



Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

This chapter explains how to install and operate the Cisco ONS 15216-MD-48-CM interleaver and deinterleaver pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 coupler and splitter pluggable.

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Overview of the Cisco ONS 15216-MD-48-CM, ONS 15216-MD-48-CME, and 15216-MD48-CME2 Pluggables

Cisco ONS 15216-MD-48-CM is 50 GHz/100 GHz C-band interleaver and deinterleaver pluggable that provides signal interleaving and deinterleaving in 50-GHz channel spacing DWDM systems. It operates inside the ONS 15216-MD-40, ONS 15216-EF-40, or ONS 15216-MD-48 odd and even patch panels.

Cisco ONS 15216-MD-48-CME and 15216-MD48-CME2 are bidirectional units that have the MUX and the DEMUX functions implemented as two different sections. The DEMUX section includes an optical splitter

to split the optical signal evenly into two different output ports: EVEN-TX port and ODD-TX port. The optical coupler provides the MUX section and combines even and odd channels signals at 100 GHz spacing (EVEN-RX and ODD-RX ports respectively) into a signal of 50 GHz channel spacing. In the Cisco ONS 15216-MD48-CME2 2x2 dual coupler and splitter pluggable, the DEMUX section also provides the input signal to dual monitor ports. The MUX section also duplicates the combined spectrum on two output ports.

For installing the 15216-MD-40 patch panel, refer to the *"Installing the Cisco ONS 15216-MD-40-ODD and 15216-MD-40-EVEN Mux/Demux Patch Panels"* guide. For installing the 15216-EF-40 patch panel, refer to the *"Installing the Cisco ONS 15216-EF-40-ODD and 15216-EF-40-EVEN Mux/Demux Patch Panels"* guide. For installing the 15216-MD-48 patch panel, refer to the *"Installing the Cisco ONS 15216-MD-48-ODD and 15216-MD-48-EVEN Mux/Demux Patch Panels"*

The ONS 15216-MD-48-CM, 15216-MD-48-CME, and 15216-MD48-CME2 interfaces between the following:

- 15216-MD-40 odd/even patch panels and 80 channels of wavelengths
- 15216-EF-40 odd/even patch panels and 80 channels of wavelengths
- 15216-MD-48 odd/even patch panels and 96 channels of wavelengths

The advantages of installing the ONS15216-MD-48-CM, 15216-MD-48-CME, and 15216-MD48-CME2 are:

- Extends existing network capacity.
- Provides low-cost future proofing of network capacity.
- Allows for non-traffic affecting capacity upgrade when the patch panel is equipped with the ONS15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable at first installation.

Features

The ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 is optically and electrically passive and requires no temperature control. It uses fused fiber coupler and birefringent crystal technologies.

The operating features of ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 include:

- Low dispersion
- Low insertion loss
- High channel isolation
- Wide clear bandwidth
- Full C-band coverage
- Interleave and Deinterleave (ONS 15216-MD-48-CM)/Couple and Split (ONS 15216-MD-48-CME/ONS 15216-MD48-CME2) 80 or 96 channels
- Athermal design

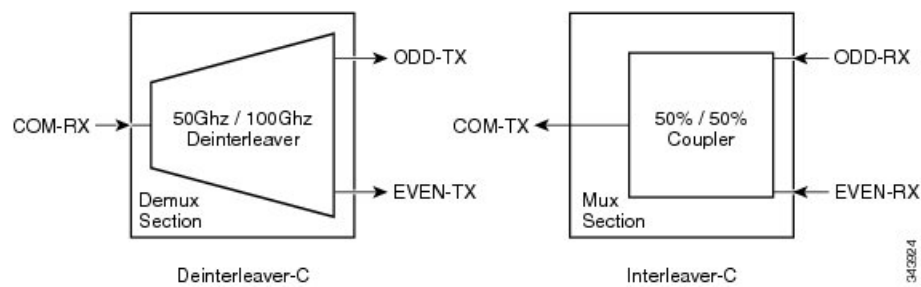
Functional Description

ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable

The ONS 15216-MD-48-CM pluggable increases the network capacity by combining two optical data streams into a single, more densely spaced stream. This pluggable can be used in mux mode to combine two 100 GHz optical signal streams into one 50 GHz stream, or in demux mode to separate the 50 GHz stream into two 100 GHz streams.

The ONS 15216-MD-48-CM is a bidirectional pluggable in which the mux and demux functions are implemented in two different sections to enable signals flowing in opposite directions to be managed separately. This functionality is illustrated in the following figure.

Figure 1: Functional Description of the ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable



The interleaver (3dB optical coupler) in the mux section combines the even and odd channel signals at 100 GHz spacing (EVEN-RX and ODD-RX ports, respectively) into the 50 GHz channel spacing signal.

The deinterleaver in the demux section separates the 50 GHz channel spacing signal into even and odd channel signals of 100 GHz spacing (EVEN-TX and ODD-TX ports, respectively).

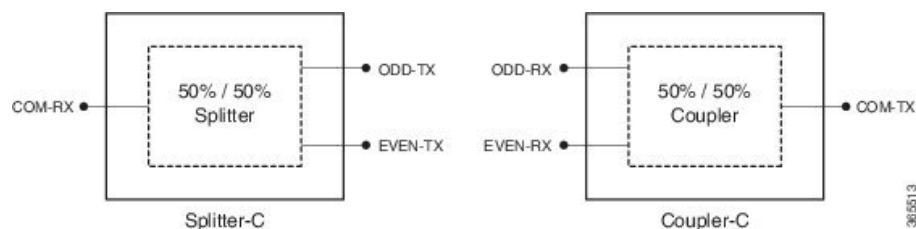
The interleaver and deinterleaver module is plugged inside the patch panel and is interconnected with another patch panel of a different grid (odd or even).

ONS 15216-MD-48-CME and ONS 15216-MD48-CME2 Coupler and Splitter Pluggables

The ONS 15216-MD-48-CME and ONS 15216-MD48-CME2 pluggables increase the network capacity by combining two optical data streams into a single, more densely spaced stream. This pluggable can be used in mux mode to combine two 100 GHz optical signal streams into one 50 GHz stream, or in demux mode to split the optical signal evenly into two different streams.

The ONS 15216-MD-48-CME and 15216-MD48-CME2 are bidirectional pluggables in which the mux and demux functions are implemented in two different sections to enable signals flowing in opposite directions to be managed separately. This functionality is illustrated in the following figure.

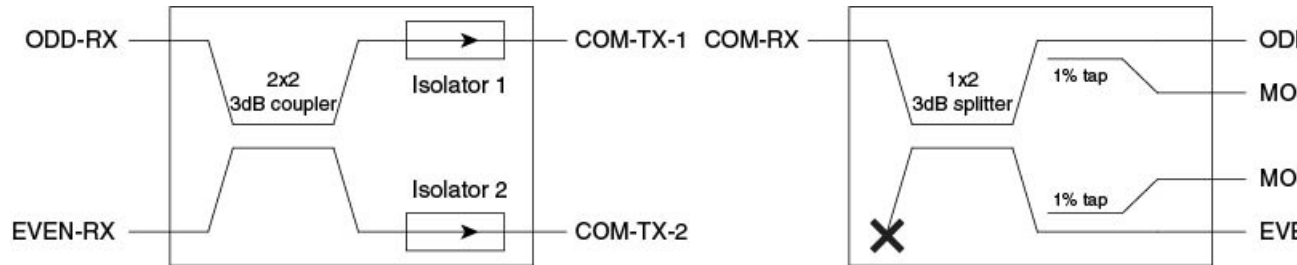
Figure 2: Functional Description of the Coupler and Splitter Pluggable



The DEMUX section includes an optical splitter to split the optical signal evenly into two different output ports: EVEN-TX port and ODD-TX port.

The MUX section includes an optical coupler that combines even and odd channels signals at 100 GHz spacing (EVEN-RX and ODD-RX ports respectively) into a signal of 50 GHz channel spacing.

Figure 3: Functional Description of the 15216-MD48-CME2 Pluggable



Optical Interconnections

Optical Interconnections for ONS 15216-MD-48-CM

The optical interconnections between the odd patch panel, ONS 15216-MD-48-CM interleaver and deinterleaver pluggable and the even patch panel is shown in the following figure.

Figure 4: ONS 15216-MD-40 and ONS 15216-EF-40 Patch Panel Interconnection with ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable

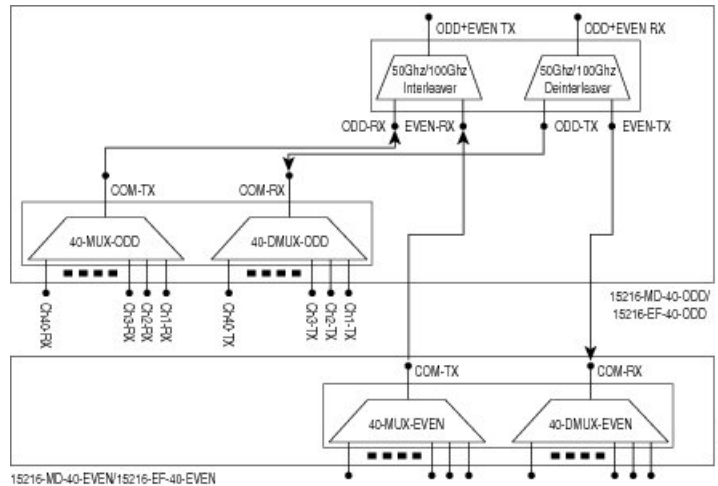
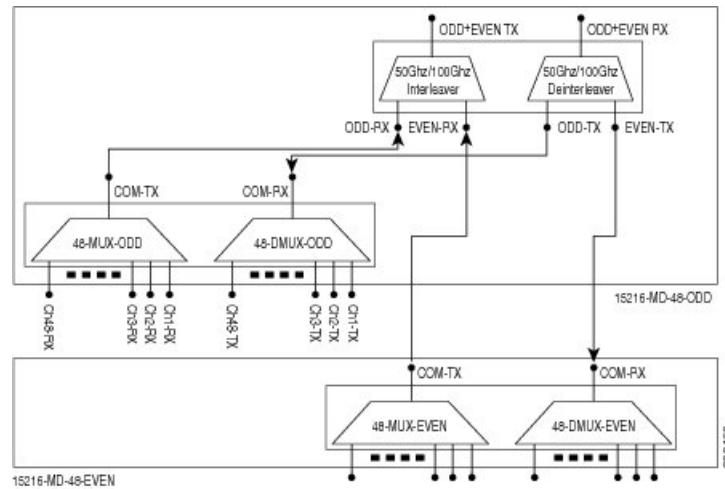


Figure 5: ONS 15216-MD-48 Patch Panel Interconnection with ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable



The port connections between the odd patch panel (15216-MD-40, 15216-EF-40, or 15216-MD-48), ONS 15216-MD-48-CM interleaver and deinterleaver pluggable, and the even patch panel (15216-MD-40, 15216-EF-40, or 15216-MD-48) are established as follows:

- COM-TX port of the odd patch panel and ODD-RX port of the interleaver and deinterleaver pluggable.
- COM-RX port of the odd patch panel and ODD-TX port of the interleaver and deinterleaver pluggable.
- COM-TX port of the even patch panel and EVEN-RX port of the interleaver and deinterleaver pluggable.
- COM-RX port of the even patch panel and EVEN-TX port of the interleaver and deinterleaver pluggable.

Optical Interconnections for ONS 15216-MD-48-CME

The optical interconnections between the odd patch panel, ONS 15216-MD-48-CME coupler and splitter pluggable and the even patch panel is shown in the following figure.

Figure 6: ONS 15216-MD-40 and ONS 15216-EF-40 Patch Panel Interconnection with ONS 15216-MD-48-CME Coupler and Splitter Pluggable

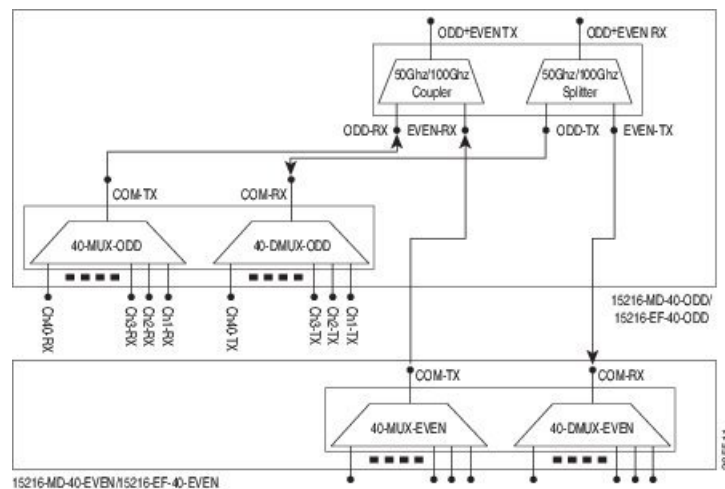
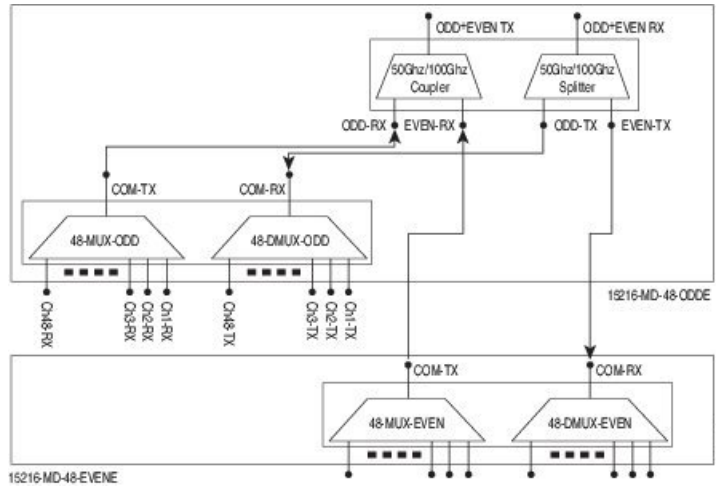


Figure 7: ONS 15216-MD-48 Patch Panel Interconnection with ONS 15216-MD-48-CME Coupler and Splitter Pluggable



The port connections between the odd patch panel (15216-MD-40, 15216-EF-40, or 15216-MD-48), ONS 15216-MD-48-CME coupler and splitter pluggable, and the even patch panel (15216-MD-40, 15216-EF-40, or 15216-MD-48) are established as follows:

- COM-TX port of the odd patch panel and ODD-RX port of the pluggable.
- COM-RX port of the odd patch panel and ODD-TX port of the pluggable.
- COM-TX port of the even patch panel and EVEN-RX port of the pluggable.
- COM-RX port of the even patch panel and EVEN-TX port of the pluggable.

Channel Wavelength Allocation

The following table describes the C-band channel wavelength allocation plan for the odd and even patch panels.

Table 1: 15216-MD-40 and 15216-EF-40 Odd and Even Patch Panels C-Band Channel Wavelength Allocation Plan

Channel Wavelength			Channel Wavelength		
15216-MD-40-ODD/15216-EF-40-ODD			15216-MD-40-ODD/15216-EF-40-EVEN		
Channel Label	Frequency (THz)	Wavelength (nm)	Channel Label	Frequency (THz)	Wavelength (nm)
1	195.9	1530.33	1	195.85	1530.72
2	195.8	1531.12	2	195.75	1531.51
3	195.7	1531.90	3	195.65	1532.29
4	195.6	1532.68	4	195.55	1533.07
5	195.5	1533.47	5	195.45	1533.86
6	195.4	1534.25	6	195.35	1534.64
7	195.3	1535.04	7	195.25	1535.43

Channel Wavelength			Channel Wavelength		
15216-MD-40-ODD/15216-EF-40-ODD			15216-MD-40-ODD/15216-EF-40-EVEN		
Channel Label	Frequency (THz)	Wavelength (nm)	Channel Label	Frequency (THz)	Wavelength (nm)
8	195.2	1535.82	8	195.15	1536.22
9	195.1	1536.61	9	195.05	1537.00
10	195	1537.40	10	194.95	1537.79
11	194.9	1538.19	11	194.85	1538.58
12	194.8	1538.98	12	194.75	1539.37
13	194.7	1539.77	13	194.65	1540.16
14	194.6	1540.56	14	194.55	1540.95
15	194.5	1541.35	15	194.45	1541.75
16	194.4	1542.14	16	194.35	1542.54
17	194.3	1542.94	17	194.25	1543.33
18	194.2	1543.73	18	194.15	1544.13
19	194.1	1544.53	19	194.05	1544.92
20	194	1545.32	20	193.95	1545.72
21	193.9	1546.12	21	193.85	1546.52
22	193.8	1546.92	22	193.75	1547.32
23	193.7	1547.72	23	193.65	1548.11
24	193.6	1548.51	24	193.55	1548.91
25	193.5	1549.32	25	193.45	1549.72
26	193.4	1550.12	26	193.35	1550.52
27	193.3	1550.92	27	193.25	1551.32
28	193.2	1551.72	28	193.15	1552.12
29	193.1	1552.52	29	193.05	1552.93
30	193	1553.33	30	192.95	1553.73
31	192.9	1554.13	31	192.85	1554.54
32	192.8	1554.94	32	192.75	1555.34
33	192.7	1555.75	33	192.65	1556.15
34	192.6	1556.55	34	192.55	1556.96
35	192.5	1557.36	35	192.45	1557.77
36	192.4	1558.17	36	192.35	1558.58
37	192.3	1558.98	37	192.25	1559.39

Channel Wavelength			Channel Wavelength		
15216-MD-40-ODD/15216-EF-40-ODD			15216-MD-40-ODD/15216-EF-40-EVEN		
Channel Label	Frequency (THz)	Wavelength (nm)	Channel Label	Frequency (THz)	Wavelength (nm)
38	192.2	1559.79	38	192.15	1560.20
39	192.1	1560.61	39	192.05	1561.01
40	192	1561.42	40	191.95	1561.83

Table 2: 15216-MD-48 Odd and Even Patch Panels C-Band Channel Wavelength Allocation Plan

Channel Wavelength			Channel Wavelength		
15216-MD-48-ODD/15216-MD-48-ODDE			15216-MD-48-EVEN/15216-MD-48-EVENE		
Channel Label	Frequency (THz)	Wavelength (nm)	Channel Label	Frequency (THz)	Wavelength (nm)
1	196.1	1528.77	1	196.05	1529.16
2	196.0	1529.55	2	195.95	1529.94
3	195.9	1530.33	3	195.85	1530.72
4	195.8	1531.12	4	195.75	1531.51
5	195.7	1531.90	5	195.65	1532.29
6	195.6	1532.68	6	195.55	1533.07
7	195.5	1533.47	7	195.45	1533.86
8	195.4	1534.25	8	195.35	1534.64
9	195.3	1535.04	9	195.25	1535.43
10	195.2	1535.82	10	195.15	1536.22
11	195.1	1536.61	11	195.05	1537.00
12	195	1537.40	12	194.95	1537.79
13	194.9	1538.19	13	194.85	1538.58
14	194.8	1538.98	14	194.75	1539.37
15	194.7	1539.77	15	194.65	1540.16
16	194.6	1540.56	16	194.55	1540.95
17	194.5	1541.35	17	194.45	1541.75
18	194.4	1542.14	18	194.35	1542.54
19	194.3	1542.94	19	194.25	1543.33
20	194.2	1543.73	20	194.15	1544.13
21	194.1	1544.53	21	194.05	1544.92
22	194	1545.32	22	193.95	1545.72
23	193.9	1546.12	23	193.85	1546.52

Channel Wavelength			Channel Wavelength		
15216-MD-48-ODD/15216-MD-48-ODDE			15216-MD-48-EVEN/15216-MD-48-EVENE		
Channel Label	Frequency (THz)	Wavelength (nm)	Channel Label	Frequency (THz)	Wavelength (nm)
24	193.8	1546.92	24	193.75	1547.32
25	193.7	1547.72	25	193.65	1548.11
26	193.6	1548.51	26	193.55	1548.91
27	193.5	1549.32	27	193.45	1549.72
28	193.4	1550.12	28	193.35	1550.52
29	193.3	1550.92	29	193.25	1551.32
30	193.2	1551.72	30	193.15	1552.12
31	193.1	1552.52	31	193.05	1552.93
32	193	1553.33	32	192.95	1553.73
33	192.9	1554.13	33	192.85	1554.54
34	192.8	1554.94	34	192.75	1555.34
35	192.7	1555.75	35	192.65	1556.15
36	192.6	1556.55	36	192.55	1556.96
37	192.5	1557.36	37	192.45	1557.77
38	192.4	1558.17	38	192.35	1558.58
39	192.3	1558.98	39	192.25	1559.39
40	192.2	1559.79	40	192.15	1560.20
41	192.1	1560.61	41	192.05	1561.01
42	192	1561.42	42	191.95	1561.83
43	191.9	1562.23	43	191.85	1562.64
44	191.8	1563.05	44	191.75	1563.45
45	191.7	1563.86	45	191.65	1564.27
46	191.6	1564.68	46	191.55	1565.09
47	191.5	1565.50	47	191.45	1565.90
48	191.4	1566.31	48	191.35	1566.72

Port Label Description

The following table lists the connection ports, description, and the type of connectors used for each port. All ports are on the front faceplate of ONS 15216-MD-48-CM/15216-MD-48-CME, which is equipped with optical LC adapters and one USB Type A receptacle connector.

Table 3: Port Label Descriptions

Port Label	Description	Type of Connector
ODD+EVEN-RX	Common input	LC-UPC II
ODD-TX	Odd channels output	LC-UPC II
EVEN-TX	Even channels output	LC-UPC II
ODD+EVEN-TX	Common output	LC-UPC II
ODD-RX	Odd channels input	LC-UPC II
EVEN-RX	Even channels input	LC-UPC II
INV	USB inventory port	USB Type A receptacle connector

The following table lists the connection ports, description, and the type of connectors used for each port. All ports are on the front faceplate of 15216-MD48-CME2.

Table 4: Port Label Descriptions

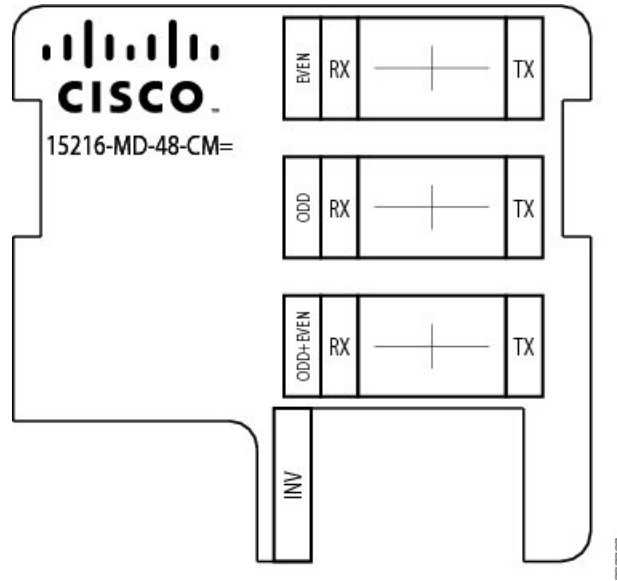
Port Label	Description	Type of Connector
ODD+EVEN-RX	Common input	LC-UPC II
ODD-TX	Odd channels output	LC-UPC II
EVEN-TX	Even channels output	LC-UPC II
ODD+EVEN-TX	Common output	LC-UPC II
ODD-RX	Odd channels input	LC-UPC II
EVEN-RX	Even channels input	LC-UPC II
COM1-TX		
COM1-RX		
COM2-TX		
MON-TX1		
MON-TX2		

Channel Identification Label

ONS 15216-MD-48-CM

The channel identification label is placed on the ONS 15216-MD-48-CM interleaver and deinterleaver pluggable faceplate. The following figure shows the product identification and channel identification label of the ONS 15216-MD-48-CM interleaver and deinterleaver pluggable.

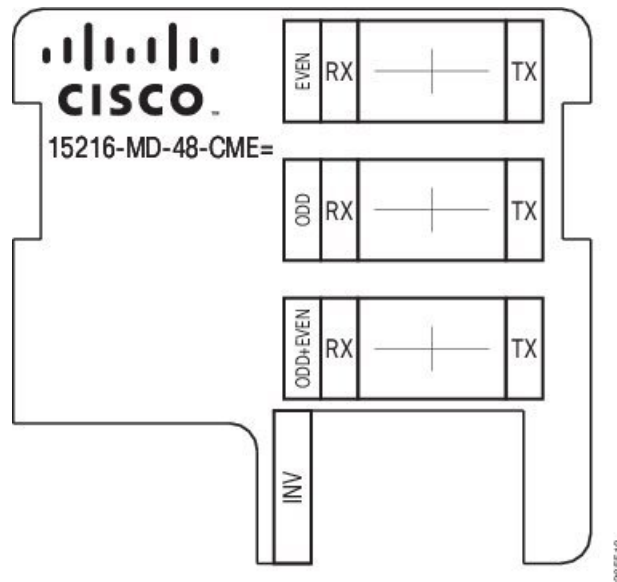
Figure 8: ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable-Product and Channel ID Label



ONS 15216-MD-48-CME

The channel identification label is placed on the ONS 15216-MD-48-CME coupler and splitter pluggable faceplate. The following figure shows the product identification and channel identification label of the ONS 15216-MD-48-CME coupler and splitter pluggable.

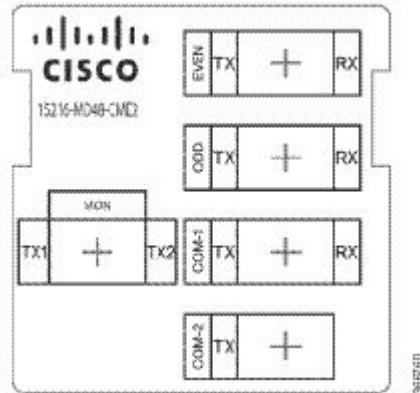
Figure 9: ONS 15216-MD-48-CME Coupler and Splitter Pluggable-Product and Channel ID Label



ONS 15216-MD48-CME2

The channel identification label is placed on the ONS 15216-MD48-CME2 coupler and splitter pluggable faceplate. The following figure shows the product identification and channel identification label of the ONS 15216-MD48-CME2 coupler and splitter pluggable.

Figure 10: ONS 15216-MD48-CME2 Coupler and Splitter Pluggable-Product and Channel ID Label



Safety Information

Before you install, operate, or service this product, you must read the [Regulatory Compliance and Safety Information for Cisco Optical Transport Products](#) document for important safety information and warning translations.

This product is compliant with the GR 1089, UL60950 /CSA 22.2 No. 60950-00, and IEC 60950 standards.

Laser Radiation Emission Restrictions

The Class 1M Laser safety and warning label is affixed to this product and indicates that the product should never be used or installed in an optical network with emissions higher than Class 1M.



Warning

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



Warning

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

Electrical Safety

This product is optically and electrically passive and requires no electrical connections. No electrostatic discharge (ESD) or other electrical safety considerations apply.

Unpacking and Verifying the ONS 15216-MD-48-CM/15216-MD-48-CME Pluggable

Procedure

- Step 1** Unpack and inspect the pluggable. The package should include these components:
- ONS 15216-MD-48-CM or 15216-MD-48-CME or 15216-MD48-CME2 pluggable
 - Packing slip
- Step 2** Compare the equipment received with the packing slip and the equipment list that the customer service representative 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 ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 Pluggable

The following procedure explains how to install the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable inside the 15216-EF-40 or 15216-MD-48 odd and even patch panels. To install the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 inside the 15216-MD-40 odd or even patch panel, see the *Installing Cisco ONS 15216-MD-ID-50 Optical Interleaver and Deinterleaver Pluggable* guide.

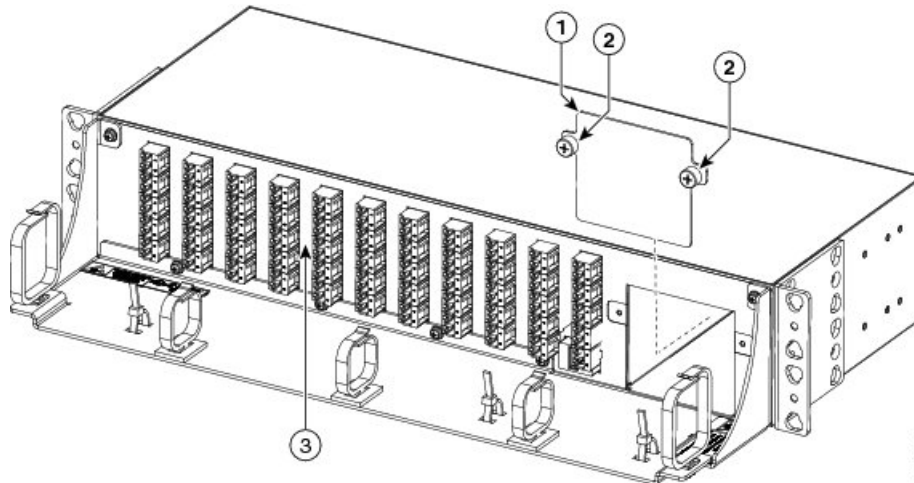


- Caution** Use only the fastening hardware provided with the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.
-

Procedure

- Step 1** Unscrew the captive screws to remove the Interleaver/Deinterleaver (I/D) or the Coupler/Splitter blank cover from the patch panel as shown in the following figure:

Figure 11: Removing the Interleaver/Deinterleaver or Coupler/Splitter Blank Cover

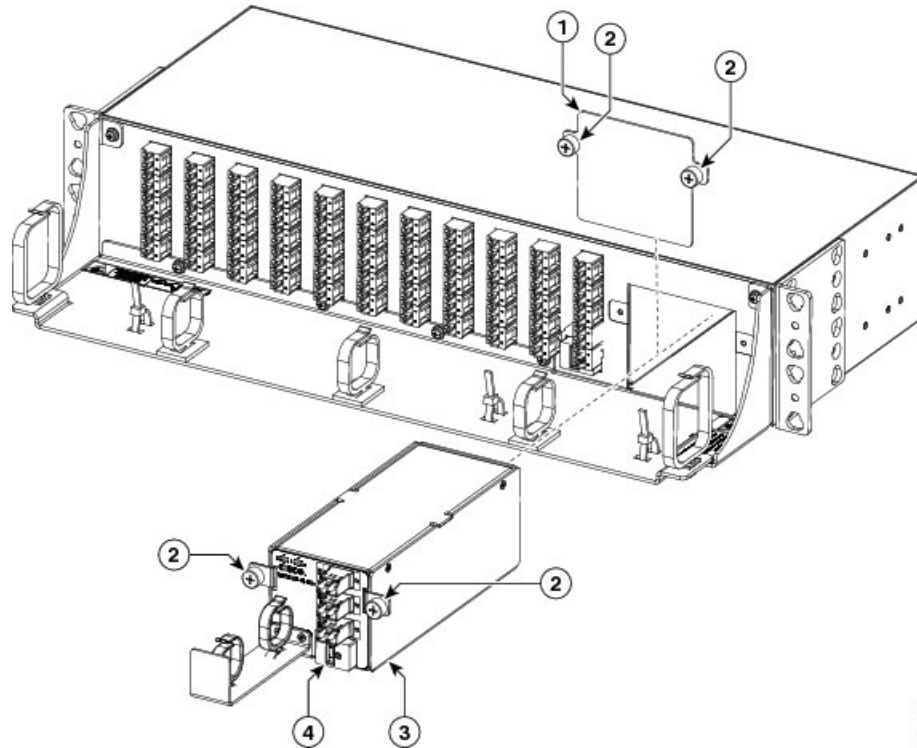


1	Interleaver/Deinterleaver or Coupler/Splitter blank cover	2	Captive screw
3	Front plate		

Note During an in-field upgrade, all the fibers installed previously must be routed toward the left fiber bend radius controller. To plug in the pluggable, the space in front of the I/D blank cover must be free of fibers and cables.

- Step 2** Insert the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable as shown in the following figure:

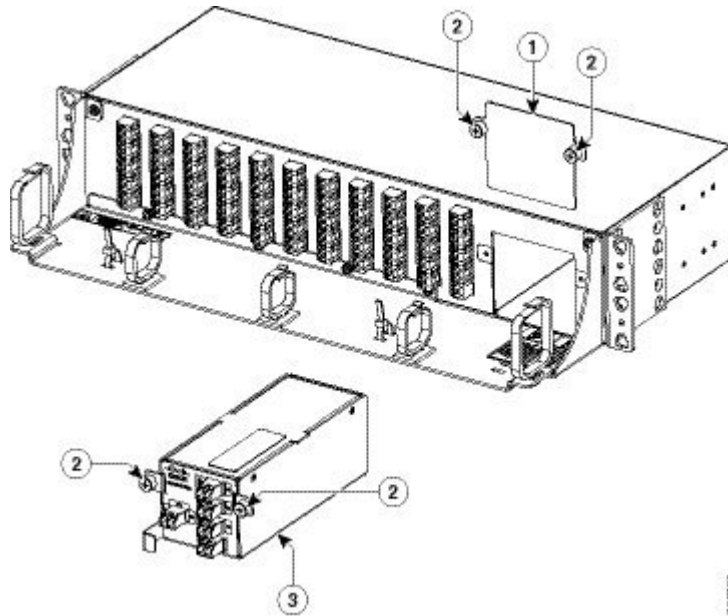
Figure 12: Inserting the ONS 15216-MD-48-CM/15216-MD-48-CME Pluggable



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1	Interleaver/Deinterleaver or Coupler/Splitter blank cover	2	Captive screw
3	Interleaver/Deinterleaver or Coupler/Splitter pluggable	4	Inventory USB Type A receptacle connector

Figure 13: Inserting the ONS 15216-MD48-CME2 Pluggable



1	Interleaver/Deinterleaver or Coupler/Splitter blank cover	2	Captive screw
3	ONS 15216-MD48-CME2 pluggable		

Step 3 Tighten the screws of the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable.

For installing and routing fiber-optic and USB cables, see "[Install and Route Fiber-Optic and USB Cables, on page 16](#)". For cleaning the fiber-optic connectors, see "[Cleaning and Maintaining Fiber-Optic Connectors, on page 20](#)".

Install and Route Fiber-Optic and USB Cables

All connectors are on the front of the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable and are equipped with LC/UPC bulkhead adapters and with a USB Type A receptacle connector for inventory purpose. For port label description, see "[Table 3: Port Label Descriptions, on page 10](#)". The LC-LC patch cords are used to connect the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable to the patch panels.



Warning

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



Caution When connecting an optical fiber patch cord between the patch panel and the optical card ports in a Cisco 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.



Note 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 "[Clean Fiber-Optic Cable Connectors, on page 21](#)".



Caution The ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggables have LC/UPC bulkhead adapters for optical connections. Always use fiber-optic cables equipped with the corresponding (LC/UPC) connector type. Using any other type of connector results in damage to the connector or adapter, or both.

Procedure

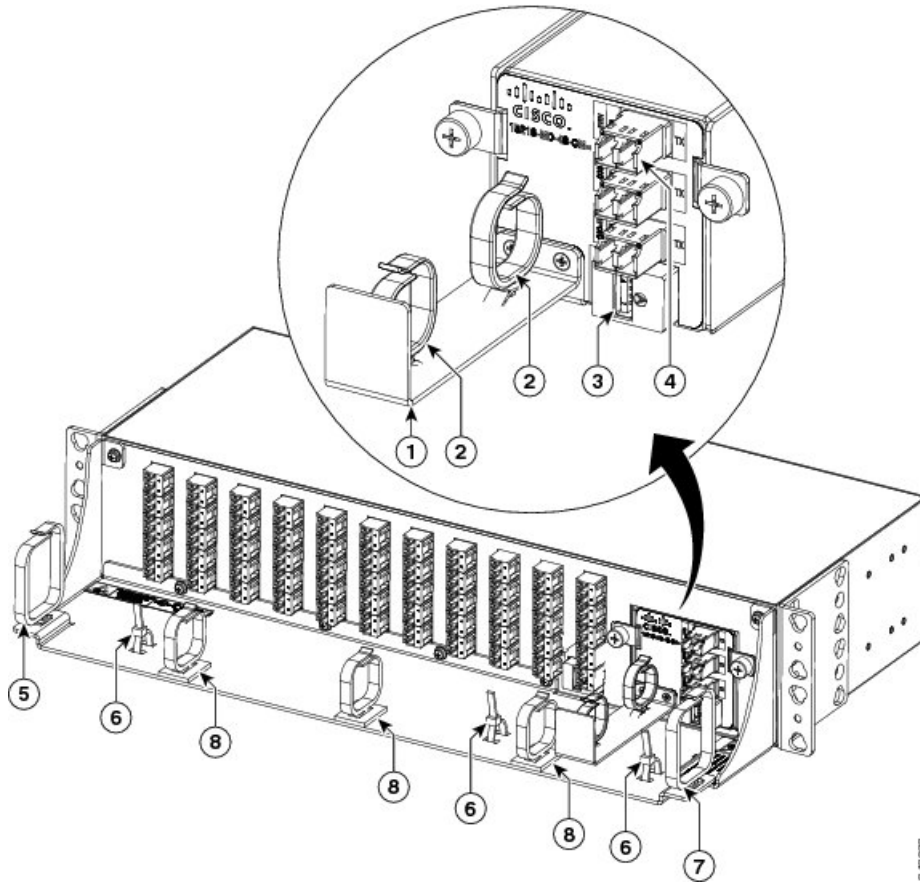
Step 1 To connect the fibers as appropriate (see the following figure):

- a) Remove the LC adapter cap from the LC-LC adapter of the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable .
- b) Place the LC/UPC cable connector in front of the corresponding bulkhead adapter on the front panel of the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable.
- c) Align the keyed ridge of the cable connector with the slot in the receiving adapter.
- d) Gently push the cable connector into the adapter until you hear a click, which indicates that the latching system is engaged.
- e) Route the cables through the left or right fiber holder clip.
- f) (Optional) Secure the fibers further by placing them into one or more adhesive clips. The adhesive clips can be placed on the fiber management plate as per the actual installation conditions.
- g) Place the extra fiber length of the two LC-LC patch cords used to connect the patch panel with its plugged ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 module on the interleaver/deinterleaver or coupler/splitter fiber management bracket.

Note The interleaver/deinterleaver or coupler/splitter fiber management bracket can be removed from the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable and the extra fiber length of the two LC-LC patch cords can be routed outside the patch panel.

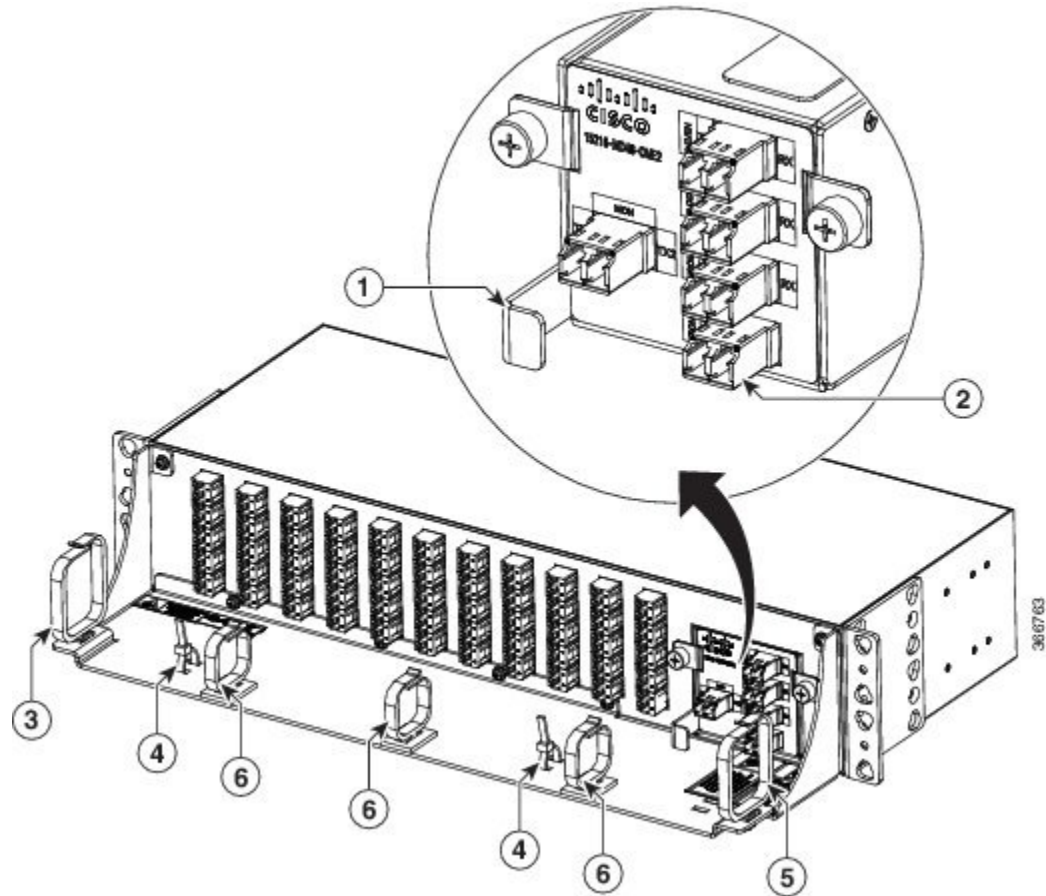
For interconnections between the ONS 15216-MD-48-CM/15216-MD-48-CME pluggables, odd or even patch panel with a patch panel of a different grid, see "[Optical Interconnections , on page 4](#)".

Figure 14: 15216-MD-48-CM/15216-MD-48-CME - Connecting and Routing Cables



1	Interleaver/Deinterleaver or Coupler/Splitter fiber management bracket	2	Interleaver/Deinterleaver or Coupler/Splitter fiber clip
3	Inventory USB Type A receptacle connector	4	LC-LC adapter
5	Left fiber holder clip	6	Tie-wrap
7	Right fiber holder clip	8	Adhesive fiber holder clip

Figure 15: 15216-MD48-CME2 - Connecting and Routing Cables



1	Unit withdrawal hook	2	LC-LC adapter
3	Left fiber holder clip	4	Tie-wrap
5	Right fiber holder clip	6	Adhesive fiber holder clip

Step 2 To secure the fibers, bundle the fibers using one of the four velcro strips that is provided.

Step 3 To connect and secure the inventory USB Type A plug connector to the inventory USB Type A receptacle connector (see [Figure 14: 15216-MD-48-CM/15216-MD-48-CME - Connecting and Routing Cables, on page 18](#)):

- Route the inventory USB cable through the left or right fiber holder clip.
- Connect the USB Type A plug connector to the USB Type A receptacle connector.
- Secure the USB cable with a tie-wrap at one of the three available locations on the patch panel.

Uninstalling the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 Pluggable

Procedure

- Step 1** Gently disconnect the fiber-optic connectors from the LC-LC adapters of the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable.
 - Step 2** Disconnect the inventory USB cable releasing it from the tie wrap and from the USB receptacle connector of the pluggable. Clear the front of the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable from any cable or fiber.
 - Step 3** Unscrew the captive screws of the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable.
 - Step 4** Remove the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable from the patch panel.
 - Step 5** Close the empty space on the patch panel with the I/D blank cover.
-

Cleaning and Maintaining Fiber-Optic Connectors

Connector cleaning is required to maintain the performance of fiber-optic circuits. It is important that both the LC/UPC connector at the end of the fiber-optic cable and the optical mating adapter on the front panel of the device are clean before the connection is made.



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

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



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



Note 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 optical mating adapter on the front panel.



Note The LC optical mating adapter on the faceplate of the device is less likely to get dirty if it is capped when not in use. On some devices, the optical mating adapter has a shutter. The shutter automatically closes when the LC/UPC connector is disconnected. This prevents entry of dirt.

The procedure for a thorough cleaning of these adapters is complicated. Use a commercially available cleaning kit and closely follow the instructions included with the kit.

Customer-supplied Cleaning Materials

The Type A fiber optic connector cleaners (for example, CLETOP reel) are recommended to clean the cable connectors, but are not supplied with the device.

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 by using the CLETOP stick swab.



Note For multifiber cable assemblies, use specific cleaning tools or materials designed for the assembly type.

Cleaning the Optical Mating Adapter

Procedure

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

Note Always keep unused adapter ports and fiber connectors capped with a clean dust cap. The optical mating adapters that have shutter need not be capped.

Clean Fiber-Optic Cable Connectors

The tools required to clean fiber connectors are:

- Inspection microscope
- Type A Fiber Optic Connector Cleaner (CLETOP reel)
- Optical swab
- Optical receiver cleaning stick

Procedure

Step 1 Using an inspection microscope, inspect each fiber connector for dirt, cracks, or scratches.

Step 2 Replace any damaged fiber connectors.

Note Replace all dust caps whenever the equipment is unused for 30 minutes or more.

Caution Do not reuse optical swabs. Keep unused swabs off of work surfaces.

Step 3 Clean the fiber connectors with CLETOP reel:

- a) If present, remove the dust cap from the fiber connector.
- b) Press the lever down to open the shutter door. When you press the lever each time, you expose a clean wiping surface.
- c) Insert the connector into the CLETOP cleaning cassette slot, rotate one-quarter turn, and gently swipe downwards.
- d) Use an inspection microscope to inspect each fiber connector for dirt, cracks, or scratches. If the connector is not clean, repeat the above sub-steps.
- e) Insert the fiber connector into the applicable adapter or attach a dust cap to the fiber connector.

Note Before replacing a dust cap on a connector, verify that the dust cap is clean. To clean the dust cap, wipe the outside of the cap using a dry, lint-free wipe and the inside of the dust cap using a CLETOP stick swab (14100400).

Cisco ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 Pluggable Specifications

This section contains environmental, power, optical, connector and mechanical specifications for the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable.

Environmental and Power Specifications

Table 5: Environmental and Power Specifications for ONS 15216-MD-48-CM

Environmental Condition	Minimum	Maximum	Units
Short Term (96 hours/year) Temperature Range (STR)	-5	65	Celsius
	23	149	Fahrenheit
Continuous Operative Temperature Range (OTR)	5	40	Celsius
	41	104	Fahrenheit

Environmental Condition	Minimum	Maximum	Units
Power handling for the optical port	500	—	mW
Power handling for the USB Port	400	600	mW

Table 6: Environmental and Power Specifications for ONS 15216-MD-48-CME

Environmental Condition	Minimum	Maximum	Units
Storage Temperature Range	-40	85	Celsius
	-40	185	Fahrenheit
Continuous Operative Temperature Range (OTR)	-5	65	Celsius
	23	149	Fahrenheit
Power handling for each port	500	—	mW

Table 7: Environmental and Power Specifications for 15216-MD48-CME2

Environmental Condition	Minimum	Maximum	Units
Short Term (96 hours/year) Temperature Range (STR)	-40	85	Celsius
	-40	185	Fahrenheit
Continuous Operative Temperature Range (OTR)	-5	65	Celsius
	23	149	Fahrenheit
Operating Humidity	5	95	RH
Power handling for each port	500	—	mW

Optical Specifications

Table 8: Optical Specifications for ONS 15216-MD-48-CM

Parameter	Condition	Min	Typical	Max	Units
50 GHz /100 GHz Channel Grids					

Optical Specifications

Parameter	Condition	Min	Typical	Max	Units
ITU Channel Center Frequencies /Wavelength	<ul style="list-style-type: none"> • COM ports • Within short term temperature range 	191.35	—	196.10	THz
ITU Channel Spacing		1528.77	—	1566.72	nm
		50		—	GHz
Number of Channels		96		—	
ITU Channel center frequencies/Wavelength (ODD Grid)	<ul style="list-style-type: none"> • ODD ports • Within short term temperature range 	191.40	—	196.10	THz
		1528.77	—	1566.31	nm
ITU Channel spacing - ODD Grid		100		—	GHz
Number of Channels		48		—	
ITU Channel center frequencies/Wavelength (EVEN Grid)	<ul style="list-style-type: none"> • EVEN ports • Within short term temperature range 	191.35	—	196.05	THz
		1529.16	—	1566.72	nm
ITU Channel spacing - EVEN Grid		100		—	GHz
Number of Channels		48		—	
Deinterleaver Module					
Operating Bandwidth		± 10	—	—	GHz
Bandwidth at -0.5 dB	<ul style="list-style-type: none"> • Any state of polarization (SOP) and within operative temperature range • Around ITU center wavelength 	± 10	± 11	—	GHz
Bandwidth at -1.0 dB		± 12	± 13	—	GHz
Bandwidth at -3.0 dB		± 16	± 17	—	GHz

Parameter	Condition	Min	Typical	Max	Units
Bandwidth at -0.5 dB	<ul style="list-style-type: none"> Any state of polarization (SOP) and within short term temperature range Around ITU center wavelength 	± 8	± 9	—	GHz
Bandwidth at -1.0 dB		± 10	± 12	—	GHz
Bandwidth at -3.0 dB		± 14	± 16	—	GHz
DMX Adjacent Channel Isolation ¹	<ul style="list-style-type: none"> Any state of polarization (SOP) and within operating bandwidth 	25	28	—	dB
Insertion Loss EOL— COM-RX to ODD-TX path and COM-RX to EVEN-TX path	<ul style="list-style-type: none"> Any state of polarization (SOP) and within operating bandwidth including connectors 	0.5	± 1.8	2.5	dB

Optical Specifications

Parameter	Condition	Min	Typical	Max	Units
Insertion Loss Uniformity ²	<ul style="list-style-type: none"> Any state of polarization (SOP) and within operating bandwidth including connectors 	—	0.35	0.5	dB
Channels Band Ripple		—	—	0.5	dB
Group Delay Ripple (GDR) ³		—	1.8	± 2.5	ps
Chromatic Dispersion ⁴		—	± 15	± 45	ps/nm
Optical Return Loss		40.0	45.0	—	dB
Polarization Dispersion Loss (PDL) ⁵		—	0.3	0.4	dB
Polarization Mode Dispersion (PMD) ⁶		—	0.25	0.3	ps
Directivity ODD-TX<- -> EVEN-TX ports		40.0	—	—	dB
Interleaver Module (50%/50% Coupler)					
Wavelength range	<ul style="list-style-type: none"> Any state of polarization (SOP) and within short term temperature range 	1525 to 1570	—	—	nm

Parameter	Condition	Min	Typical	Max	Units
Insertion Loss EOL— COM-RX to ODD-TX path and COM-RX to EVEN-TX path	<ul style="list-style-type: none"> Any state of polarization (SOP) and within wavelength range including connectors 	2.5	—	3.6	dB
Insertion Loss Uniformity ⁷		—	—	0.5	
Insertion Loss Ripple ⁸		—	—	0.2	dB
Chromatic Dispersion		—	—	± 5	ps/nm
Optical Return Loss		40.0	—	—	dB
Polarization Dispersion Loss		—	—	0.1	dB
Polarization Mode Dispersion		—	—	0.1	
Directivity ODD-RX<-- --> EVEN-RX ports		50.0	—	—	dB

- ¹ Adjacent Channel Isolation is defined as the difference between the maximum IL in the 50 GHz transmitted channel Bandwidth (ITU ± 80 pm) and the minimum IL measured over the Operating Wavelength Bandwidth (± 80 pm, centered on each ITU wavelength of the channel) of both adjacent 100 GHz channels.
- ² Defined as the difference between the maximum insertion losses over any two wavelengths in the wavelength range.
- ³ The difference between the maximum and minimum group delay in the Operating Wavelength Bandwidth of each channel evaluated at all SOP.
- ⁴ Chromatic Dispersion is defined as the maximum of derivative of the Group Delay versus the wavelength curve in the 50 GHz transmitted channel bandwidth (Operating Wavelength Bandwidth)
- ⁵ PDL (Polarization Dependent Loss) is defined as the difference between the maximum and minimum IL in the 100 GHz transmitted channel Bandwidth (Operating Wavelength Bandwidth) evaluated at all SOP, measured at a given wavelength.
- ⁶ PMD (Polarization Mode Dispersion) is defined as the maximum of the DGD versus the wavelength curve in the 50 GHz transmitted channel bandwidth (Operating Wavelength Bandwidth).
- ⁷ Defined as the difference between the insertion loss values of the ODD-RX —>COM-TX and the EVEN-RX —>COM-TX paths.
- ⁸ Difference between the maximum and minimum Insertion Loss values measured within the overall Operating Wavelength Bandwidth.

Table 9: Optical Specifications for ONS 15216-MD-48-CME

Parameter	Condition	Min	Typical	Max	Units
50 GHz /100 GHz Channel Grids					

Optical Specifications

Parameter	Condition	Min	Typical	Max	Units
ITU Channel Center Frequencies /Wavelength	<ul style="list-style-type: none"> • COM ports • Within short term temperature range 	191.35	—	196.1	THz
		1566.72	—	1528.77	nm
Insertion Loss EOL— ODD-RX to COM-TX path EVEN-RX to COM-TX path	<ul style="list-style-type: none"> • Any state of polarization (SOP) and within operating bandwidth including connectors 	2.5	—	3.5	dB
Insertion Loss Uniformity ⁹	<ul style="list-style-type: none"> • Any state of polarization (SOP) and within operating bandwidth including connectors 	—	—	0.6	dB
Insertion Loss Ripple ¹⁰		—	—	0.25	dB
Chromatic Dispersion ¹¹		—	—	± 5	ps/nm
Optical Return Loss		40.0	—	—	dB
Polarization Dispersion Loss (PDL) ¹²		—	—	0.15	dB
Polarization Mode Dispersion (PMD) ¹³		—	—	0.1	ps
Directivity ODD-RX<- -> EVEN-RX ports		50	—	—	dB

⁹ Defined as the difference between the maximum insertion losses over any two wavelengths in the wavelength range.

¹⁰ Difference between the maximum and minimum Insertion Loss values measured within the overall Operating Wavelength Bandwidth.

¹¹ Chromatic Dispersion is defined as the maximum of derivative of the Group Delay versus the wavelength curve in the 50 GHz transmitted channel bandwidth (Operating Wavelength Bandwidth)

¹² PDL (Polarization Dependent Loss) is defined as the difference between the maximum and minimum IL in the 100 GHz transmitted channel Bandwidth (Operating Wavelength Bandwidth) evaluated at all SOP, measured at a given wavelength.

¹³ PMD (Polarization Mode Dispersion) is defined as the maximum of the DGD versus the wavelength curve in the 50 GHz transmitted channel bandwidth (Operating Wavelength Bandwidth).

Table 10: Optical Specifications for ONS 15216-MD48-CME2

Parameter	Min	Max	Units
Frequency range	191.35	196.10	Thz
Wavelength range	1528.77	1566.72	nm
DEMUX insertion loss	2.5	3.8	dB
MUX insertion loss	3.2	4.2	dB
Insertion loss uniformity	—	0.6	dB
Insertion loss ripple	—	0.3	dB
Chromatic dispersion	—	± 5	ps/nm
Optical return loss	40	—	dB
Polarization dispersion loss	—	0.25	dB
Polarization mode dispersion	—	0.1	ps
Directivity ODD-RX <--> EVEN-RX ports	40	—	dB
Directivity COM TX-1/2 <--> ODD/EVEN-RX ports	40	—	dB
MON ports relative attenuation	18	22	dB

Connector and Mechanical Specifications

Table 11: Connector and Mechanical Specifications

Parameter	Condition	Specification
Connector Type	All optical ports	LC/UPC II
	USB inventory port	USB Type A receptacle connector
Adapter Type	All optical ports	LC
Patch Panel Dimensions		9.911-inches (251.7 mm) long, 2.645-inches (67.2 mm) wide, and 2.452-inches (62.2 mm) high. Considering the captive screw brackets, the interleaver and deinterleaver module width is 3.54-inches (89.9 mm).

Related Documentation

Use this guide in conjunction with the following referenced publications:

- *Cisco ONS 15454 DWDM Configuration Guides*
- *Cisco ONS 15454 DWDM Troubleshooting Guide*

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