



**RoHS compliant
DWDM SFP Transceiver,
Small Form Pluggable (SFP), 3.3V
100M - 2.5Gb/s Fiber Channel/ 100M- 2.5 Gigabit Ethernet**



Features

- Up to 2.5Gb/s data links
- Duplex LC connector
- Hot-pluggable SFP footprint
- Uncooled DFB laser transmitter
- RoHS compliant and Lead Free
- Up to 120Km on 9/125um SMF
- 100GHz channel spacing
- Metal enclosure for lower EMI
- Single +3.3V power supply
- Power dissipation <1.8W
- SFP MSA SFF-8074i Compliant

Application

- Gigabit Ethernet
- 1x Fibre Channel

Ordering Information

PART NUMBER	INPUT/OUTPUT	SIGNAL DETECT	VOLTAGE	TEMPERATURE
CL-SFP-MD-120-XX/2,5	AC/AC	TTL	3.3V/5V	-5°C to 70 °C
CL-SFP-MD-120-XX/2,5i	AC/AC	TTL	3.3V/5V	-40°C to 85 °C



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General

Carelink's CL-SFP-MD-120-XX/2,5 Small Form Factor Pluggable (SFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). It is designed for DWDM SONET/ SDH, Gigabit Ethernet and Fiber-Channel applications.

Product Channel Selection

Product Code	ITU	Frequency	Center Wavelength(nm)
CL-SFP-MD-120-61/2,5	61	196.1	1528.77
CL-SFP-MD-120-60/2,5	60	196.0	1529.55
CL-SFP-MD-120-59/2,5	59	195.9	1530.33
CL-SFP-MD-120-58/2,5	58	195.8	1531.12
CL-SFP-MD-120-57/2,5	57	195.7	1531.90
CL-SFP-MD-120-56/2,5	56	195.6	1532.68
CL-SFP-MD-120-55/2,5	55	195.5	1533.47
CL-SFP-MD-120-54/2,5	54	195.4	1534.25
CL-SFP-MD-120-53/2,5	53	195.3	1535.04
CL-SFP-MD-120-52/2,5	52	195.2	1535.82
CL-SFP-MD-120-51/2,5	51	195.1	1536.61
CL-SFP-MD-120-50/2,5	50	195.0	1537.40
CL-SFP-MD-120-49/2,5	49	194.9	1538.19
CL-SFP-MD-120-48/2,5	48	194.8	1538.98
CL-SFP-MD-120-47/2,5	47	194.7	1539.77
CL-SFP-MD-120-46/2,5	46	194.6	1540.56
CL-SFP-MD-120-45/2,5	45	194.5	1541.35
CL-SFP-MD-120-44/2,5	44	194.4	1542.14
CL-SFP-MD-120-43/2,5	43	194.3	1542.94



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CL-SFP-MD-120-42/2,5	42	194.2	1543.73
CL-SFP-MD-120-41/2,5	41	194.1	1544.53
CL-SFP-MD-120-40/2,5	40	194.0	1545.32
CL-SFP-MD-120-39/2,5	39	193.9	1546.12
CL-SFP-MD-120-38/2,5	38	193.8	1546.92
CL-SFP-MD-120-37/2,5	37	193.7	1547.72
CL-SFP-MD-120-36/2,5	36	193.6	1548.51
CL-SFP-MD-120-35/2,5	35	193.5	1549.32
CL-SFP-MD-120-34/2,5	34	193.4	1550.12
CL-SFP-MD-120-33/2,5	33	193.3	1550.92
CL-SFP-MD-120-32/2,5	32	193.2	1551.72
CL-SFP-MD-120-31/2,5	31	193.1	1552.52
CL-SFP-MD-120-30/2,5	30	193.0	1553.33
CL-SFP-MD-120-29/2,5	29	192.9	1554.13
CL-SFP-MD-120-28/2,5	28	192.8	1554.94
CL-SFP-MD-120-27/2,5	27	192.7	1555.75
CL-SFP-MD-120-26/2,5	26	192.6	1556.55
CL-SFP-MD-120-25/2,5	25	192.5	1557.36
CL-SFP-MD-120-24/2,5	24	192.4	1558.17
CL-SFP-MD-120-23/2,5	23	192.3	1558.98
CL-SFP-MD-120-22/2,5	22	192.2	1559.79
CL-SFP-MD-120-21/2,5	21	192.1	1560.61
CL-SFP-MD-120-20/2,5	20	192.0	1561.42
CL-SFP-MD-120-19/2,5	19	191.9	1562.23
CL-SFP-MD-120-18/2,5	18	191.8	1563.05
CL-SFP-MD-120-17/2,5	17	191.7	1563.86



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Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883 Method 3015
- ESD to the Duplex LC Receptacle: compatible with IEC 61000-4-2
- Immunity compatible with IEC 61000-4-3
- EMI compatible with FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B
- Laser Eye Safety compatible with FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2
- RoHS compliant with RoHS 2 (2011/65/EU)

Pin Descriptions

Pin	Symbol	Name/Description	Ref.
1	VeeT	Transmitter Ground (Common with Receiver Ground)	1
2	TX Fault	Transmitter Fault.	
3	TX Disable	Transmitter Disable. Laser output disabled on high or open.	2
4	MOD_DEF(2)	Module Definition 2. Data line for Serial ID.	3
5	MOD_DEF(1)	Module Definition 1. Clock line for Serial ID.	3
6	MOD_DEF(0)	Module Definition 0. Grounded within the module.	3
7	Rate Select	No connection required	
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	4
9	VeeR	Receiver Ground (Common with Transmitter Ground)	1
10	VeeR	Receiver Ground (Common with Transmitter Ground)	1
11	VeeR	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	VeeR	Receiver Ground (Common with Transmitter Ground)	1
15	VccR	Receiver Power Supply	
16	VccT	Transmitter Power Supply	
17	VeeT	Transmitter Ground (Common with Receiver Ground)	1

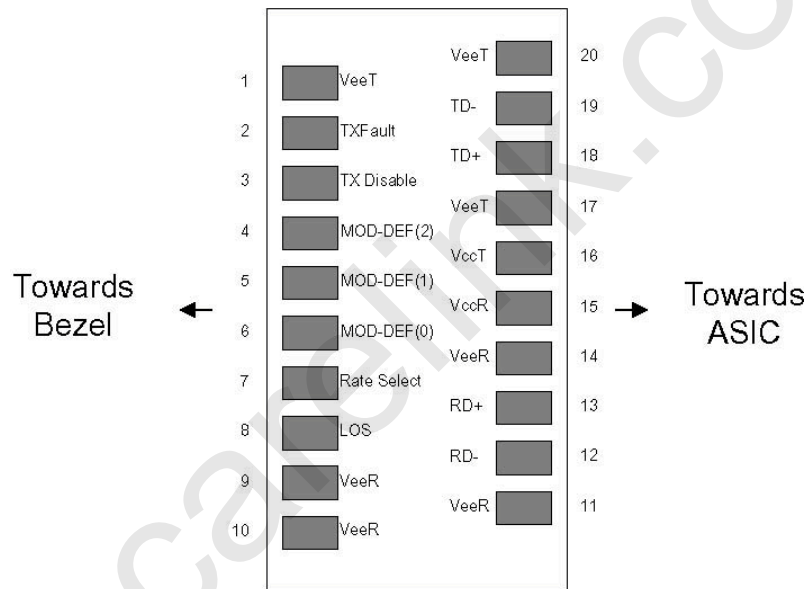


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18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	VeeT	Transmitter Ground (Common with Receiver Ground)	1

Notes

1. Circuit ground is internally isolated from chassis ground. :
2. Laser output disabled on TX Disable >2.0V or open, enabled on TX Disable <0.8V.
3. Should be pulled up with 4.7k - 10kohms on host board to a voltage between 2.0V and 3.6V. MOD_DEF (0) pulls line low to indicate module is plugged in.
4. LOS is open collector output. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

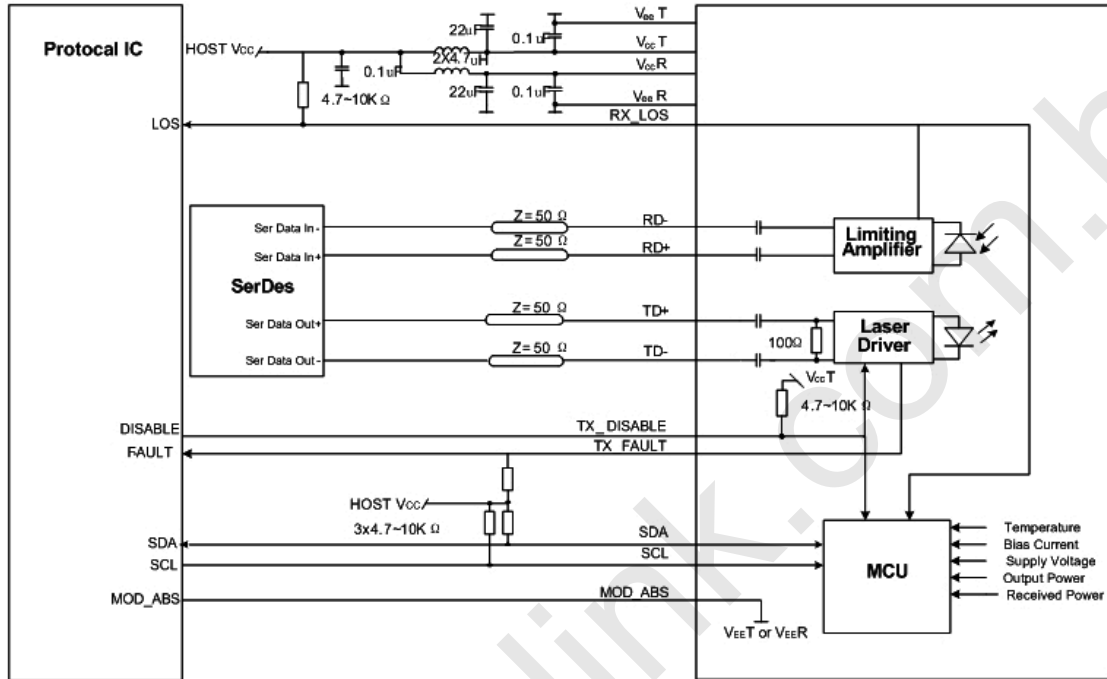


Pin-out of Connector Block on Host Board



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Recommend Circuit Schematic



Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Maximum Supply Voltage	V _{cc}	-0.5		+4.0	V	
Storage Temperature	T _S	-40		+85	°C	
Operating Humidity	RH	0		85	%	



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Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Power Supply Voltage	Vcc	3.13	3.30	3.47	V	
Power Supply Current	Icc			500	mA	
Case Operating Temperature	Tc	-5		+70	°C	1
	Tl	-40		+85		2
Data Rate(Gigabit Ethernet)			1.25		Gbps	
Data Rate(Fibre Channel)			1.063		Gbps	
9/125um G.652 SMF	Lmax			120	km	

Notes

1. For commercial class product.
2. For industrial class product.

Electrical Characteristics (TOP=25°C, Vcc=3.3Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Input differential impedance	Rin		100		Ω	1
Single ended data input swing	Vin, pp	250		1200	mV	
TX Disable-High		Vcc – 1.3		Vcc	V	
TX Disable-Low		Vee		Vee+ 0.8	V	
TX Fault-High		Vcc-0.5		Vcc	V	
TX Fault-Low		Vee		Vee+0.5	V	
Receiver						
Single ended data output swing	Vout, pp	300	400	800	mV	2
Data output rise time	tr			175	ps	3
Data output fall time	tf			175	ps	3
LOS-High		Vcc – 0.5		Vcc	V	



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LOS-Low		Vee		Vee+0.5	V	
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Notes

1. AC coupled.
2. Into 100 ohm differential termination.
3. 20 – 80 %

Optical Characteristics (TOP=25°C, Vcc=3.3 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Output Opt. Power	PO	0		+4	dBm	1
Optical Wavelength	λ	As per ITU-T 694.1			nm	
Spectral Width(-20dB)	$\Delta \lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Total Jitter	TJ			0.35	UI	
Optical Extinction Ratio	ER	9			dB	
Center Wavelength	λ_c EOL	z-100	z	Z+100	pm	
Receiver						
RX Sensitivity @2.488Gb/s	SENS			-30	dBm	2,3
Receiver Overload		-9			dBm	
Optical Center Wavelength	λ_c	1270		1600	nm	
LOS De-Assert	LOSD			-32	dBm	
LOS Assert	LOSA	-45			dBm	
LOS Hysteresis		0.5		5	dB	

Notes

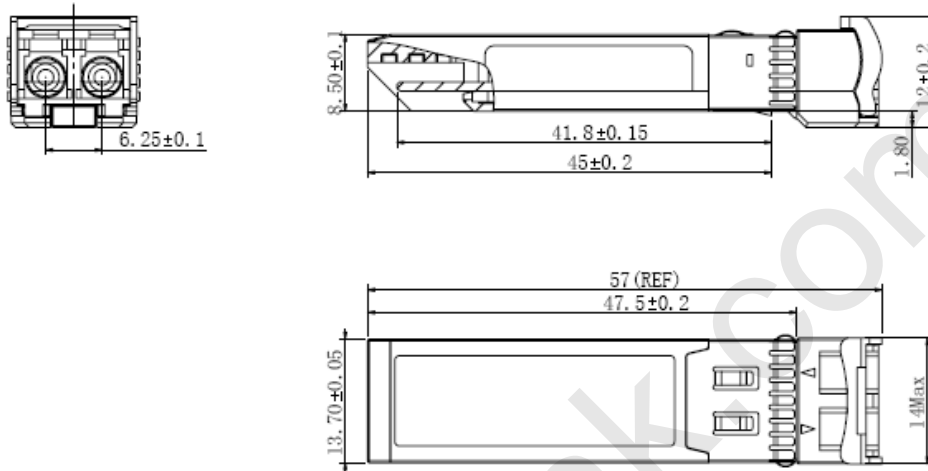
1. Class 1 Laser Safety. :
2. Measured with conformance signals defined in FC-PI-2 Rev. 10.0 specifications.
3. Measured with PRBS 27-1 at 10-12 BER.



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Mechanical Specifications

Carelink's Small Form Factor Pluggable (SFP) transceivers are compatible with the dimensions defined by the SFP Multi-Sourcing Agreement (MSA), dimensions are in mm.



EEPROM Information

EEPROM memory map specific data field description is as below:

2 wire address 1010000X (A0h)		2 wire address 1010001X (A2h)	
0	Serial ID Defined by SFP MSA (96 bytes)	0	Alarm and Warning Thresholds (56 bytes)
95		55	Cal Constants (40 bytes)
127		95	Real Time Diagnostic Interface (24 bytes)
	Vendor Specific (32 bytes)	119	Vendor Specific (8 bytes)
127	Reserved, SFF8079 (128 bytes)	127	User Writable EEPROM (120 bytes)
255		247	Vendor Specific (8 bytes)
		255	Vendor Specific (8 bytes)



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Digital Diagnostic Monitoring Interface

Parameter	Range	Accuracy	Calibration
Temperature	-5 to +70°C (C)	±3°C	Internal
	-40 to +85°C (I)		
Voltage	2.97 to 3.63V	±3%	Internal
Bias Current	0 to 100mA	±10%	Internal
TX Power	0 to +4dBm	±3dB	Internal
RX Power	-30 to -9dBm	±3dB	Internal