-SMR2-C cards in the other directions.

It is optically and electrically passive and requires no temperature control.

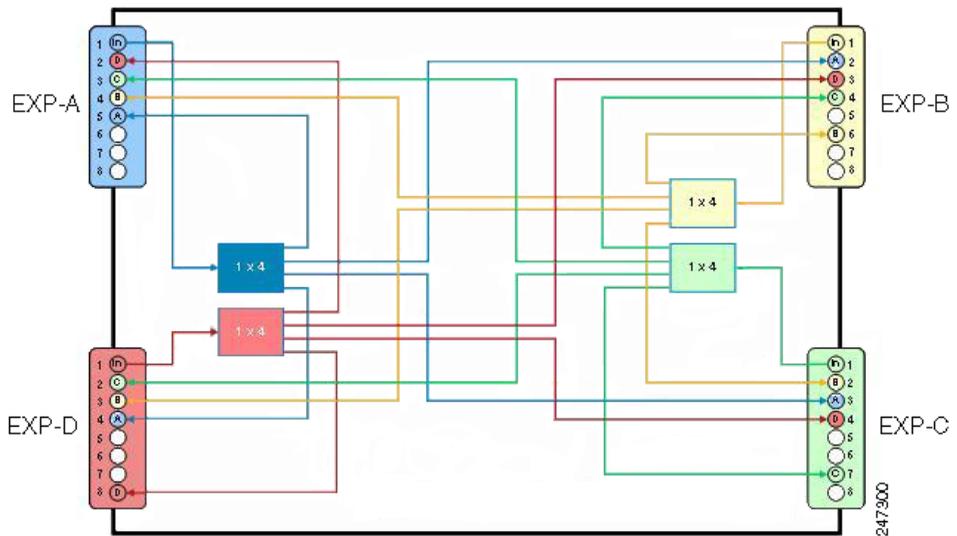
## Functional Description

The patch panel has four optical ports (EXP-A, EXP-B, EXP-C, and EXP-D) that are based on the 8-fiber MPO connector. Each MPO connector has one input fiber and seven output fibers. The input signal of each EXP port is split into four signals by the 1x4 fused fibre optical splitter, and distributed as follows:

- One signal is routed back to the EXP port into one of the four spare fibers of the 8-fiber MPO connector.
- The remaining signals are routed to the other three EXP ports of the 15454-PP-4-SMR patch panel.

For example, when the input signal from the EXP-A port is split into four signals, one of the four signals is routed back to the EXP-A port and the remaining three signals are routed to the EXP-B, EXP-C, and EXP-D ports of the 15454-PP-4-SMR patch panel. See [Figure 1](#).

**Figure 1** Cisco ONS 15454-PP-4-SMR Patch Panel—Functional Description



## Installation

This section explains how to:

- [Unpacking and Verifying the Equipment](#)
- [Installing the 15454-PP-4-SMR Patch Panel](#)
- [Installing and Routing the Fiber-Optic Cables](#)

## Unpacking and Verifying the Equipment

This procedure describes the steps for unpacking and verifying the equipment.

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- Step 1** Unpack and inspect the module. The package should include these components:
- Patch panel module
  - Production test report form showing the manufacturer's part number and serial number, Cisco part number, date, and device description
  - Packing slip
- Step 2** Compare the equipment received with the packing slip and the equipment list that customer service provided. If there are any discrepancies, notify the Customer Service Center.
- Step 3** Check for external damage. Visually check all components and immediately report any shipping damage to your customer service representative. Have this information ready:
- Invoice number of shipper (see packing slip)
  - Model and serial number of the damaged unit
  - Description of damage
  - Effect of damage on the installation
  - Packing slip

## Installing the 15454-PP-4-SMR Patch Panel

The patch panel can be installed either above or below the DWDM generating equipment according to the local site practice.

The patch panel measures the height of one rack unit (RU). Each package includes one set of the following brackets:

- 19-inch (482.6-mm) or 23-inch (584.2-mm) reversible (two-way) mounting brackets that can be rotated to fit either rack size. These reversible brackets are used for EIA, WECO and IEC standard racks.
- ETSI brackets that are used for ETSI standard racks.

The patch panel is passive and requires no power cabling or connections. All connectors are on the sliding drawer face plate. The sliding drawer face plate is equipped with four MPO-MPO adapters and with a USB Type A receptacle connector for inventory purpose. The patch panel provides 1.5 inches of bend radius protection for the ribbons slack.

The patch panel ports are silkscreened on the drawer face plate, as shown in [Figure 11](#). The port assignments of the patch panel is provided in “[Port Label Description](#)” section on page 16.

The patch panel has a left hand entrance for all the ribbon fibers and for the USB cable.

**Note**

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Only the USB cable can also be routed toward the right hand entrance of the patch panel.

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**Caution**

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Use only the fastening hardware provided with the 15454-PP-4-SMR patch panel to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

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**Caution**

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When mounting the 15454-PP-4-SMR patch panel in a frame with a nonconductive coating (such as paint, lacquer, or enamel), use either the thread-forming screws provided with its shipping kit or remove the coating from the threads to ensure electrical continuity.

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The patch panel has three working conditions:

- Normal Operating Condition:

The front panel is closed and the drawer is in the recessed position. When the patch panel is closed, there is adequate space between the sliding drawer face plate and the front panel. This provides a minimum bend radius of 1.5 inches (38.1-mm) for optical ribbons inside the patch panel.

- Intermediate Maintenance Condition:

The front panel is open and the drawer is in the recessed position.

- Main Maintenance Condition:

The front panel is open and the drawer is in the extracted position. The operator can route, plug or unplug cables and connectors.

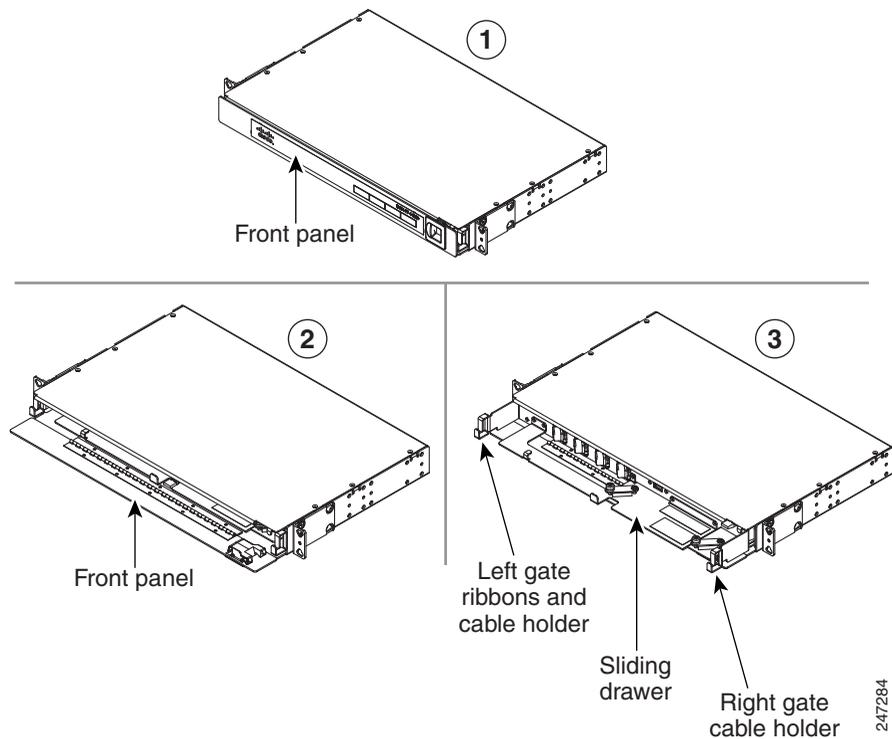
Figure 2 displays the working positions of 15454-PP-4-SMR patch panel.

Diagram 1 in Figure 2 displays the front panel in the closed position.

Diagram 2 in Figure 2 displays the open front panel and drawer in the recessed position.

Diagram 3 in Figure 2 displays the open front panel and drawer in the extracted position.

**Figure 2 Working Positions—Patch Panel**



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This procedure describes the steps to install the 15454-PP-4-SMR panels.

**Step 1** Set the mounting brackets to the rack you are using.

The ONS 15454-PP-4-SMR patch panel can be mounted on the following racks:

- 19-inch (482.6-mm), 23-inch (584.2-mm) EIA standard racks
- 19-inch (482.6-mm) IEC standard rack
- 600 mm x 600 mm or 600 mm x 300 mm ETSI racks

A patch panel is 17.21-inches (437.1-mm) wide, and occupies 1 RU in a rack (1.75 inch or 44.45-mm).

The patch panel mounting brackets can be mounted such that the patch panels project either 2.25, 5, 6, or 6.5 inches from the front of the EIA standard racks fixing plane, or 40-mm from the front of the IEC or ETSI standard racks fixing plane.



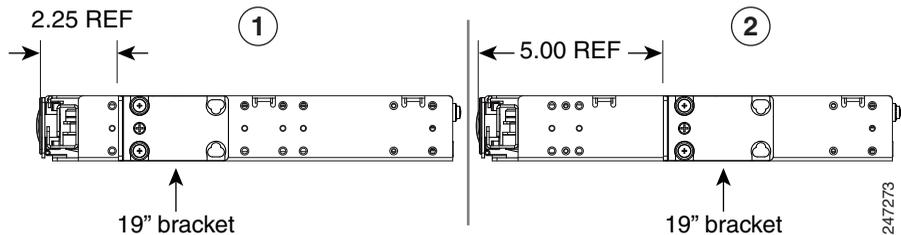
**Note**

The unit is shipped with the 19-inch mounting brackets in the 40-mm position.

Figure 3 and Figure 4 display different offsets of the ANSI bracket positions and also mentions the 40-mm position of the ETSI brackets. The 19-inch (482.6-mm) brackets are shown for reference in the following figures:

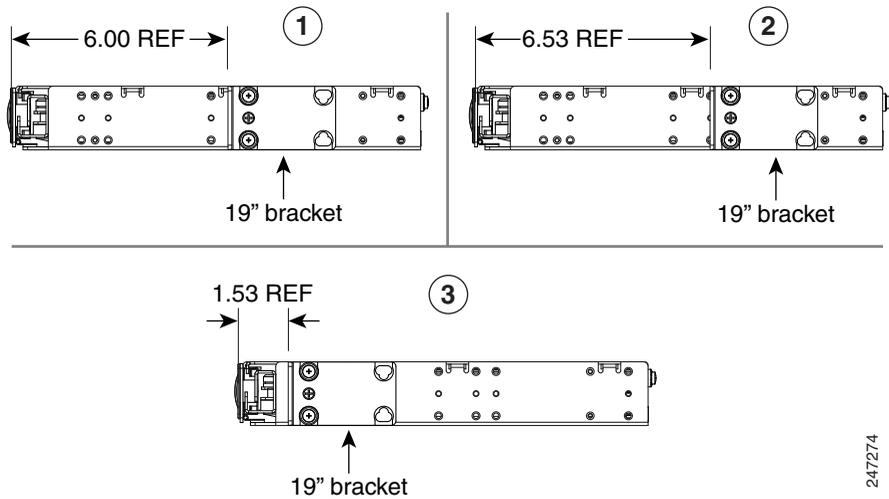
- Diagram 1 in Figure 3 displays 2.25 inch Recess Location.
- Diagram 2 in Figure 3 displays 5 inch Recess Location.

**Figure 3** 2.25" and 5" Recess Location



- Diagram 1 in [Figure 4](#) shows 6- inch Recess Location.
- Diagram 2 in [Figure 4](#) shows 6.5- inch Recess Location.
- Diagram 3 in [Figure 4](#) shows 40- mm Recess Location.

**Figure 4** 6" , 6.5" and 40 mm Recess Location



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**Step 2** Secure the unit to the rack using the mounting screws.

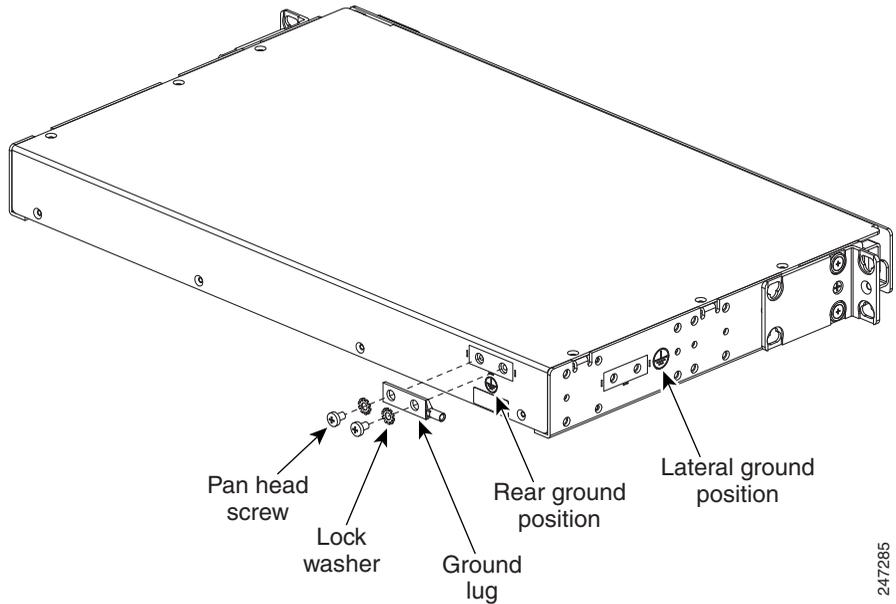
**Step 3** Establish grounding for the patch panel. The ground position is present on the rear and lateral sides of the patch panel. (See [Figure 5](#)).



**Note**

When the patch panel is installed in the ETSI 600x300 cabinet, only the lateral ground position must be used.

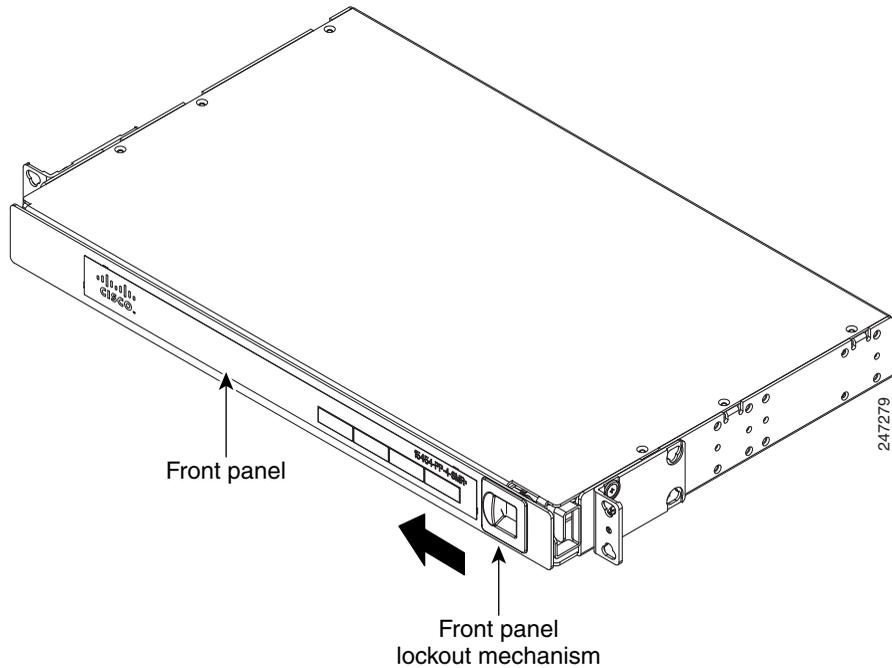
**Figure 5** *Ground Lug on the Rear Side of the 15454-PP-4-SMR Patch Panel*



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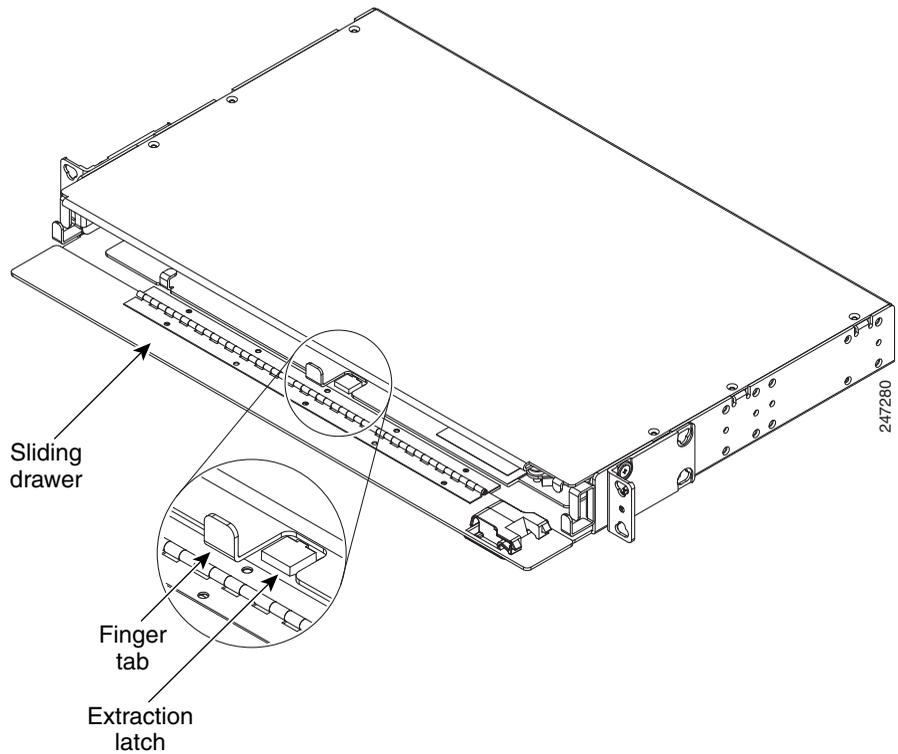
- Step 4** To open the front panel:
- Drag the front panel lock out mechanisms to the left. (See [Figure 6](#)).
  - Open the front panel to its maximum position.

**Figure 6** *Cisco 15454-PP-4-SMR Patch Panel – Closed Position*



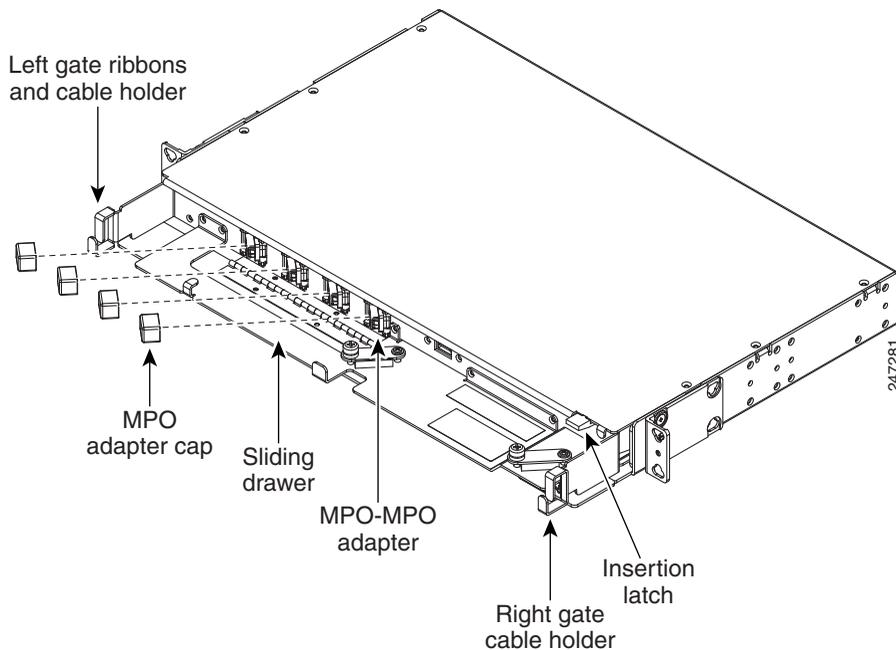
- Step 5** To extract the internal drawer of the patch panel:
- a. Push the extraction latch with one hand. (See [Figure 7](#)).
  - b. Pull the sliding drawer holding the finger tab with the other hand. (See [Figure 7](#)).

**Figure 7** *Cisco 15454-PP-4-SMR Patch Panel-Opened Front Panel and Drawer in the Recessed Position*



- c. Extract the internal drawer from the patch panel until the insertion latch is engaged. (See [Figure 8](#)).

**Figure 8** *Cisco 15454-PP-4-SMR Patch Panel -Opened Front Panel and Drawer in the Extracted Position*

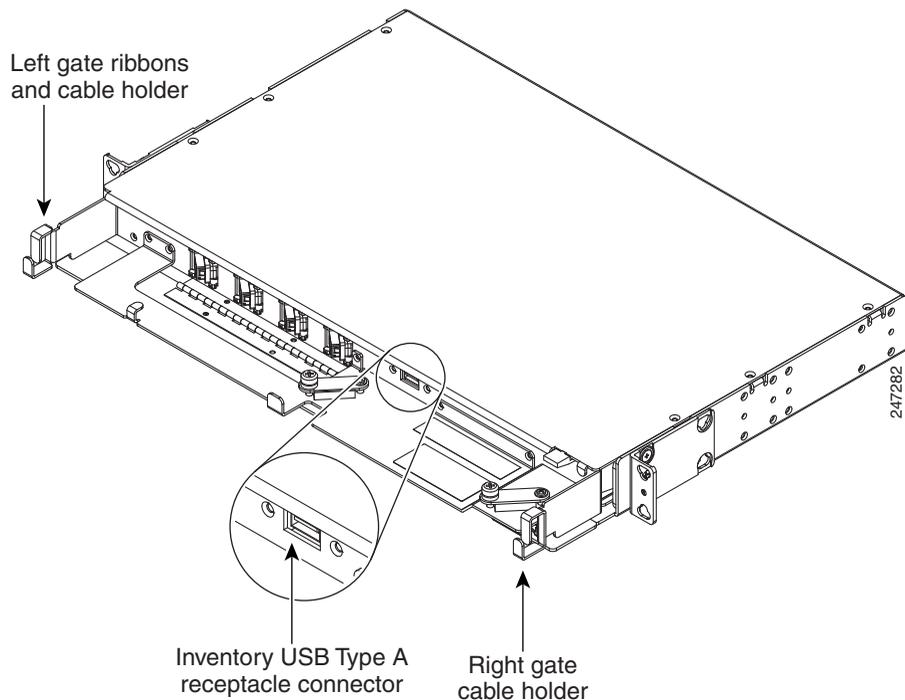


- Step 6** To connect the fibers:
- a. Remove the MPO adapter cap from the MPO-MPO adapter. (See [Figure 8](#)).
  - b. Route the ribbons and the USB cable through the left gate ribbons and cable holder. (See [Figure 8](#)). The USB cable can also be routed through the Right gate cable holder.

Refer to [Table 1](#) for port label description, and [Figure 11](#) for port information. For fibering instructions, see the “[Fiber-Optic Connector Cleaning and Maintenance](#)” section on page 17 and the “[Installing and Routing the Fiber-Optic Cables](#)” section on page 19.

- Step 7** To connect the inventory USB Type A plug connector to the inventory USB Type A receptacle connector:
- a. Route the inventory USB cable through the left or right hand gate cable holders. (See [Figure 9](#)).
  - b. Connect the USB Type A plug connector to the USB Type A receptacle connector. (See [Figure 9](#)).

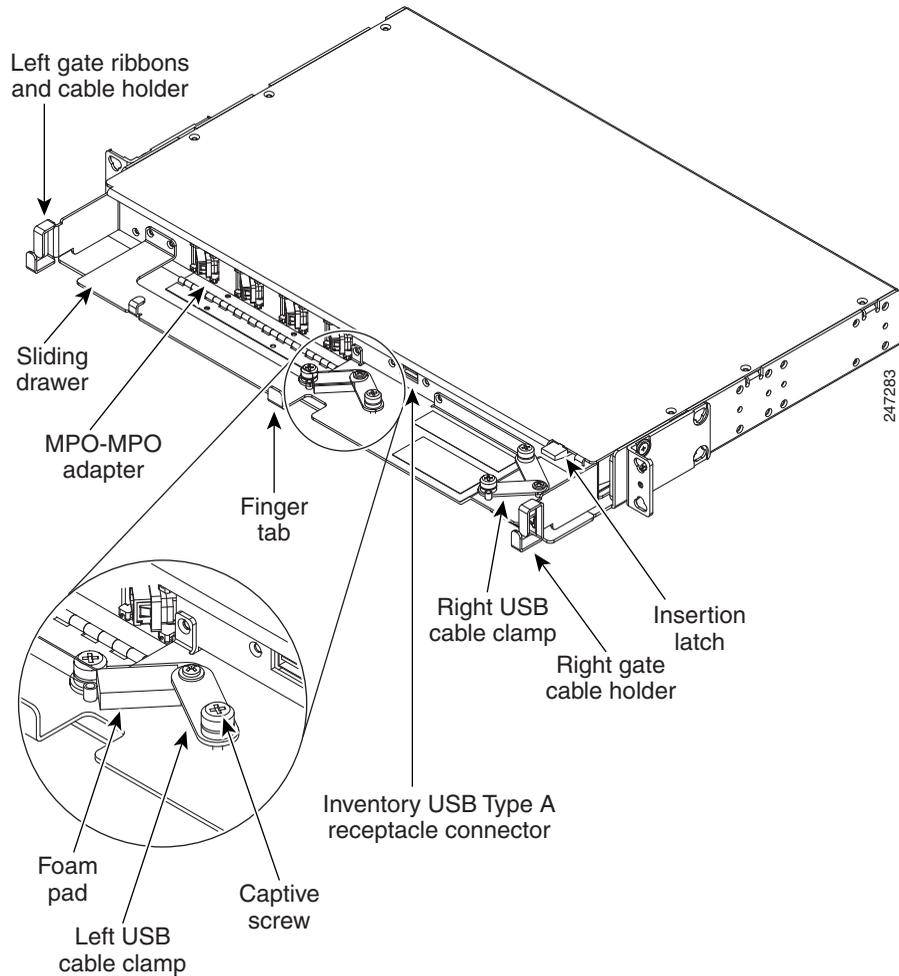
**Figure 9** *Cisco 15454-PP-4-SMR Patch Panel — Opened Front Panel and Drawer in the Extracted Position*



- Step 8** To secure the USB plug cable:
- a. Unscrew the captive screw of the left or right USB cable clamp. (See [Figure 10](#)).
  - b. Rotate to open the USB cable clamp. (See [Figure 10](#)).
  - c. Place the cable on the foam pad. (See [Figure 10](#)).

- d. Rotate the clamp to its original position. (See [Figure 10](#)).
- e. Tighten the captive screw to lock the USB cable. (See [Figure 10](#)).

**Figure 10** *Cisco 15454-PP-4-SMR Patch Panel—Opened Front Panel and Drawer in the Extracted Position*



**Caution**

The 15454-PP-4-SMR Patch Panel front panel features MPO/MPO bulkhead adapters. It uses fiber-optic ribbons equipped with the corresponding (MPO) connector type. Using any other type of connector damages the connector and/or adapter

**Step 9**

To place the patch panel in the closed working configuration:

- a. Connect all the ribbons to their appropriate MPO-MPO adapters and route them through the left gate ribbons and cable holder.
- b. Connect the USB cable to the receptacle USB connector and route it through the preferred left or right gate cable holder. (See [Figure 10](#)).
- c. Push the insertion latch with one hand. (See [Figure 10](#)).
- d. Push the sliding drawer holding the finger tab with the other hand. (See [Figure 10](#)).
- e. Push the drawer inside the patch panel until the extraction latch is engaged. (See [Figure 7](#)).
- f. Close the front panel until the front panel lockout mechanism is engaged. (See [Figure 6](#)).

## Port Label Description

[Table 1](#) lists the connection ports, description, and the type of connectors used for each port. All ports are on the drawer face plate, which is equipped with optical MPO-MPO adapters and one USB Type A receptacle connector.

**Table 1** *Port Label Descriptions*

Port Label	Description	Type of Connector
EXP-A	Common Input/Output	MPO
EXP-B	Common Input/Output	MPO
EXP-C	Common Input/Output	MPO
EXP-D	Common Input/Output	MPO
INV	USB Inventory Port	USB Type A receptacle connector

## Port Identification Label

The port identification label is silkscreened on the drawer face plate of the sliding drawer.

Figure 11 shows the port identification label.

**Figure 11 Patch-Panel Port Identification Label**



## Fiber-Optic Connector Cleaning and Maintenance

Connector cleaning is required to maintain the performance of fiber-optic circuits. It is important that both the MPO connector at the end of the fiber-optic cable and the mating bulkhead adapter on the front panel of the patch panel are clean before you connect the cables.



**Warning**

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**Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.** Statement 1051

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The following warning applies to disposal of chemicals and other materials used to clean connectors and adapters:



**Warning**

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**Ultimate disposal of this product should be handled according to all national laws and regulations.** Statement 1040

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**Note**

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Before installing the fiber-optic cable, always perform the cleaning procedure for cable connectors described in the following section. Whenever possible, inspect each connector before connecting it to the mating bulkhead adapter on the front panel.

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**Note**

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The MPO adapters on the ONS 15454-PP-SMR front panel are less likely to get dirty if they are capped when not in use. Because the procedure for a thorough cleaning of these adapters is complicated and involves opening the patch panel, Cisco recommends that you use a commercially available cleaning kit and closely follow the instructions included with the kit. Only a simple, routine cleaning procedure for these adapters that can be easily performed by the customer is described here.

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## Customer Supplied Cleaning Materials

The MPO dry cloth cartridge cleaners are recommended to clean the cable connector, but are not supplied with the patch panel.

When cleaning a paired cable connector (bulkhead mating adapter), always clean the mating adapter first.

If properly maintained (only used with clean, defect-free fiber connectors and capped when not in use), the mating adapter would not require cleaning. However, if you suspect the adapter is dirty, clean it using the dry cloth cartridge cleaner.

## Cleaning the Bulkhead Mating Adapters

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- Step 1** Read the manufacturer instructions to insert the cartridge cleaning tip into the mating adapter.
  - Step 2** Slide the lever on the cartridge to swipe the mating surface.

**Note**

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Always keep unused adapter ports and fiber connectors capped with a clean dust cap.

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## Cleaning the Fiber-Optic Cable Connectors

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- Step 1** Remove the protective cap on the MPO optical fiber cable connector.
- Step 2** Read the manufacturer instructions to insert the connector into the adapter of the MPO style dry cloth cleaning cartridge.
- Step 3** Slide the lever on the cartridge to swipe the connector surface.
- Step 4** Insert the fiber connector into the applicable adapter or attach a dust cap to the fiber connector.

**Note**

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If you must replace a dust cap on a connector, first verify that the dust cap is clean.

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## Installing and Routing the Fiber-Optic Cables

**Warning**

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**Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.**  
Statement 1051

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**Caution**

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When connecting an optical fiber patch cord between the patch panel and the optical card ports in the ONS 15454, use the electrostatic discharge wristband supplied with the ONS 15454. Plug the wristband into the ESD jack on the lower right front side of the ONS 15454.

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**Note**

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Always clean all fiber connectors thoroughly before making the connection with the mating adapter. Very small particles can permanently damage the end of the mating fiber inside the patch panel, which makes regular cleaning imperative. For cleaning instructions see [“Fiber-Optic Connector Cleaning and Maintenance” section on page 17.](#)

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**Note** The patch panel features MPO bulkhead adapters. Always use fiber-optic cables equipped with the corresponding (MPO) connector type. Using any other type of connector results in damage to the connector and/or adapter.

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- Step 1** Place the MPO cable connector in front of the corresponding bulkhead adapter on the front panel of the patch panel.
- Step 2** Align the keyed ridge of the cable connector with the slot in the receiving adapter.
- Step 3** Gently push the cable connector into the adapter until you hear a click, which indicates that the latching system is engaged.
- Step 4** Route the fiber cables through the left gate ribbons and cable holder. (See [Figure 9](#).)

## Fiber and Cable Management Outside the Patch Panel

The ribbons and the USB cable coming in and out of the patch panel should be guided to provide best edge protection and to keep minimum optical fiber bend radius of 1.5 inches (38.1-mm). The vertical cable guide provides edge protection as the ribbons enter and exit the drawer. It also bundles and provides physical protection to the ribbons and cables along the sides of the rack. When ribbons route downward, each patch panel has a VCG mounted on its sides. When ribbons route upward, the patch panel has a cable guide mounted above it. Once the drawer is closed, all ribbons should be tied with velcro. If there are two or more drawers, one cable guide above all the drawers is used and the ribbons are tied with velcro outside each drawers.



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**Note** The fiber and cable management provided in this guide are for reference only. The users can choose to use different methods according to the local site practice.

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## Mounting the Cable Guide

This section contains illustrations that indicate the position of the cable guide for various rack configurations of the patch panel.

Diagram 1 in [Figure 12](#) indicates the cable guides position for a single patch panel configuration when ribbons and USB cable route upward and there is available space on the frame to mount the cable guides above it. The cable guides must be positioned as shown in Diagram 1 of [Figure 12](#). Do not use cable guides when the mounting brackets are recessed deeper than 2.25-inch (57.15-mm). A 19-inch (482.6-mm) rack is displayed here for reference.

Diagram 2 in [Figure 12](#) indicates the cable guides position when the ribbons and USB cable route downward. Each patch panel will have the cable guides mounted when ribbons and USB cable route downward. A 19-inch (482.6-mm) rack is displayed for reference in Diagram 2 of [Figure 12](#). When the mounting brackets are recessed more than 2.25-inch (57.15- mm), the cable guides must be positioned as displayed in [Diagram 2 of Figure 13](#), assembling them on the ETSI brackets which were previously placed in the 40-mm position of the patch panel. Use only for 5-inch (127-mm), 6-inch (152.4-mm) and 6.5-inch (165.1-mm) mounting brackets recessed positions. In [Diagram 2 of Figure 13](#), a 23-inch (584.2-mm) rack is displayed for reference.

**Figure 12** *Single Drawer Configuration*

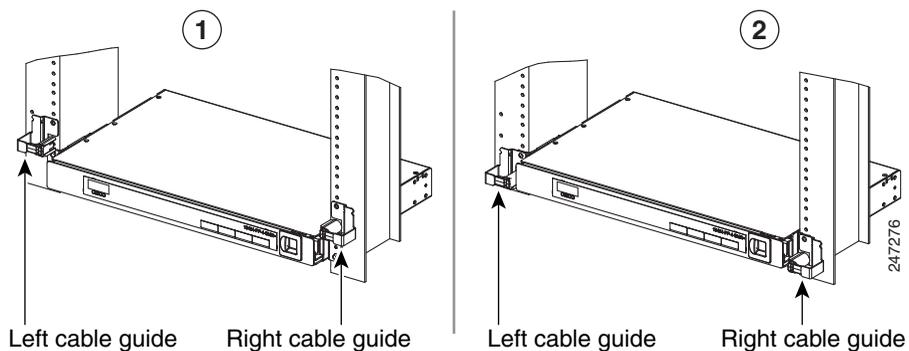
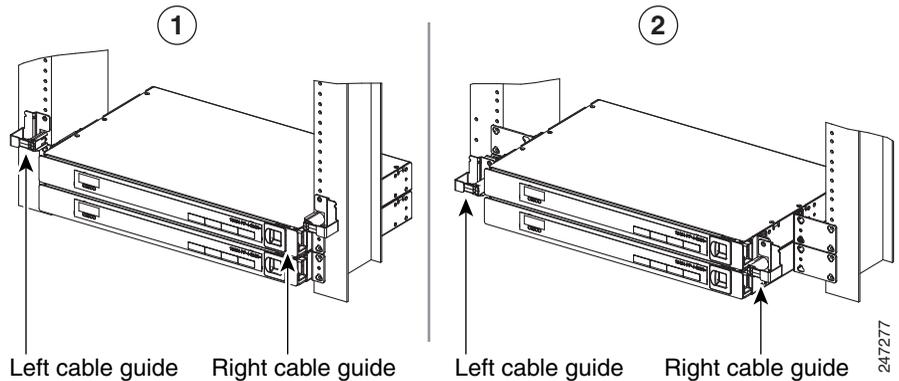


Diagram 1 in [Figure 13](#) indicates the cable guides position for two or more patch panels configuration, and when ribbons and USB cable route upward and there is available space on the frame to mount the cable guides above them. Do not use cable guides when the mounting brackets are recessed deeper than 2.25-inch (57.15-mm). A 19-inch (482.6-mm) rack is displayed for reference.

Diagram 2 in [Figure 13](#) indicates the mounting cable guides position for the patch panels configuration when the mounting brackets are recessed more than 2.25-inch (57.15- mm). The cable guides must be positioned as shown in Diagram 2 of [Figure 13](#), assembling them on the ETSI brackets which were previously placed in the 40-mm position of the patch panel. Use only for 5-inch (127-mm), 6-inch (152.4-mm) and 6.5-inch (165.1-mm) mounting brackets recessed positions. 23-inch (584.2-mm) rack is displayed for reference.

**Figure 13 Two Drawer Configuration**



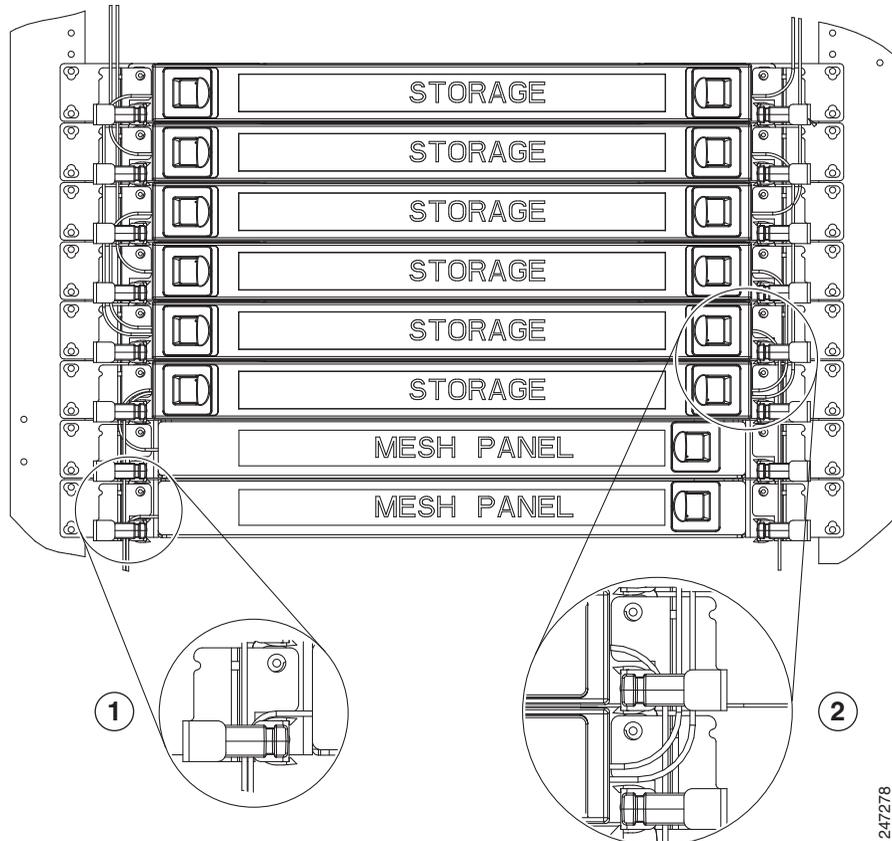
## Fiber Protection

This section contains illustrations that indicate cable guide protection for fibers routing upward and downward and also the protection provided by velcro and cable tie.

Diagram 1 in [Figure 14](#) shows the protection for ribbons and cable routing downward.

Diagram 2 in [Figure 14](#) shows the protection provided by the upper cable guide for ribbons and cable routing upward.

**Figure 14** *Fiber Protection*

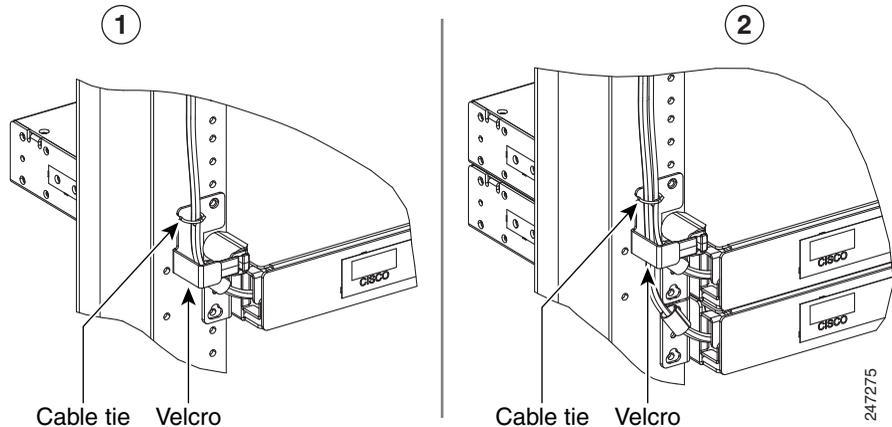


After the patch panel drawer is closed, velcro is wrapped around the ribbons and cables. When ribbons and cables route upward, the cable tie is tied around them through the cable guide. When ribbons and cables route downward, no velcro or cable tie is needed.

Diagram 1 of [Figure 15](#) shows velcro and cable guide tied for a single drawer configuration.

Diagram 2 of [Figure 15](#) shows velcro and cable guide tied for a double drawer configuration.

**Figure 15** *Velcro and Cable Tie*



## Uninstalling the 15454-PP-4-SMR Patch Panel

This procedure describes the steps for uninstalling and removing the patch panel from the rack.

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- Step 1** Open the front panel of the patch panel.
- To open the front panel, follow the instructions in [Step 4](#) of the “[Installing the 15454-PP-4-SMR Patch Panel](#)” section on page 5. (See [Figure 6](#)).
- Step 2** Extract the internal sliding drawer of the patch panel.
- To extract the internal sliding drawer, follow the instructions in [Step 5](#) of the “[Installing the 15454-PP-4-SMR Patch Panel](#)” section on page 5. (See [Figure 7](#) and [Figure 8](#)).
- Step 3** Gently disconnect the MPO connectors from the MPO-MPO adapters.

- Step 4** Disconnect the inventory USB cable releasing it from the USB cable clamp and from the USB type A receptacle connector (See [Figure 10](#)).
- Step 5** Remove ribbons and USB cable from the lateral ribbons and cable holders.
- Step 6** Insert the drawer. (See [Figure 7](#)).
- Step 7** Close the front panel. (See [Figure 6](#)).
- Step 8** Disconnect the ground lug. (See [Figure 5](#)).
- Step 9** Undo the mounting screws and remove the patch panel from the rack.

## Patch Panel Specifications

This section contains environmental, optical, and mechanical specifications for the patch panel.

### Environmental Performance Specifications

[Table 2](#) provides the environmental performance specifications for the patch panel.

**Table 2** *Environmental Performance Specifications*

<b>Environmental Condition</b>	<b>MIN</b>	<b>MAX</b>	<b>Units</b>
Short Term (96 hours/year) Temperature Range (STR)	-5	+55	Celsius
	+23	+131	Fahrenheit
Continuous Operative Temperature Range (OTR)	0	+55	Celsius
	+32	+131	Fahrenheit

## Optical Specifications

Table 3 provides the optical specifications for the patch panel.

**Table 3**      **Optical Specifications**

Parameter	Condition	Min	Max	Units	
Power Handling for the Optical Port	—	500	—	mW	
Power Handling for the USB Port	—	400	600	mW	
Wavelength Range	<ul style="list-style-type: none"> <li>any state of polarization (SOP) and within operative temperature range</li> </ul>	1520	1570	nm	
Insertion Loss EOL (End of life)	<ul style="list-style-type: none"> <li>any state of polarization (SOP) and within operative temperature range</li> </ul>	5.5	7.5	dB	
Insertion Loss Uniformity <sup>1</sup>			0.5	dB	
Insertion Loss Ripple			0.2	dB	
Chromatic Dispersion <sup>2</sup>	<ul style="list-style-type: none"> <li>within wavelength range</li> </ul>	-5.0	+5.0	ps/nm	
Optical Return Loss	<ul style="list-style-type: none"> <li>from each input port of any MPO connector to any output port</li> <li>including two MPO connections</li> </ul>	50.0		dB	
Polarization Dependent Loss (PDL) <sup>3</sup>			0.1	dB	
Polarization Mode Dispersion (PMD) <sup>4</sup>				0.1	ps
Directivity			50.0		dB

1. Insertion Loss Uniformity is defined as the difference between the insertion loss values of any of the four branches of each 1x4 coupler.
2. Chromatic Dispersion is defined as the maximum of derivative of the Group Delay versus the wavelength curve in the 100 GHz transmitted channel bandwidth (Operating Wavelength Bandwidth)

3. PDL (Polarization Dependent Loss) is defined as the difference between the maximum and minimum IL (insertion loss) in the 100 GHz transmitted channel Bandwidth (Operating Wavelength Bandwidth) evaluated at all SOP, measured at a given wavelength.
4. PMD (Polarization Mode Dispersion) is defined as the maximum of the DGD versus the wavelength curve in the 100 GHz transmitted channel bandwidth (Operating Wavelength Bandwidth).

## Mechanical Specifications

The mechanical specifications of the package are indicated in [Table 4](#).

**Table 4**      **Mechanical Specifications**

Parameter	Condition	Specification
Connector Type	All optical ports	MPO
	USB inventory port	USB Type A Receptacle Connector
Optical Adapter Type	All optical ports	MPO-MPO
Patch Panel Dimensions		The Cisco ONS 15454-PP-4-SMR patch panel measures 1.71-inches (43.5-mm) high, 17.21-inches (437.1-mm) wide, and 11.04-inches (280.4-mm) deep

## Related Documentation

Use the Installing Cisco ONS 15454-PP-4-SMR Patch Panel document in conjunction with the following referenced publications:

- Cisco ONS 15454 DWDM Reference Manual
- Cisco ONS 15454 DWDM Procedure Guide
- Cisco ONS 15454 DWDM Troubleshooting Guide

Visit the [End-of-Life and End-of-Sale Notices](#) page for EOL and EOS announcements.

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