SFPD-MR4-xx Series

SFP Single-Mode for DWDM Application, Duplex SFP Transceiver
Digital Diagnostic Function, RoHS6 Compliant

Features

- Operating Data Rate up to 4.25Gbps
- Available in all C-Band Wavelengths on the 100GHz DWDM ITU Grid
- Single 3.3V Power Supply and TTL Logic Interface
- Hot-Pluggable SFP Footprint Duplex LC Connector Interface
- Compliant with Class 1 FDA and IEC60825-1 Laser Safety
- Compliant with SFP MSA
- Compliant with SFF-8472
- Operating Case Temperature:
  - Standard: 0°C to 70°C
  - Extended: -5°C to 70°C

Applications

- Amplified DWDM networks
- Ring topologies with fixed and reconfigurable OADMs
- Fast Ethernet, Giga Ethernet
- Fiber Channel
- SONET / SDH Switch

Product Description

The SFPD-MR4-xx series single mode transceiver is small form factor pluggable module for duplex optical data communications. This module is designed for single mode fiber and operates at a nominal DWDM wavelength from 1528.77nm to 1565.50nm as specified by the ITU-T. It is designed to deploy in the DWDM networking equipment in metropolitan access and core networks.
It is with the SFP 20-pin connector to allow hot plug capability. The transmitter section uses a DWDM multiple quantum well DFB laser and is a class 1 laser compliant according to International Safety Standard IEC-60825.
The SFPD-MR4-XX series are designed to be compliant with SFF-8472 Multi-Source Agreement (MSA).

For more information please contact:

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Opticonnect SYSTEMS B.V., an Optical Networking vendor with its headquarters in the Netherlands, provides Optical Transport solutions and Optical Transceivers at the best price performance ratio possible. Our goal is to simplify the planning, deployment and maintenance of complex Optical Networks. This is achieved by our user friendly planning apps and information, sophisticated products and transparent support. Relying on our superior product quality, all items are supplied with life time warranty.

Ordering Information

Part No. *note1	Data Rate	Laser	Power Budget*(note2)	Interface	Temperature
SFPD-MR4-EX-XXD	4.25GMbps	DWDM DFB	18dB	LC	Standard
SFPD-MR4-EX-XXDI	4.25GMbps	DWDM DFB	18dB	LC	Extended
SFPD-MR4-ZX-XXD	4.25GMbps	DWDM DFB	24dB	LC	Standard
SFPD-MR4-ZX-XXDI	4.25GMbps	DWDM DFB	24dB	LC	Extended

Note1: xx refers to DWDM Wavelength range as ITU-T specified, please refer the following table for detailed center wavelength information.
Note2: The power budget which is guaranteed.

DWDM* Wavelength(0~70℃)

Channel (xx)	Part NO.	Frequency (THz)	Central wavelength (nm)
15	SFPD-MR4- X-15D SFPD-MR4- X-15DI	191.5	1565.50
16	SFPD-MR4- X-16D SFPD-MR4- X-16DI	191.6	1564.68
17	SFPD-MR4- X-17D SFPD-MR4- X-17DI	191.7	1563.86
18	SFPD-MR4- X-18D SFPD-MR4- X-18DI	191.8	1563.05
19	SFPD-MR4- X-19D SFPD-MR4- X-19DI	191.9	1562.23
20	SFPD-MR4- X-20D SFPD-MR4- X-20DI	192.0	1561.42
21	SFPD-MR4- X-21D SFPD-MR4- X-21DI	192.1	1560.61
22	SFPD-MR4- X-22D SFPD-MR4- X-22DI	192.2	1559.79
23	SFPD-MR4- X-23D SFPD-MR4- X-23DI	192.3	1558.98
24	SFPD-MR4- X-24D SFPD-MR4- X-24DI	192.4	1558.17
25	SFPD-MR4- X-25D SFPD-MR4- X-25DI	192.5	1557.36
26	SFPD-MR4- X-26D SFPD-MR4- X-26DI	192.6	1556.55
27	SFPD-MR4- X-27D SFPD-MR4- X-27DI	192.7	1555.75
28	SFPD-MR4- X-28D SFPD-MR4- X-28DI	192.8	1554.94
29	SFPD-MR4- X-29D SFPD-MR4- X-29DI	192.9	1554.13
30	SFPD-MR4- X-30D SFPD-MR4- X-30DI	193.0	1553.33
31	SFPD-MR4- X-31D SFPD-MR4- X-31DI	193.1	1552.52
32	SFPD-MR4- X-32D SFPD-MR4- X-32DI	193.2	1551.72
33	SFPD-MR4- X-33D SFPD-MR4- X-33DI	193.3	1550.92
34	SFPD-MR4- X-34D SFPD-MR4- X-34DI	193.4	1550.12
35	SFPD-MR4- X-35D SFPD-MR4- X-35DI	193.5	1549.32
36	SFPD-MR4- X-36D SFPD-MR4- X-36DI	193.6	1548.51

37	SFPD-MR4- X-37D SFPD-MR4- X-37DI	193.7	1547.72
38	SFPD-MR4- X-38D SFPD-MR4- X-38DI	193.8	1546.92
39	SFPD-MR4- X-39D SFPD-MR4- X-39DI	193.9	1546.12
40	SFPD-MR4- X-40D SFPD-MR4- X-40DI	194.0	1545.32
41	SFPD-MR4- X-41D SFPD-MR4- X-41DI	194.1	1544.53
42	SFPD-MR4- X-42D SFPD-MR4- X-42DI	194.2	1543.73
43	SFPD-MR4- X-43D SFPD-MR4- X-43DI	194.3	1542.94
44	SFPD-MR4- X-44D SFPD-MR4- X-44DI	194.4	1542.14
45	SFPD-MR4- X-45D SFPD-MR4- X-45DI	194.5	1541.35
46	SFPD-MR4- X-46D SFPD-MR4- X-46DI	194.6	1540.56
47	SFPD-MR4- X-47D SFPD-MR4- X-47DI	194.7	1539.77
48	SFPD-MR4- X-48D SFPD-MR4- X-48DI	194.8	1538.98
49	SFPD-MR4- X-49D SFPD-MR4- X-49DI	194.9	1538.19
50	SFPD-MR4- X-50D SFPD-MR4- X-50DI	195.0	1537.40
51	SFPD-MR4- X-51D SFPD-MR4- X-51DI	195.1	1536.61
52	SFPD-MR4- X-52D SFPD-MR4- X-52DI	195.2	1535.82
53	SFPD-MR4- X-53D SFPD-MR4- X-53DI	195.3	1535.04
54	SFPD-MR4- X-54D SFPD-MR4- X-54DI	195.4	1534.25
55	SFPD-MR4- X-55D SFPD-MR4- X-55DI	195.5	1533.47
56	SFPD-MR4- X-56D SFPD-MR4- X-56DI	195.6	1532.68
57	SFPD-MR4- X-57D SFPD-MR4- X-57DI	195.7	1531.90
58	SFPD-MR4- X-58D SFPD-MR4- X-58DI	195.8	1531.12
59	SFPD-MR4- X-59D SFPD-MR4- X-59DI	195.9	1530.33
60	SFPD-MR4- X-60D SFPD-MR4- X-60DI	196.0	1529.55
61	SFPD-MR4- X-61D SFPD-MR4- X-61DI	196.1	1528.77

*: X refers to the DWDM Power budget (18 / 24). please contact opticonnect to confirm whether the wavelength is available.

Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883G Method 3015.7	Class 1C (>1000V)

Electrostatic Discharge to the Enclosure	EN 55024:1998+A1+A2 IEC-61000-4-2 GR-1089-CORE	Compliant with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022:2006 CISPR 22B :2006 VCCI Class B	Compliant with standards Noise frequency range: 30MHz to 6GHz. Good system EMI design practice required to achieve Class B margins. System margins are dependent on customer host board and chassis design.
Immunity	EN 55024:1998+A1+A2 IEC 61000-4-3	Compliant with standards. 1KHz sine-wave, 80% AM, from 80MHz to 1GHz. No effect on transmitter/ receiver performance is detectable between these limits.
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1:2007 EN (IEC) 60825-2:2004+A1	CDRH compliant and Class I laser product. TüV Certificate No. 50135086
Component Recognition	UL and CUL EN60950-1:2006	UL file E317337 TüV Certificate No. 50135086 (CB scheme)
RoHS6	2002/95/EC 4.1&4.2 2005/747/EC 5&7&13	Compliant with standards*note3

Note 3: For update of the equipments and strict control of raw materials, Opticonnect has the ability to supply the customized products since Jan 1st, 2007, which meet the requirements of RoHS6 (Restrictions on use of certain Hazardous Substances) of European Union. In light of item 5 in RoHS exemption list of RoHS Directive 2002/95/EC, Item 5: Lead in glass of cathode ray tubes, electronic components and fluorescent tubes.
In light of item 13 in RoHS exemption list of RoHS Directive 2005/747/EC, Item 13: Lead and cadmium in optical and filter glass.
The three exemptions are being concerned for Opticonnect's transceivers, because Opticonnect's transceivers use glass, which may contain Pb, for components such as lenses, windows, isolators, and other electronic components.

Absolute Maximum Ratings*

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	TS	-40	+85	°C
Supply Voltage	VCC	-0.5	3.6	V
Operating Relative Humidity		-	95	%

*Exceeding any one of these values may destroy the device immediately.

Recommended Operating Conditions

Parameter	Symbol		Min.	Typical	Max.	Unit
Operating Case Temperature	Tc	SFPD-MR4-XX	0	-	+70	°C
		SFPD-MR4-XXI	-5	-	+70	
Power Supply Voltage	Vcc		3.15	3.3	3.45	V
Power Supply Current	Icc		-	-	455	mA
Date Rate					4.25G	bps

Performance Specifications - Electrical

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Transmitter						
CML Inputs(Differential)	Vin	400	-	2000	mVpp	AC coupled inputs*(note4)

Input Impedance (Differential)		Zin	85	100	115	ohm	Rin > 100 kohm @ DC
TX_Dis	Disable		2	-	Vcc	V	
	Enable		0	-	0.8		
TX_FAULT	Fault		2	-	Vcc	V	
	Normal		0	-	0.8		
Receiver							
CML Outputs (Differential)		Vout	400	800	1200	mVpp	AC coupled outputs
Output Impedance (Differential)		Zout	85	100	115	ohm	
RX_LOS	LOS		2	-	Vcc	V	
	Normal		0	-	0.8	V	
MOD_DEF (0:2)		VoH	2.5	-	-	V	
		VoL	0	-	0.8	V	

Performance Specifications - Optical - SFPD-MR4-EX-XXD(I)

Parameter	Symbol	Min.	Typical	Max.	Unit
Data Rate		-	4.25	-	Gbps
Transmitter					
Center Wavelength Spacing	λc		0.8		nm
Spectral Width (-20dB)	Δλ	-	-	0.3	nm
Deviation from Central Frequency@EOL		-12		12	GHz
Average Output Power*(note5)	Pout	0	-	5	dBm
Side Mode Suppression Ratio	SMSR	30	-	-	dB
Extinction Ratio @ 4.25Gbps	ER	4.5	-	-	dB
Rise/Fall Time(20%～80%)	tr/tf	-	-	0.26	ns
Total Jitter	TJ	-	-	120	ps
Output Optical Eye*(note6)	Complies with ANSI FC-PI specification*(note8)				
TX_Disable Assert Time	t_off	-	-	10	us
P_{out}@TX Disable Asserted	Pout	-	-	-45	dBm
Receiver					
Center Wavelength	λ	1528		1665	nm
Receiver Sensitivity*(note6)	Pmin			-18	dBm
Receiver Overload	Pmax	-3			dBm
LOS De-Assert	LOSD			-19	dBm
LOS Assert	LOSA	-42			dBm
LOS Hysteresis*(note9)		0.5			dB

Performance Specifications - SFPD-MR4-ZX-XXD(I)

Parameter	Symbol	Min.	Typical	Max.	Unit
Data Rate			4.25G		bps
Transmitter					
Center Wavelength	λc		0.8		nm
Spectral Width (-20dB)	Δλ	-	-	0.3	nm
Average Output Power*(note5)	Pout	0	-	5	dBm

Side Mode Suppression Ratio	SMSR	30	-	-	dB
Extinction Ratio @ 4.25 Gbps	ER	4.5	-	-	dB
Rise/Fall Time(20%～80%)	tr/tf	-	-	120	ns
Output Optical Eye*(note6)	Compatible with IEEE 802.3ah-2004*(note9)				
TX_Disable Assert Time	t_off	-	-	10	us
P_{out}@TX Disable Asserted	Pout	-	-	-45	dBm
Receiver					
Center Wavelength	λ	1528		1665	nm
Receiver Sensitivity*(note6)	Pmin			-24	dBm
Receiver Overload	Pmax	-9			dBm
LOS De-Assert	LOSD			-25	dBm
LOS Assert	LOSA	-45			dBm
LOS Hysteresis*(note9)		0.5			dB

Note4: CML logic, internally AC coupled.
Note5: Output power is power coupled into a 9/125μm single-mode fiber.
Note6: Filtered, measured with a PRBS 27-1 test pattern @4.25Gbps
Note7: Minimum average optical power at BER less than 1E-12 or lower, with a 27-1 NRZ PRBS.
Note8: Eye Pattern Mask
Note9: LOS Hysteresis