

# User Guide

## CWDM-xxxxxCR

### Mux/Demux



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## Introduction

Transition Networks' Coarse Wavelength Division Multiplexing (CWDM) solution utilizes passive optical CWDM technology in conjunction with CWDM wavelength-specific optical ports on Transition Networks' complete line of media converters and switching products. This allows users to maximize capacity and increase bandwidth on existing fiber routes by multiplexing several distinct signals or protocols over a single, duplex-fiber connection.

The passive optical CWDM devices utilize thin-film filter technology. They are available in various wavelength combinations based on the entire wavelength spectrum (1270nm–1610nm in 20nm increments) defined by the ITU G.694.2 CWDM standard. These CWDM devices are available in two main configurations: Multiplexer/Demultiplexer (Mux/Demux) modules and Optical Add/Drop Multiplexer (OADM) modules. Each module is a pluggable device that slides into a one rack unit (1RU) chassis that can hold 2 modules and mount into a 19" equipment rack.

## Model Numbers

**Note:** Replace “x” in the part numbers below based on connector type:


**L** = LC Singlemode duplex

**S** = SC Singlemode duplex.

Model	Description
<b>CWDM-M451xCR</b>	4-channel mux/demux, 1510/1530/1550/1570nm, duplex LC/SC*, rack mount enclosure.
<b>CWDM-M453xCR</b>	4-channel mux/demux, 1530/1550/1570/1590nm, duplex LC/SC*, rack mount enclosure.
<b>CWDM-M455xCR</b>	4-channel mux/demux, 1550/1570/1590/1610nm, duplex LC/SC*, rack mount enclosure.
<b>CWDM-M551xCR</b>	5-channel mux/demux, 1510/1530/1550/1570nm + 1310nm, duplex LC/SC*, rack mount enclosure.
<b>CWDM-M553xCR</b>	5-channel mux/demux, 1530/1550/1570/1590nm + 1310nm, duplex LC/SC*, rack mount enclosure.
<b>CWDM-M555xCR</b>	5-channel mux/demux, 1550/1570/1590/1610nm + 1310nm, duplex LC/SC*, rack mount enclosure.
<b>CWDM-M847xCR</b>	8-channel mux/demux, 1470nm ~ 1610nm, duplex LC/SC*, rack mount enclosure.
<b>CWDM-M947xCR</b>	9-channel mux/demux, 1470nm ~ 1610nm + 1310nm, duplex LC/SC*, rack mount enclosure.
<b>CWDM-M451UxCR</b>	4-channel mux/demux, 1510/1530/1550/1570nm + upgrade port, duplex LC/SC*, rack mount enclosure.
<b>CWDM-M453UxCR</b>	4-channel mux/demux, 1530/1550/1570/1590nm + upgrade port, duplex LC/SC*, rack mount enclosure.
<b>CWDM-M455UxCR</b>	4-channel mux/demux, 1550/1570/1590/1610nm + upgrade port, duplex LC/SC*, rack mount enclosure.
<b>CWDM-A2A831LCR</b>	1-channel add/drop mux with “East/West” lines. 1310 drop, pass 1330/1350/1370/1390/1410/1430/1450/1470/1490/1510/1530/1550/1570/1590/1610 duplex LC connectors, rack mount enclosure.
<b>CWDM-A2A831LCR</b>	1-channel add/drop mux with “East/West” lines. 1310 drop, pass 1330/1350/1370/1390/1410/1430/1450/1470/1490/1510/1530/1550/1570/1590/1610 duplex LC connectors, rack mount enclosure
<b>CWDM-A2A833LCR</b>	1-channel add/drop mux with “East/West” lines. 1330 drop, pass 1310/1350/1370/1390/1410/1430/1450/1470/1490/1510/1530/1550/1570/1590/1610 duplex LC connectors, rack mount enclosure.
<b>CWDM-A2A835LCR</b>	1-channel add/drop mux with “East/West” lines. 1350 drop, pass 1310/1330/1370/1390/1410/1430/1450/1470/1490/1510/1530/1550/1570/1590/1610 duplex LC connectors, rack mount enclosure.
<b>CWDM-A2A837LCR</b>	1-channel add/drop mux with “East/West” lines. 1370 drop, pass 1310/1330/1350/1390/1410/1430/1450/1470/1490/1510/1530/1550/1570/1590/1610 duplex LC connectors, rack mount enclosure.
<b>CWDM-A2A839LCR</b>	1-channel add/drop mux with “East/West” lines. 1390 drop, pass 1310/1330/1350/1370/1410/1430/1450/1470/1490/1510/1530/1550/1570/1590/16 duplex LC connectors, rack mount enclosure.

<b>CWDM-A2A841LCR</b>	1-channel add/drop mux with "East/West" lines. 1410 drop, pass 1310/1330/1350/1370/1390/1430/1450/1470/1490/1510/1530/1550/1570/1590/1610 duplex LC connectors, rack mount enclosure.
<b>CWDM-A2A843LCR</b>	1-channel add/drop mux with "East/West" lines. 1430 drop, pass 1310/1330/1350/1370/1390/1410/1450/1470/1490/1510/1530/1550/1570/1590/1610 duplex LC connectors, rack mount enclosure.
<b>CWDM-A2A845LCR</b>	1-channel add/drop mux with "East/West" lines. 1450 drop, pass 1310/1330/1350/1370/1390/1410/1430/1470/1490/1510/1530/1550/1570/1590/1610 duplex LC connectors, rack mount enclosure.
<b>CWDM-A2A847LCR</b>	1-channel add/drop mux with "East/West" lines. 1470 drop, pass 1310/1330/1350/1370/1390/1410/1430/1450/1490/1510/1530/1550/1570/1590/1610 duplex LC connectors, rack mount enclosure.
<b>CWDM-A2A849LCR</b>	1-channel add/drop mux with "East/West" lines. 1490 drop, pass 1310/1330/1350/1370/1390/1410/1430/1450/1470/1510/1530/1550/1570/1590/1610 duplex LC connectors, rack mount enclosure.
<b>CWDM-A2A851LCR</b>	1-channel add/drop mux with "East/West" lines. 1510 drop, pass 1310/1330/1350/1370/1390/1410/1430/1450/1470/1490/1530/1550/1570/1590/1610 duplex LC connectors, rack mount enclosure.
<b>CWDM-A2A853LCR</b>	1-channel add/drop mux with "East/West" lines. 1530 drop, pass 1310/1330/1350/1370/1390/1410/1430/1450/1470/1490/1510/1550/1570/1590/1610 duplex LC connectors, rack mount enclosure.
<b>CWDM-A2A855LCR</b>	1-channel add/drop mux with "East/West" lines. 1550 drop, pass 1310/1330/1350/1370/1390/1410/1430/1450/1470/1490/1510/1570/1590/1610 duplex LC connectors, rack mount enclosure.
<b>CWDM-A2A857LCR</b>	1-channel add/drop mux with "East/West" lines. 1570 drop, pass 1310/1330/1350/1370/1390/1410/1430/1450/1470/1490/1510/1550/1590/1610 duplex LC connectors, rack mount enclosure.
<b>CWDM-A2A859LCR</b>	1-channel add/drop mux with "East/West" lines. 1590 drop, pass 1310/1330/1350/1370/1390/1410/1430/1450/1470/1490/1510/1550/1570/1610 duplex LC connectors, rack mount enclosure.
<b>CWDM-A2A861LCR</b>	1-channel add/drop mux with "East/West" lines. 1610 drop, pass 1310/1330/1350/1370/1390/1410/1430/1450/1470/1490/1510/1550/1570/1590 duplex LC connectors, rack mount enclosure.
<b>CWDM-M1631LCR</b>	16-channel mux/demux, 1310/1330/1350/1370/1390/1410/1430/1450/1470/1490/1510/1530/1550/1570/1590/1610 duplex LC connectors, rack mount enclosure.
<b>CWDM-M1631LCR-H</b>	16-channel mux/demux, 1310/1330/1350/1370/1390/1410/1430/1450/1470/1490/1510/1530/1550/1570/1590/1610 duplex LC connectors, rack mount enclosure.
<b>CWDM-M447LCR</b>	4-channel mux/demux, 1470/1490/1510/1530 duplex LC connectors, rack mount enclosure.

## Accessories (*Sold Separately*)

Model	Description
CWDM-MB19R1	19" Two-slot Rack Mount Bracket, 1RU high shown below, holds two CWDM modules 

## Installation

The CWDM modules install into the optional CWDM-MB19R1 mounting bracket for installation in a free-standing rack. To install the bracket and CWDM module into a rack, do the following:

1. Locate the CWDM module and bracket. See Figure 1.

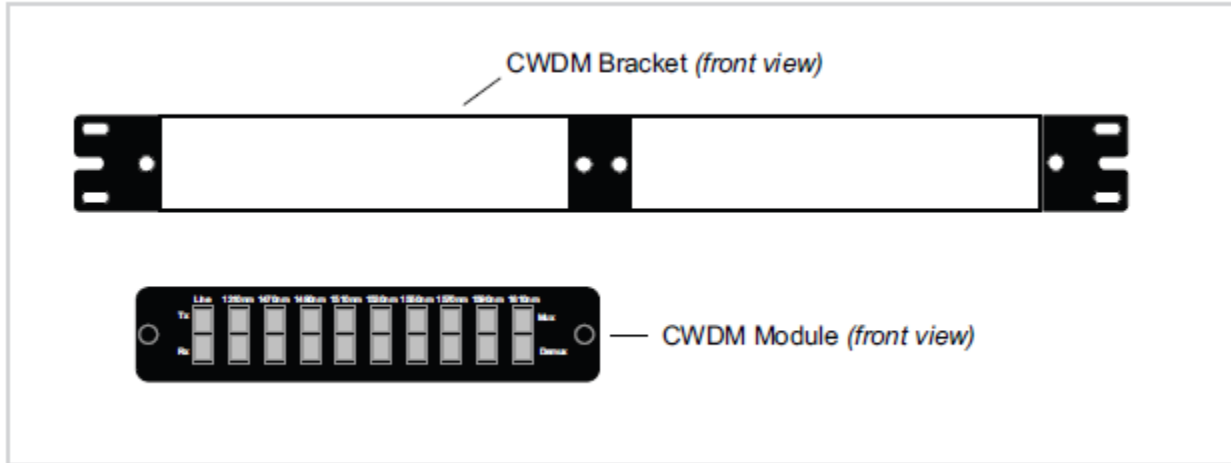


Figure 1: Bracket and CWDM Module

2. Mount the Bracket to the equipment rack, using '4' screws as shown in Figure 2.

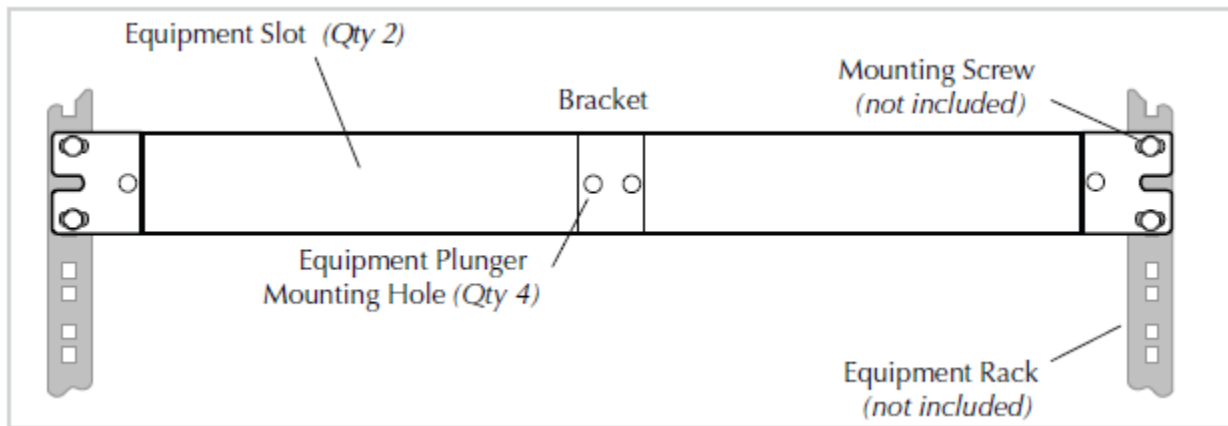


Figure 2: Bracket Installation

3. Pull the CWDM mounting plungers fully out, as shown in Figure 3.
4. Slide the CWDM module into one of the slots, as shown in Figure 3.

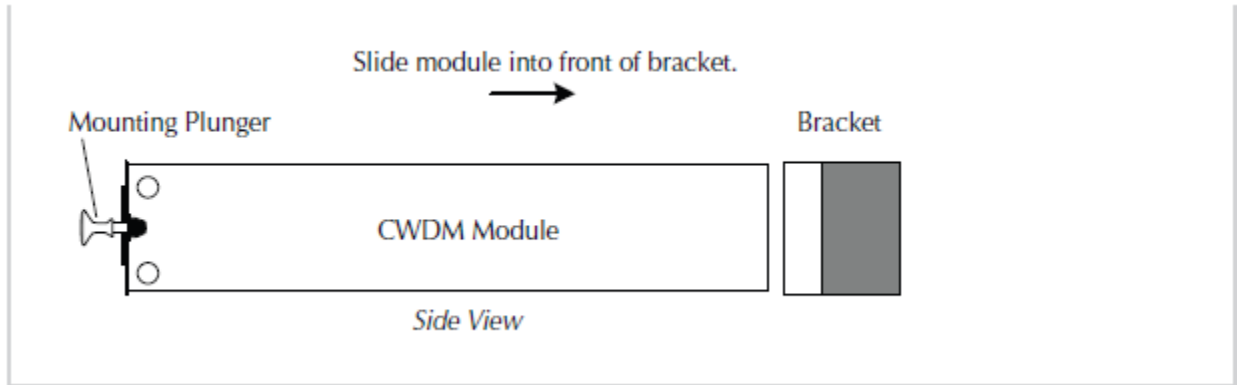


Figure 3: Slide CWDM Module into Front of Bracket

5. Secure the CWDM module to the bracket, as shown in Figure 4.

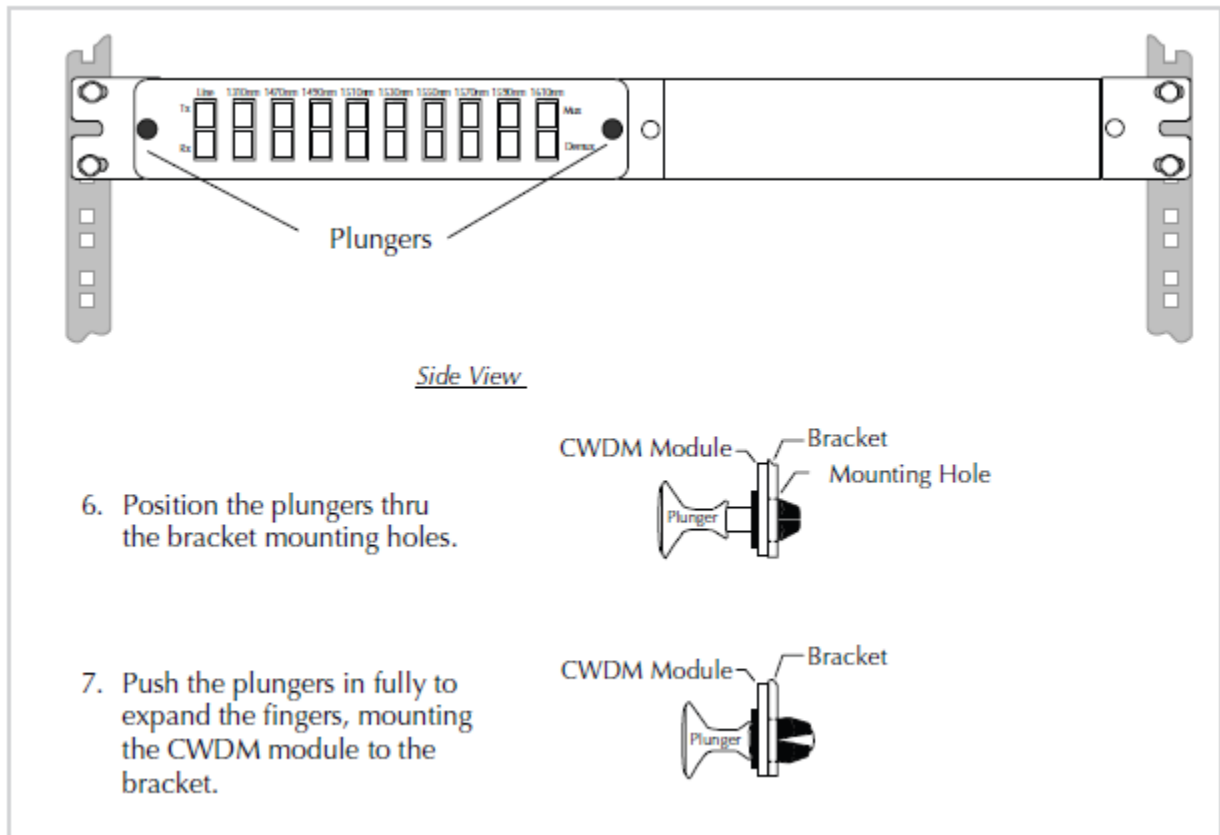


Figure 4: CWDM Module Installation into Bracket

## CWDM Module Features

The CWDM module does not require power; therefore, it has no LEDs. The front panel contains fiber ports only. See Figure 5.

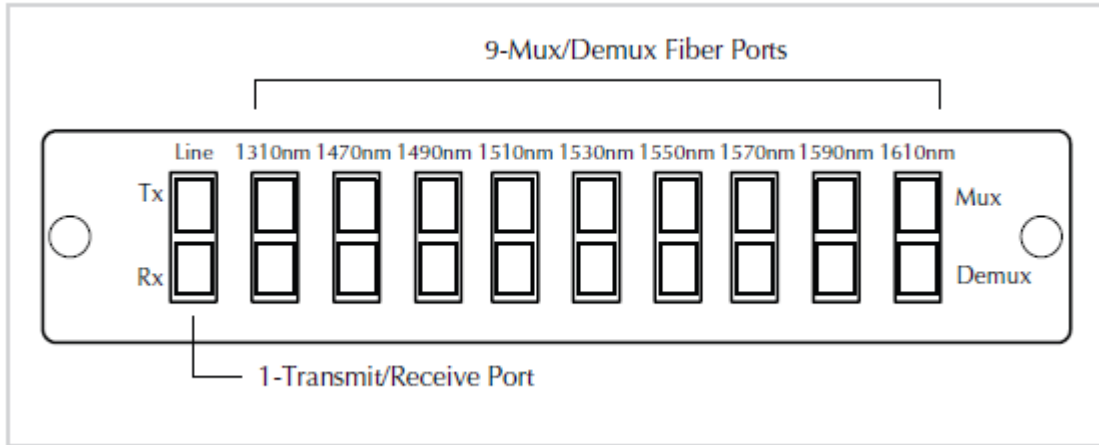


Figure 5: CWDM Front Panel Port Configuration

## Fiber Cabling Handling & Installation

### Handling fiber cables

Accurate and repeatable data transmissions require clean fiber-optic connections; therefore, inspect the ends of all connectors for dust or imperfections. To achieve the best possible performance, follow these guidelines:

- To prevent damage, keep the connectors' protective cover on when not in use.
- Use care in handling all fiber-optic connectors.
- Visually inspect fiber ends for signs of damage.
- Always clean and inspect fiber connectors prior to making a connection.

### Installing fiber cables

To install the fiber cables, do the following:

1. Remove the protective cover from the port. See Figure 6.

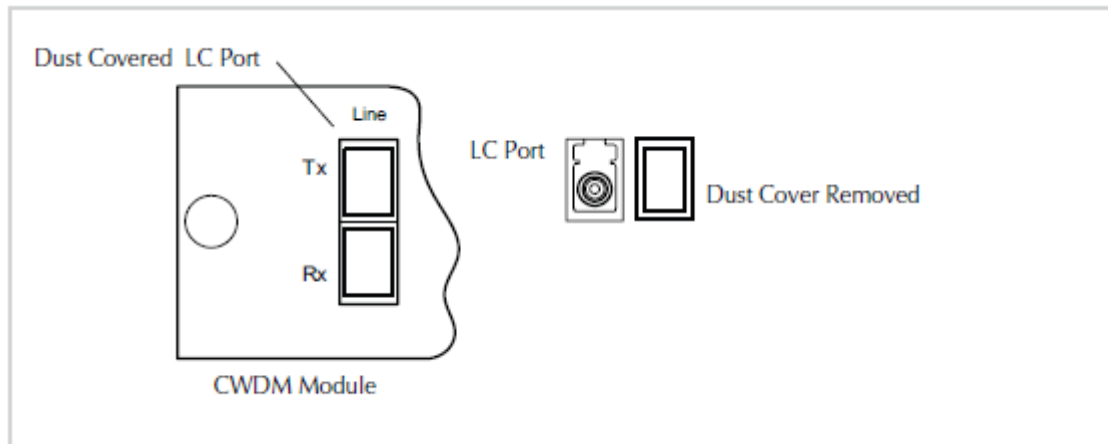


Figure 6: LC Port and Dust Cover

2. Locate a 2-strand fiber cable with the appropriate male connectors installed on both ends.
3. Carefully insert the fiber cable into the CWDM and the device, as shown in Figure 7.



Figure 7: Fiber Cable Connections



## Theory of Operation

### Coarse wave division multiplexing

CWDM can be briefly described as a method of transmitting multiple signals over a fiber optic link through the use of separate, distinct wavelengths, based on the entire wavelength spectrum (1270nm – 1610nm in 20nm increments) defined by the ITU G.694.2 CWDM standard. In general, CWDM components multiplex the optical signal outputs from '4' or more electronic devices. These signals are sent over a single optical fiber. The signals are then demultiplexed into separate, distinct signals for input into electronic devices at the other end of the fiber optic link. See Figure 8.

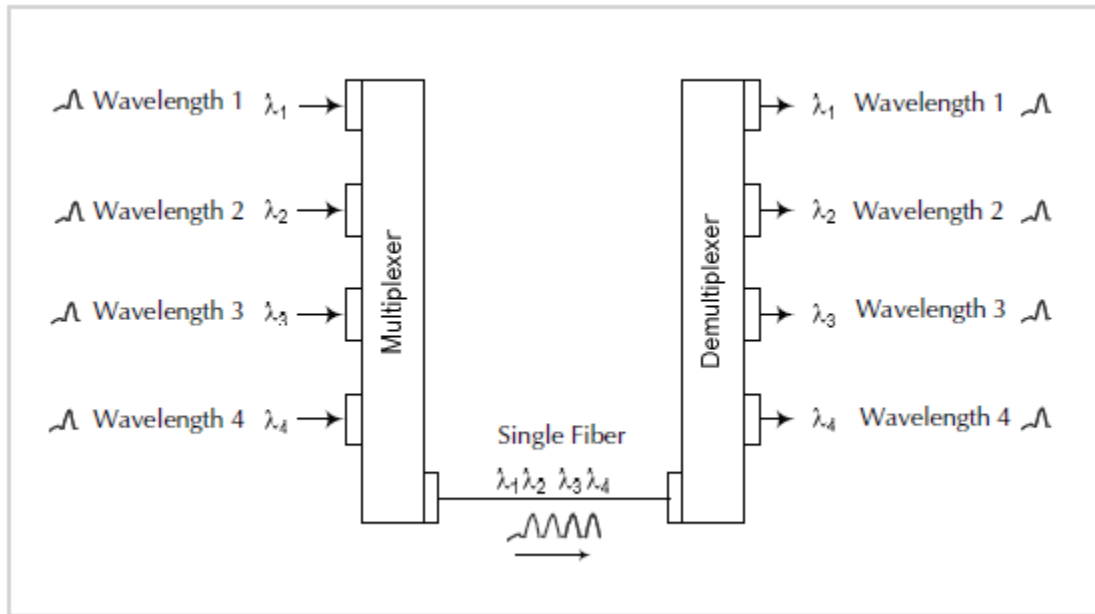


Figure 8: Coarse Wave Division Multiplexing

Transition's CWDM devices utilize thin-film filter technology. Since the CWDM devices are entirely passive, they can be used in conjunction with lower-cost, noncooled laser sources. These CWDM devices are available in two main configurations: Multiplexer/Demultiplexer (Mux/Demux) modules, and Optical Add/Drop Multiplexer (OADM) modules.

### **Optical add/drop multiplexer (OADM)**

The optical add/drop multiplexer module provides the ability to add or drop a single wavelength or multi-wavelengths from a fully multiplexed optical signal. This allows intermediate locations between remote sites to access the common, point-to-point fiber segment linking them. Wavelengths that are not dropped pass through the OADM and continue on in the direction of the remote site. See Figure 9.

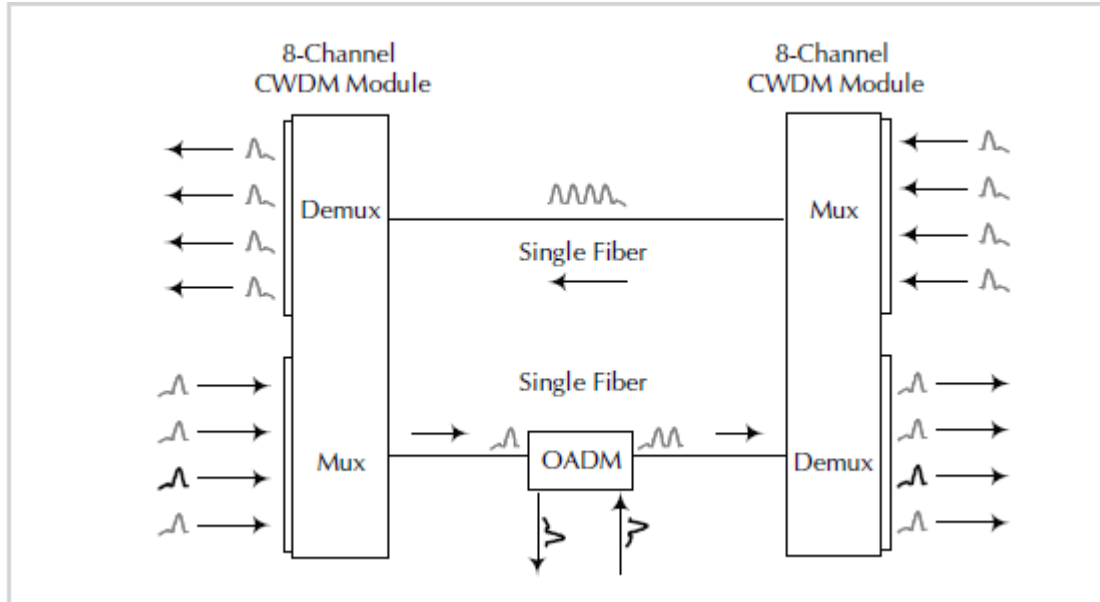


Figure 9: Add/Drop Module

### **CWDM wavelength-specific optical transceivers**

Transition's full line of media converters and switches can incorporate CWDM wavelengths with the addition of wavelength-specific small form-factor pluggable (SFP) optical transceivers or traditional fixed optical ports. CWDM SFPs comply with ITU G.694.2 standard and are available for Fast Ethernet, Gigabit Ethernet, OC-3/STM-1, OC-12/STM-4, and OC-48/STM-16 data rates. Fixed optical ports are available in Fast Ethernet and Gigabit Ethernet, and in the same CWDM ITU wavelengths.

## Technical Specifications

**Standards:** ITU G.694.2 CWDM  
Telcordia GR-1221 and GR-1209

### General Optical Specs (applies to all CWDM configurations)

CWDM Channel Spacing:	20nm
CWDM Channel Passband:	-5.5nm < $\lambda_c$ < +7.5nm
Passband Ripple:	0.5 dB max
Adjacent Channel Isolation:	30 dB min
Non-adjacent Channel Isolation:	40 dB min
Directivity:	50 dB min
Return Loss:	45 dB min
Polarization Dependent Loss (PDL):	0.2 dB max
Optical Operating Power:	300 mW max.

### Course Wavelength Division Multiplexing (CWDM) Modules

#### 4 Channel Mux/Demux Specific Optical Specs

Operating Wavelength:	1500nm ~ 1620nm
Center Wavelength ( $\lambda_c$ ):	1510nm ~ 1610nm
Max Insertion Loss*:	1.7 dB/channel

#### 5 Channel Mux/Demux Specific Optical Specs

CWDM Operating Wavelength:	1500nm ~ 1620nm
CWDM Center Wavelength ( $\lambda_c$ ):	1510nm ~ 1610nm
1310nm Ch. Operating Wavelength:	1260nm ~ 1360nm
1310nm Ch. Center Wavelength ( $\lambda_c$ ):	1310nm
CWDM Max. Insertion Loss*:	2.0 dB/channel
1310nm Ch. Max Insertion Loss*:	1.0 dB/channel
1310nm Ch. Port Isolation:	30 dB Min.

(@CWDM bands)

#### 8 Channel Mux/Demux Specific Optical Specs

Operating Wavelength:	1460nm ~ 1620nm
Center Wavelength ( $\lambda_c$ ):	1470nm ~ 1610nm
Max Insertion Loss*:	3.0 dB/channel

#### 9 Channel Mux/Demux Specific Optical Specs

CWDM Operating Wavelength:	1460nm ~ 1620nm
CWDM Center Wavelength ( $\lambda_c$ ):	1470nm ~ 1610nm
1310nm Ch. Operating Wavelength:	1260nm ~ 1360nm
1310nm Center Wavelength ( $\lambda_c$ ):	1310nm
CWDM Max. Insertion Loss*:	3.3 dB/channel
1310nm Ch. Max Insertion Loss*:	1.0 dB/channel
1310nm Ch. Port Isolation:	30 dB Min.

(@CWDM bands)

#### 16 Channel Mux/Demux Specific Optical Specs

Operating Wavelength:	1300nm ~ 1620nm
Center Wavelength:	1310nm ~ 1610nm
Add/Drop Ch. Max Insertion Loss*:	3.7 dB

### Add/Drop Module

Operating Wavelength:	1300nm ~ 1620nm
Center Wavelength:	1310nm ~ 1610nm
Add/Drop Ch. Max Insertion Loss*:	1.1 dB

\* All insertion loss values include one connector pair.

Fiber Type: Corning SMF-28  
Dimensions: 

<u>Module Rack</u>	<u>Mount Bracket</u>
Width: 8.3" (212 mm)	Width: 18.9" (481 mm)
Depth: 7.6" (192 mm)	Depth: 1.6" (40 mm)
Height: 1.7" (43 mm)	Height: 1.7" (44 mm)

**Environment**

Operating Temp: 0°C to +70°C

Storage Temp: -40°C to +85°C storage temperature

Warranty: Lifetime

## Contact Us

**Technical support**

Technical support is available 24-hours a day

US and Canada: 1-800-260-1312

International: 00-1-952-941-7600

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## Compliance Information

### CE Mark



In accordance with European Union Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003, Transition Networks will accept post usage returns of this product for proper disposal. The contact information for this activity can be found in the 'Contact Us' portion of this document.

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## Record of Revisions

Rev	Date	Notes
A	03-17-08	Initial release.
B	03/10/11	Added the CWDM-A2A8xxLCR series part numbers.
C	02/03/12	Added 8 CWDM-A2A83xLCR part numbers
D	01/06/14	Removed references to the discontinued CWDM-A1A products and changed format.

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