

A solid red circle graphic.

FHD-ML04MB Data Sheet

Contents

Product Overview

Features and Benefits

Front Panel and Port Description

Product Hightlights

Application

Technical Specification

ITU Channel Guiding

Layout and Dimension

Ordering Information

3

4

4

5

5

6

7

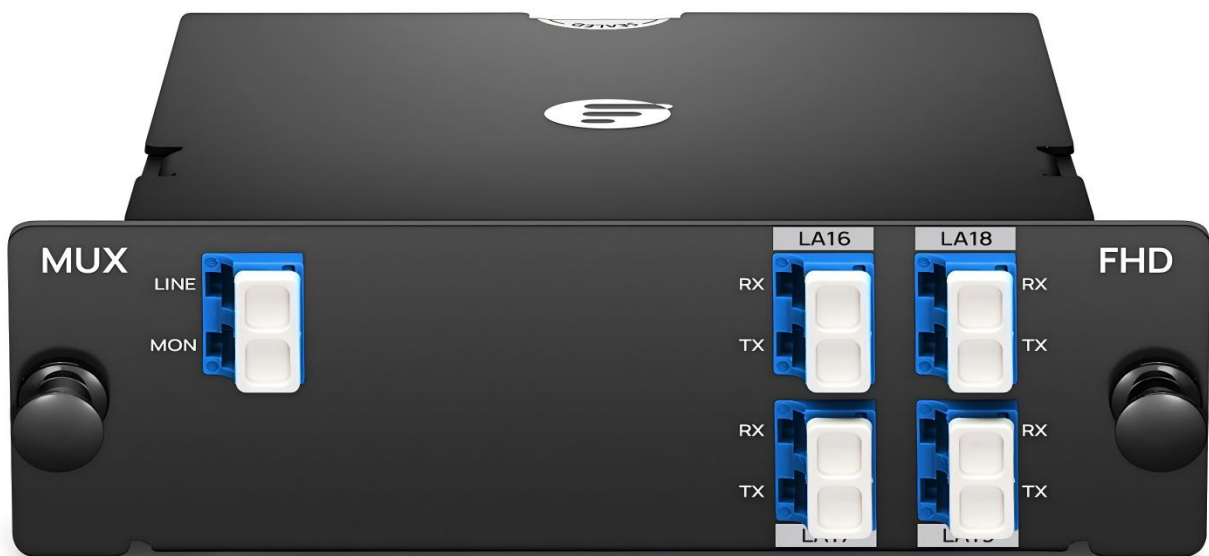
7

8

Product Overview

The 4CH LAN-WDM Mux/Demux is a passive LWDM device based on Thin Film Filter (TFF) technology featuring high density, low loss, and long-haul transmission suitability. It is integrated with a monitor port, which allows easy troubleshooting without downtime. In addition, this unit can be used as either a multiplexer or demultiplexer (Mux/Demux). It combines 4-channel of LWDM wavelengths into a composite signal and separates the combined LWDM signal into 4-channel individual wavelengths over a single-mode optical fiber. In accordance with the ITU-T , it maximizes the capacity of the C-band range. Designed for maximum configuration flexibility, the LWDM Mux Demux can plug directly into the FHD® chassis, each module occupying one slot.

The LAN-WDM Mux/Demux is designed for short-distance ($\leq 40\text{km}$) , offering low dispersion cost and scalable 5G fronthaul deployment. Additionally, it delivers a cost-efficient solution for high-density fiber connectivity in 5G infrastructure.



Features and Benefits

- Multiplexing of up to 4 Channels on Single Fiber to Maximize the Using of Existing Fiber
- Compatible with ITU Grid and Interconnects with Optical Networking Products
- Monitor Port Taps off 1% of the Signal to Monitor the Channel Power Levels
- Enables Space-efficient Integration and Hybrid Deployment of CWDM, DWDM, LWDM, OWDM, FAP and MTP Cassettes within the FHD® Chassis
- Passive Transparent Multiplexing at Any Rate, Any Service, Including Ethernet, SDH/SONET, Fiber Channel, FTTx, and CATV
- Ideal for Short-distance ($\leq 40\text{km}$) 5G Pre-transmission Networks
- The Solution can be [Customized](#) per Customer Application Requirements
- Fit into One Slot of the [FHD 4-Slot 1U 19" Rack Chassis](#)

Front Panel and Port Description



LINE

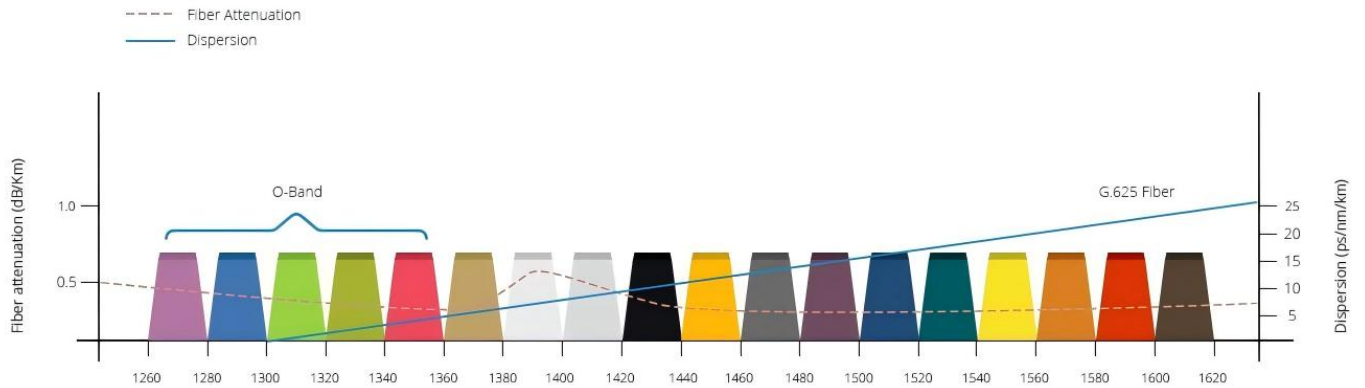
Line interface for common signal

MON

1% Monitoring for easy troubleshooting

Product Highlights

LAN-WDM wavelengths are located nearly at the zero-dispersion wavelength which enables signal transmission without restriction.



Application

LAN-WDM Mux Demux is designed to assist network operators with building a fiber foundation. It can be applied in non-controlled outdoor environments, reducing the need for site inspections.



Technical Specification

Parameter	Value
ITU Channel	4 Channels
Wavelength	TX: 1295.56, 1300.05, 1304.58, 1309.14nm
	RX: 1273.55, 1277.89, 1282.26, 1286.66nm
Technology	TFF (The Film Filter)
Channel Passband	±1.15nm
Insertion Loss	≤ 3.0dB, 2.8dB Typical
Insertion Loss (+1% Mon)	≤ +0.3dB
Channel Spacing	800GHz
-1dB Channel Bandwidth	≥3nm
Passband Ripple	≤0.5dB
Adjacent Channel Isolation	≥25dB
Non-adjacent Channel Isolation	≥30dB
Return Loss	≥45dB
Directivity	≥45dB
Polarization Dependent Loss	≤0.3dB
Polarization Mode Dispersion	≤0.1ps
Operating Temperature	-40 to 85°C (-40 to 185°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)

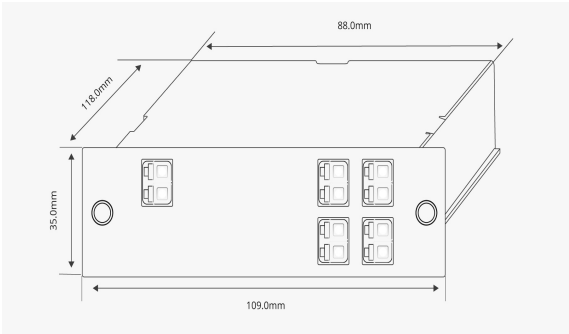
Notes: 1.Specified with connectors and adapters.

ITU Channel Guiding

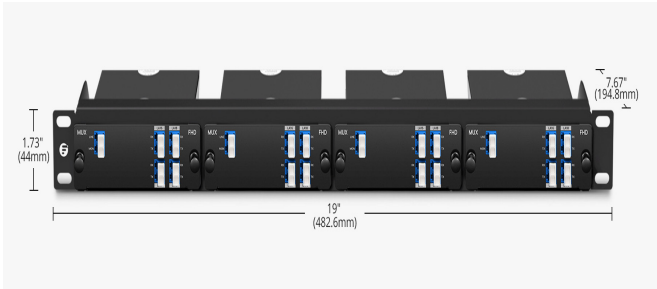
No.	LA1	LA2	LA3	LA4	LA5	LA6	LA7	LA8	LA9	LA10	LA11
Wavelength (nm)	1356.53	1351.63	1346.78	1341.95	1337.17	1332.41	1327.69	1323.00	1318.35	1313.73	1309.14
Frequency Repetition (THz)	221.00	221.80	222.60	223.40	224.20	225.00	225.80	226.60	227.40	228.20	229.00

No.	LA12	LA13	LA14	LA15	LA16	LA17	LA18	LA19	LA20	LA21	LA22
Wavelength (nm)	1304.58	1300.05	1295.56	1291.10	1286.66	1282.26	1277.89	1273.55	1269.23	1264.95	1260.69
Frequency Repetition (THz)	229.8	230.60	231.40	232.20	233.00	233.80	234.60	235.40	236.20	237.00	237.80

Layout and Dimension



Height: 1.38" (35mm)
Width: 4.29"(109mm)
Depth: 4.64"(118mm)



4-slot FHD managed chassis, supports up to 4 CWDM, DWDM, LWDM, OWDM Mux Demux modules with different channels in FHD packages.
Height: 1.73" (44mm)
Width: 19.00" (482.6mm)
Depth: 7.67" (194.8mm)
Mux Demux plug-in module occupies one slot.

Ordering Information

Mux Demux & OADM		
FHD Series DWDM Mux Demux	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
	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-MD042128EMA	4 Channels DWDM Mux Demux, 100GHz C21-C27, with Monitor and Expansion Port, 2.5dB IL, LC/UPC, Single Fiber, Side-A, High Density, FHD Plug-in Module#374823
	FHD-MD042128EMB	4 Channels DWDM Mux Demux, 100GHz C22-C28, with Monitor and Expansion Port, 2.5dB IL, LC/UPC, Single Fiber, Side-B, High Density, FHD Plug-in Module#374825
	FHD-MD042936EMA	4 Channels DWDM Mux Demux, 100GHz C29-C35, with Monitor and Expansion Port, 2.5dB IL, LC/UPC, Single Fiber, Side-A, High Density, FHD Plug-in Module#374827
	FHD-MD042936EMB	4 Channels DWDM Mux Demux, 100GHz C30-C36, with Monitor and Expansion Port, 2.5dB IL, LC/UPC, Single Fiber, Side-B, High Density, FHD Plug-in Module#374829
	FHD-MD052160BPD	1x 5 Band DWDM Mux/Demux, 100GHz C21-C60, 2.2dB Typical IL, LC/UPC, Dual Fiber, High Density, FHD Plug-in Module#374831
FHD Series CWDM Mux Demux	FHD-MD042124EMA	4 Channels DWDM Mux Demux, 100GHz C21-C24, with Monitor and Expansion Port, 2.75dB Typical IL, LC/UPC, Single Fiber, Side A, High Density, FHD Plug-in Module#374833
	FHD-MD045760EMB	4 Channels DWDM Mux Demux, 100GHz C57-C60, with Monitor and Expansion Port, 2.75dB Typical IL, LC/UPC, Single Fiber, Side B, High Density, FHD Plug-in Module#374835
	FHD-MD082128EMS	8 Channels DWDM Mux or Demux, 100GHz C21-C28, with Monitor and Expansion Port, 2.75dB Typical IL, LC/UPC, Single Fiber, High Density, FHD Plug-in Module#374839
	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 Series LWDM Mux Demux	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
	FHD-MC082961EMB	8 Channels CWDM Mux Demux, 1290-1610nm, with Monitor and Expansion Port, 4.5dB Typical IL, LC/UPC, Single Fiber, Side B, High Density, FHD Plug-in Module#374853
	FHD-ML04MA	4 Channels LAN-WDM Mux Demux, 1295.56-1309.14nm, with Monitor Port, 2.8dB Typical IL, LC/UPC, Single Fiber, Side-A, High Density, FHD Plug-in Module#374855
FHD Series O-band DWDM Mux Demux	FHD-ML04MB	4 Channels LAN-WDM Mux Demux, 1273.55-1286.66nm, with Monitor Port, 2.8dB Typical IL, LC/UPC, Single Fiber, Side-B, High Density, FHD Plug-in Module#374857
	FHD-ML042930MD	4 Channels LAN-WDM Mux Demux, 1295.56-1309.14nm, with Monitor Port, 1.5dB Typical IL, LC/UPC, Dual Fiber, High Density, FHD Plug-in Module#374859
	FHD-MO083031MD	8 Channels O-band DWDM Mux Demux, 228.4-229.8THz, with Monitor Port, 3.0dB Typical IL, LC/UPC, Dual Fiber, High Density, FHD Plug-in Module#374861
Custom Mux Demux	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

Mux Demux & OADM

OADM	DOADM-EAW	Customized Dual and Single Fiber DWDM OADM, East and West#70427
	DOADM-EOW	Customized Dual and Single Fiber DWDM OADM, East or West#73795
	COADM-EAW	Customized Dual and Single Fiber CWDM OADM, East and West#70425
	COADM-EOW	Customized Dual and Single Fiber CWDM OADM, East or West#73794
Chassis	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)#70419

Optical Line System

Amplifiers	FMT20PA-EDFA	FMT20PA-EDFA, 20dB Gain C-band DWDM EDFA Pre-amplifier for FMT Managed Chassis, 13dBm Output#72284
	FMT26PA-EDFA	FMT26PA-EDFA, 26dB Gain C-band DWDM EDFA Pre-amplifier for FMT Managed Chassis, 16dBm Output#36524
	FMT17BA-EDFA	FMT17BA-EDFA, 17dB Gain C-band DWDM EDFA Booster Amplifier for FMT Managed Chassis, 17dBm Output#72283
	FMT26PA-51EDFA	FMT26PA-51EDFA, 26dB Gain Extended C-Band DWDM EDFA Pre-amplifier for FMT Managed Chassis, 20dBm Output#248135
	FMT17BA-51EDFA	FMT17BA-51EDFA, 17dB Gain Extended C-Band DWDM EDFA Booster Amplifier for FMT Managed Chassis, 20dBm Output#248133
	FMT-EDFA	Customized C-band DWDM EDFA Amplifier for DWDM Solution#322907
	FMT-ARRAY-OA	Customized Multiports DWDM Array EDFA Amplifier#322909
Dispersion Compensation	FMT40-DCM	FMT40-DCM, C-Band 40km DCF-based Passive Dispersion Compensation Module for FMT Managed Chassis#65781
	FMT80-DCM	FMT80-DCM, C-Band 80km DCF-based Passive Dispersion Compensation Module for FMT Managed Chassis#65779
	FS-DCM	Customized C-Band DCF-based Dispersion Compensation Module for FMT Managed Chassis#65783
Line Protection	FMT-OLP2	FMT-OLP2, 1+1 Optical Line Protection Switch for FMT Managed Chassis#66010
	FMT-OLP	FMT-OLP, 1:1 Optical Line Protection Switch for FMT Managed Chassis#192620

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
Chassis	FMT04-CH1U	FMT04-CH1U, 4 Slots 1U Managed Chassis Unloaded Platform, Redundant AC PSUs, Support SNMP V3 Network Management#39214
	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.



Delaware, United States

Address: Delaware: 380 Centerpoint Blvd, New Castle, DE 19720, United States
Email: US@fs.com
Tel: +1 (888) 468-9910

Germany

Address: Röntgenstraße 18, 85757 Karlsfeld, Germany
Email: DE@fs.com
Tel: +49 (0) 8131 377 3008

Australia

Address: 57-59 Edison Rd, Dandenong South, VIC 3175, Australia
Email: AU@fs.com
Tel: +61 3 5909 9990

Japan

Address: JS Progress Building 5F, 4-1-23, Heiwajima, Ota Ku, Tokyo, 143-0006, Japan
Email: JP@fs.com
Tel: +81-3-6897-9438

California, United States

Address: California: 15241 Don Julian Rd, City of Industry, CA 91745, United States
Email: US@fs.com
Tel: +1 (888) 468-9910

United Kingdom

Address: Unit 8, Urban Express Park, Union Way, Aston, Birmingham B6 7FH, United Kingdom
Email: UK@fs.com
Tel: +44 (0) 121 726 4775

Singapore

Address: 7002 ANG MO KIO AVENUE 5 #05-02 Singapore 569914
Email: SG@fs.com
Tel: +65 31381992



FS has several offices around the world. Addresses, phone numbers are listed on the FS Website at https://www.fs.com/contact_us.html. FS and FS logo are trademarks or registered trademarks of FS in the U.S. and other countries.