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MUX-CCWDM Data Sheet



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Product Overview

The customized Mux Demux, based on Free Space, is a passive CWDM device featuring high density, low loss, and long-haul transmission suitability. It supports configurable options for expansion, monitor, 1310nm and 1550nm port. The expansion, 1310nm and 1550nm port can be used to add additional channels, providing a cost-effective and easily expandable solution. The monitor port allows easy troubleshooting without downtime. In addition, this unit can be used as either a multiplexer or de-multiplexer (Mux/Demux). It combines 2-18 channels of CWDM wavelengths into a composite signal and separates the combined CWDM signal into 2-18 channels individual wavelengths over single-mode optical fiber. In accordance with the ITU-T G.694.2, it maximizes the capacity of the C-band range. Moreover, this product can be customized in 1U rack-mount, FMU plug-in module, FHD plug-in module, ABS module and Aluminum Box module to meet diverse requirements.

It supports 1G/10G/25G Ethernet, SDH/SONET, 16/8/4/2/1G Fibre Channel, FTTx and CATV. When deployed with FS CWDM optical transceivers, OEO and OADM modules, it seamlessly enables flexible network architectures ranging from simple point-to-point connections to amplified ring configurations.

Product Highlights

- Multiplexing 2 to 18 Channels on Single or Dual Fiber to Maximize the Use of Existing Fiber
- Compatible with ITU Grid and Interconnects with Optical Networking Products
- - 1U Rack Mount, FHD/FMU Plug-in, ABS and Aluminum Box Module are Available for Various Installation Methods
- Expansion, Monitor, 1310nm and 1550nm Port are Optional for Diverse Needs
- Quick Installation and Replacement to Reduce Deployment Time and Lowering Operational Costs
- Passive Transparent Multiplexing at Any Rate, Any Service, Including Ethernet, SDH/SONET, Fiber Channel, FTTx, and CATV
- Suitable for Short Distance Transmission, Commonly Used in Small and Medium-sized Networks
- The Solution Can be [Customized](#) per Customer Application Requirements

Technical Specification

Parameter	Dual Fiber			
Number of Channels	2CH	8CH	16CH	18CH
Operating Wavelength	1260-1620nm			
Channel Spacing	20nm			
Channel Passband	±6.5nm			
Channel Insertion Loss	≤1.5dB	≤1.8dB	≤2.6dB	≤2.6dB
Adjacent Channel Isolation	≥30dB			
Non-adjacent Channel Isolation	≥40dB			
Technology	Free Space			
Channel Ripple	≤0.5dB			
Return Loss	≥45dB			
Directivity	≥50dB			
Polarization Dependent Loss	≤0.3dB			
Polarization Mode Dispersion	≤0.1ps			
Max Optical Power	≤500mW (27dBm)			
Operating Temperature	-40 to 85°C (-40 to 185°F)			
Storage Temperature	-40 to 85°C (-40 to 185°F)			
Fiber Type	G657A1			
Housing	FHD Plug-in Module:1.38"x4.29"x4.64" (35x109x118mm)			
	FMU Plug-in Module: 1.73"x8.35"x10.04" (44x212x255mm)			
	1U 19" Rack Mount: 1.73"x18.97"x10.28" (44x481.8x261.2mm)			
	ABS Pigtailed Module: 0.9mm/2.0mm/3.0mm cable diameter			

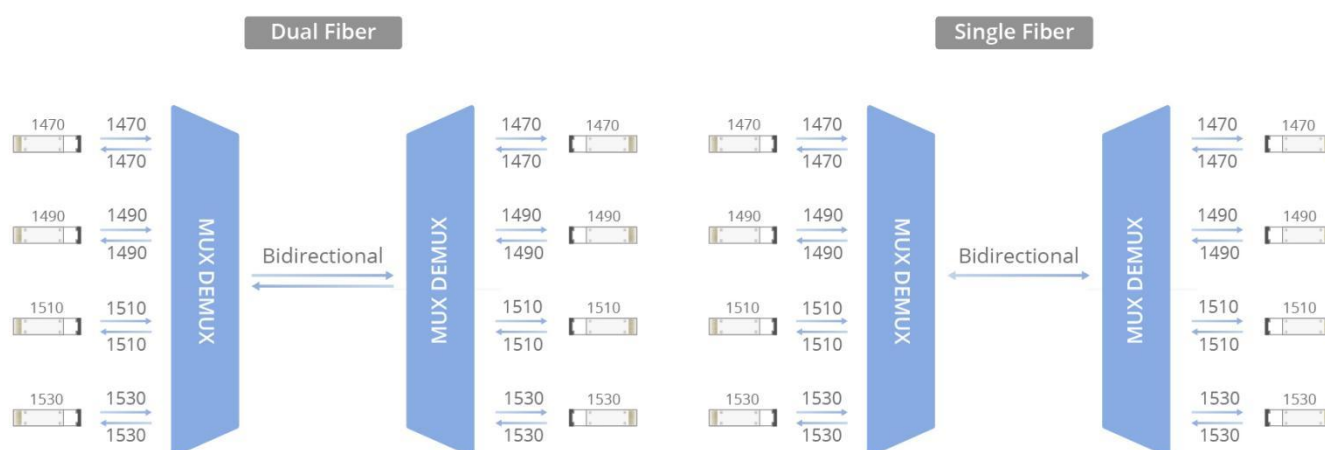
Parameter	Single Fiber			
Number of Channels	2CH	4CH	8CH	9CH
Operating Wavelength	1270-1610nm			
Channel Spacing	20nm			
Channel Passband	$\pm 6.5\text{nm}$			
Insertion Loss (Passband)	$\leq 1.3\text{dB}$	$\leq 1.8\text{dB}$	$\leq 2.6\text{dB}$	$\leq 2.6\text{dB}$
Adjacent Channel Isolation	$\geq 30\text{dB}$			
Non-adjacent Channel Isolation	$\geq 40\text{dB}$			
Technology	Free Space			
Channel Ripple	$\leq 0.5\text{dB}$			
Return Loss	$\geq 45\text{dB}$			
Directivity	$\geq 50\text{dB}$			
Polarization Dependent Loss	$\leq 0.3\text{dB}$			
Polarization Mode Dispersion	$\leq 0.1\text{ps}$			
Max Optical Power	$\leq 500\text{mW}$ (27dBm)			
Operating Temperature	-40 to 85°C (-40 to 185°F)			
Storage Temperature	-40 to 85°C (-40 to 185°F)			
Fiber Type	G657A1			
Housing	FHD Plug-in Module: 1.38"x4.29"x4.64" (35x109x118mm)			
	FMU Plug-in Module: 1.73"x8.35"x10.04" (44x212x255mm)			
	1U 19" Rack Mount: 1.73"x18.97"x10.28" (44x481.8x261.2mm)			
	ABS Pigtailed Module: 0.9mm/2.0mm/3.0mm cable diameter			

Notes:

(1) Specified without connectors. Add an additional 0.2dB loss per connector.

If any Mon/1310nm is added, passband insertion loss will increase about 0.3dB, but Exp port is added, passband insertion loss will not change.

Line Type



Special Service

1. Monitor Port

Monitor port is used to monitor or test the power signal, usually at a 1% ratio, 2%, 3%, 5%, etc, also available. By connecting with measurement or monitoring equipment, such as power meters, spectrum analyzer, or FMT AIU/OPD card, the signal can be inspected without interrupting the existing network.

2. Expansion Port

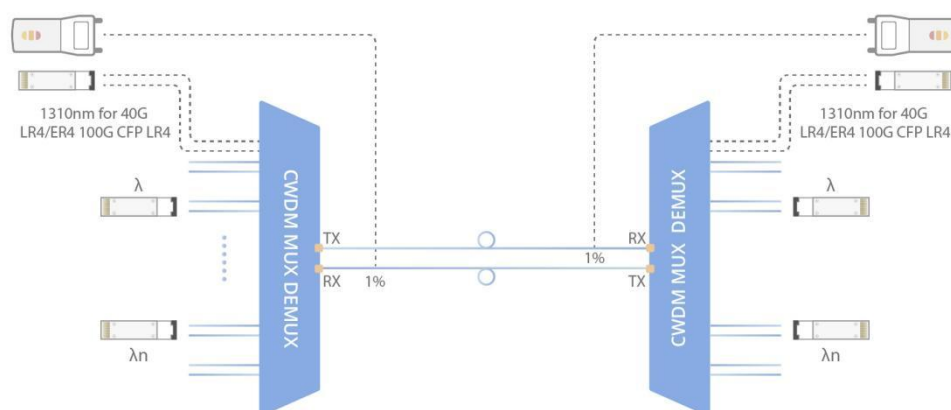
Expansion port makes it possible to increase the network capacity by connecting it to the line port of another DWDM MUX/DEMUX supporting different wavelengths, without the need of installing or leasing additional fibers.

3. 1310nm Ports

These two extra ports allow existing legacy 1310nm traffic to be added such as conventional SFP, SFP+ or other data rate conventional transceiver. And with the 1550nm port, it can be also used to cascade with another DWDM Mux for expansion.

Note:

If 1310nm port is added, the following CWDM wavelengths can't be added: 1270nm, 1290nm, 1310nm, 1330nm, 1350nm and 1370nm; DWDM Mux Demux can't add 1550nm port due to DWDM wavelength range near 1550nm wavelength.



High Quality CWDM Transceivers to Build a Passive CWDM System

FS.COM offers CWDM transceiver modules in SFP, SFP+, SFP28, 3G-SDI SFP and XFP formats. Every optics is tested in real switches and fully compatible with Cisco, Juniper, Arista, Brocade, Dell, Extreme, etc.

Transmission distance range from 10-80km, transmission data rate range from 1G-25G speeds, without the use of optical amplifiers.



CWDM-SFP



CWDM-10G SFP+



CWDM-25G SFP28



CWDM-3G-SDI-SFP



CWDM-XFP

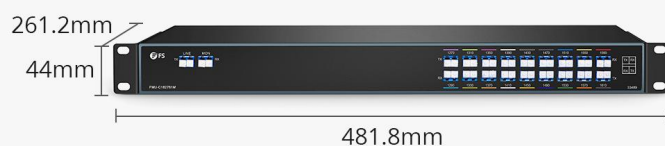
ITU Channel Guiding

ITU Channel No.	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61
Wavelength (nm)	1270	1290	1310	1330	1350	1370	1390	1410	1430	1450	1470	1490	1510	1530	1550	1570	1590	1610

Housing & Enclosure

FS.COM provides 5 different package options for CWDM Mux Demux, including 1U rack mount, FHD/FMU plug-in module, ABS pigtailed module and Aluminum Box Module, as well as the matched chassis.

CWDM Mux Demux Optional Housing



1U 19" Rack Mount

FHD 4-slot 1U Rack



FHD Plug-in Module

FMU 2-slot 1U Rack

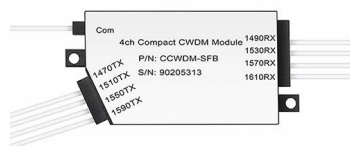


FMU Plug-in Module



ABS Pigtailed Module

0.9mm/2.0mm/3.0mm cable diameter can be customized



Aluminum Box Module

0.9mm/2.0mm/3.0mm cable diameter can be customized

Ordering Information

Mux Demux & OADM

FMU Series Mux Demux	FMU-MC045561ES	4 Channels CWDM Mux or Demux, 1550-1610nm, with Expansion Port, 1.5dB Typical IL, LC/UPC, Single Fiber, FMU Plug-in Module#214979
	FMU-MC163161EMS	16 Channels CWDM Mux or Demux, 1310-1610nm, with Monitor and Expansion Port, 4.5dB Typical IL, LC/UPC, Single Fiber, FMU Plug-in Module#214981
	FMU-MC082759EMA	8 Channels CWDM Mux Demux, 1270-1590nm, with Monitor and Expansion Port, 4.5dB Typical IL, LC/UPC, Single Fiber, Side A, FMU Plug-in Module#214983
	FMU-MC082961EMB	8 Channels CWDM Mux Demux, 1290-1610nm, with Monitor and Expansion Port, 4.5dB Typical IL, LC/UPC, Single Fiber, Side B, FMU Plug-in Module#214985
	FMU-C182761M	18 Channels CWDM Mux Demux, 1270-1610nm, with Monitor Port, 5.0dB Typical IL, LC/UPC, Dual Fiber, 1U Rack Mount#33489
	FMU-MC082745	8 Channels CWDM Mux Demux, 1270-1450nm (Skip 1390, 1410nm), 2.5dB Typical IL, LC/UPC, Dual Fiber, FMU Plug-in Module#42937
	FMU-MC042733	4 Channels CWDM Mux Demux, 1270-1330nm, 1.0dB Typical IL, LC/UPC, Dual Fiber, FMU Plug-in Module#42972
	FMU-MC09B	9 Channels CWDM Mux Demux, 1290-1610nm, 2.4dB Typical IL, LC/UPC, Single Fiber, Side-B, FMU Plug-in Module#43699
	FMU-MC09A	9 Channels CWDM Mux Demux, 1270-1590nm, 2.4dB Typical IL, LC/UPC, Single Fiber, Side-A, FMU Plug-in Module#43711
	FMU-MC084761EM	8 Channels CWDM Mux Demux, 1470-1610nm, with Monitor and Expansion Port, 2.0dB Typical IL, LC/UPC, Dual Fiber, FMU Plug-in Module#78163
	FMU-C182761M	18 Channels CWDM Mux Demux, 1270-1610nm, with Monitor Port, 2.2dB Typical IL, LC/UPC, Dual Fiber, 1U Rack Mount#123533
	FMU-D60OCMW5	60 Odd Channels DWDM Mux Demux, Super C-band 100GHz 1524.50-1571.65nm, with Monitor Port, 6.0dB Typical IL, LC/UPC, Dual Fiber, 1U Rack Mount#166000
	FMU-D60ECMW5	60 Even Channels DWDM Mux Demux, Super C-band 100GHz 1524.89-1572.06nm, with Monitor Port, 6.0dB Typical IL, LC/UPC, Dual Fiber, 1U Rack Mount#166001
	FMU-D40ODMW5	40 Odd Channels Super C-band 150GHz 190.7875-196.6375THz, with Monitor Port, 5.5dB Typical IL, LC/UPC, Dual Fiber DWDM Mux Demux, 1U Rack Mount#166002
	FMU-D40_EDMW5	40 Even Channels Super C-band 150GHz 190.7125-196.5625THz, with Monitor Port, 5.5dB Typical IL, LC/UPC, Dual Fiber DWDM Mux Demux, 1U Rack Mount#166003
	FMU-D64BMW5	64 Channels DWDM Mux Demux, Super C-band 75GHz 1528.87-1566.62nm, with Monitor Port, 5.8dB Typical IL, LC/UPC, Dual Fiber, 1U Rack Mount#166004
	FMU-MD082128EMS	8 Channels DWDM Mux or Demux, 100GHz C21-C28, with Monitor and Expansion Port, 2.75dB Typical IL, LC/UPC, Single Fiber, FMU Plug-in Module#214969
	FMU-MD042124EMA	4 Channels DWDM Mux Demux, 100GHz C21-C24, with Monitor and Expansion Port, 2.75dB Typical IL, LC/UPC, Single Fiber, Side A, FMU Plug-in Module#214971
	FMU-MD045760EMB	4 Channels DWDM Mux Demux, 100GHz C57-C60, with Monitor and Expansion Port, 2.75dB Typical IL, LC/UPC, Single Fiber, Side B, FMU Plug-in Module#214973
	FMU-MD042023EMD	4 Channels DWDM Mux Demux, 100GHz C20-C23, with Monitor and Expansion Port, 1.6dB Typical IL, LC/UPC, Dual Fiber, FMU Plug-in Module#214975

Mux Demux & OADM		
FHD Series Mux Demux	FMU-D402160M3	40 Channels DWDM Mux Demux, 100GHz C21-C60, with 1310nm and Monitor Port, 3.5dB Typical IL, LC/UPC, Dual Fiber, 1U Rack Mount#35887
	FMU-D162136EM3	16 Channels DWDM Mux Demux, 100GHz C21-C36, with Monitor, Expansion and 1310nm Port, 4.4dB Typical IL, LC/UPC, Dual Fiber, 1U Rack Mount#72430
	FMU-D162136A	16 Channels DWDM Mux Demux, 100GHz C21-C36, 4.0dB Typical IL, LC/UPC, Single Fiber, Side-A, 1U Rack Mount#78535
	FMU-D164560B	16 Channels DWDM Mux Demux, 100GHz C45-C60, 4.0dB Typical IL, LC/UPC, Single Fiber, Side-B, 1U Rack Mount#78536
	FMU-FD402160M3	40 Channels DWDM Mux Demux, 100GHz C21-C60, with 1310nm Port and Monitor Port, 4.5dB Typical IL, LC/UPC, Dual Fiber, 1U Rack Mount#84492
	FMU-MD085360E	8 Channels DWDM Mux Demux, C53-C60, with Expansion Port, 2.8dB Typical IL, LC/UPC, Dual Fiber, FMU Plug-in Module, CWDM/DWDM Hybrid Solution#30568
	FMU-D402160M	40 Channels DWDM Mux Demux, 100GHz C21-C60, with Monitor Port, 3.0dB Typical IL, LC/UPC, Dual Fiber, 1U Rack Mount#33485
	FMU-MD08_EB	8 Channels DWDM Mux Demux, 100GHz C22-C36, with Expansion Port, 4.2dB Typical IL, LC/UPC, Single Fiber, Side-B, FMU Plug-in Module#50116
	FMU-MD08_EA	8 Channels DWDM Mux Demux, 100GHz C21-C35, with Expansion Port, 4.2dB Typical IL, LC/UPC, Single Fiber, Side-A, FMU Plug-in Module#50117
	FMU-MD085360EM3	8 Channels DWDM Mux Demux, 100GHz C53-C60, with Monitor, Expansion and 1310nm Port, 3.0dB Typical IL, LC/UPC, Dual Fiber, FMU Plug-in Module, CWDM/DWDM Hybrid Solution#72433
	FMU-L042728B	4 Channels 1273.55-1286.66nm, Single Fiber LAN-WDM Mux Demux, Side-B, FMU Plug-in Module, LC/UPC#244655
	FMU-L042930A	4 Channels 1295.56-1309.14nm, Single Fiber LAN-WDM Mux Demux, Side-A, FMU Plug-in Module, LC/UPC#244657
	FHD-D82128EM3	8 Channels DWDM Mux Demux, 100GHz C21-C28, with EXP & Mon and 1310nm Port, 2.4dB Typical IL, LC/UPC, Dual Fiber, High Density, FHD® Plug-in Module#126899
	FHD-D82936EM	8 Channels DWDM Mux Demux, 100GHz C29-C36, with Monitor and Expansion Port, 2.4dB Typical IL, LC/UPC, Dual Fiber, High Density, FHD Plug-in Module#126900
Custom Mux Demux	FHD-D85360EM	8 Channels DWDM Mux Demux, 100GHz C53-C60, with Monitor and Expansion Port, 2.4dB Typical IL, LC/UPC, Dual Fiber, High Density, FHD Plug-in Module, CWDM/DWDM Hybrid Solution#126901
	FHD-C84761EM	8 Channels CWDM Mux Demux, 1470-1610nm, with Monitor and Expansion Port, 2.0dB Typical IL, LC/UPC, Dual Fiber, High Density, FHD Plug-in Module#126902
	FHD-C82745EM	8 Channels CWDM Mux Demux, 1270-1450nm (Skip 1390, 1410nm), with Monitor and Expansion Port, 2.0dB Typical IL, LC/UPC, Dual Fiber, High Density, FHD Plug-in Module#126903
OADM	MUX-DWDM	Customized Dual and Single Fiber DWDM Mux Demux#322911
	MUX-CWDM	Customized Dual and Single Fiber CWDM Mux Demux#70410
	MUX-CCWDM	Customized Dual and Single Fiber Compact CWDM Mux Demux#73961
Chassis	DOADM-DF	Customized Dual Fiber DWDM OADM#70427
	COADM-DF	Customized Dual Fiber CWDM OADM#70425
Chassis	FMU-1UFMX-N	FMU 2-Slot 1U 19" Rack Chassis Unloaded, Holds up to 2 Units FMU Plug-in Module#30408
	FHD-1U-CMP400	FHD® High Density 1U Rack Mount Modular Enclosure Unloaded, Rear Cable Managers, Holds up to 4 x FHD® Cassettes or Panels, 144 Fibers (LC)#704198

TRANSPONDERS & MUXPONDERS

10G	FMT4DL-OEO25GSFP28	FMT4DL-OEO25GSFP28, 4 Channels 25G WDM Transponder (Converter) for FMT Managed Chassis, 8 SFP28/SFP+ Slots#92056
	FMT4DL-OEO10GSFP	FMT4DL-OEO10GSFP, 4 Channels WDM Transponder (Converter) for FMT Managed Chassis, 8 SFP/SFP+ Slots#30515
	FMT04-CH1U	FMT04-CH1U, 4 Slots 1U Managed Chassis Unloaded Platform, Redundant AC PSUs, Support SNMP V1 Network Management#39214
Chassis	FMT-CH	FMT-CH, Customized 4/8/16 Slots 1U/2U/4U Managed Chassis Unloaded Platform, Redundant AC/DC PSUs, Support SNMP Network Management#70413

WDMTRANSCEIVERS

100G/200G CFP2	CFP2-DCO-200G-M	C14 1566.31nm CFP2-DCO 100G/200G DWDM C-band Tunable 96Chs ITU CH13-CH60 50GHz 80km DOM Duplex LC/UPC SMF Optical Transceiver Module for Transmission#120128
25G SFP28	DW-SFP25G10-17	Cisco C17 DWDM-SFP25G-63.86 Compatible SFP28 25G DWDM 1563.86nm 100GHz 10km DOM Duplex LC/UPC SMF Optical Transceiver Module for Transmission#87000
	CW-SFP25G30-27	Cisco CWDM-SFP25G-1270-30 Compatible SFP28 25G CWDM 1270nm 30km DOM Duplex LC/UPC SMF Optical Transceiver Module for Transmission#100112
	CW-SFP25G10-27	Cisco CWDM-SFP25G-1270-10 Compatible SFP28 25G CWDM 1270nm 10km DOM Duplex LC/UPC SMF Optical Transceiver Module for Transmission#76003
10G SFP+	LW-SFP25G40-86	Cisco LWDM-SFP25G-86.66 Compatible SFP28 25G LWDM 1286.66nm 40km DOM Duplex LC/UPC SMF Optical Transceiver Module for Transmission#93786
	DW-SFP10G80-21-I	Cisco C21 DWDM-SFP10G-60.61-I Compatible SFP+ 10G DWDM 1560.61nm 100GHz 80km DOM Duplex LC/UPC SMF Optical Transceiver Module for Transmission (Industrial)#113562
	DW-SFP10G40-21-I	Cisco C21 DWDM-SFP10G-60.61-I Compatible SFP+ 10G DWDM 1560.61nm 100GHz 40km DOM Duplex LC/UPC SMF Optical Transceiver Module for Transmission (Industrial)#113511
1GSFP	CW-SFP10G80-47	Cisco CWDM-SFP10G-1470 Compatible SFP+ 10G CWDM 1470nm 80km DOM Duplex LC/UPC SMF Optical Transceiver Module for Transmission#19367
	CW-SFP10G40-27-I	Cisco CWDM-SFP10G-1270-I Compatible SFP+ 10G CWDM 1270nm 40km DOM Duplex LC/UPC SMF Optical Transceiver Module for Transmission (Industrial)#112392
	DWDM-SFP1G-EZX	Cisco C17 DWDM-SFP-6386 Compatible SFP 1000BASE-DWDM 1563.86nm 100GHz 100km DOM Duplex LC/UPC SMF Optical Transceiver Module for Transmission#54150
	DWDM-SFP1G-ZX	Cisco C17 DWDM-SFP-6386-80 Compatible SFP 1000BASE-DWDM 1563.86nm 100GHz 80km DOM Duplex LC/UPC SMF Optical Transceiver Module for Transmission#47697
	CWDM-SFP1G-ZX	Cisco CWDM-SFP-1270 Compatible SFP 1000BASE-CWDM 1270nm 80km DOM Duplex LC/UPC SMF Optical Transceiver Module for Transmission#33234
	DWDM-SFP1G-ZX	Cisco C17 DWDM-SFP-6386-80 Compatible SFP 1000BASE-DWDM 1563.86nm 100GHz 80km DOM Duplex LC/UPC SMF Optical Transceiver Module for Transmission#47697
	CWDM-SFP1G-ZX	Cisco CWDM-SFP-1270 Compatible SFP 1000BASE-CWDM 1270nm 80km DOM Duplex LC/UPC SMF Optical Transceiver Module for Transmission#33234

*Standard products are listed above. Customized specifications are available upon request.



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