



**Modulelink(Shenzhen) Technology Co., Ltd.**

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## **SFP+ 10G Transceiver M10GB-SFP-D80**

### **Features:**

- Hot pluggable
- 10Gb/s serial optical interface
- ITU-T DWDM 100G Grid Cooled EML Laser and APD Receiver
- Up to 80km on 9/125um SMF
- SFP+ MSA package with Duplex LC Connector
- 2-wire interface for management and diagnostic monitor
- SFI High Speed Electrical Interface
- Very low EMI and excellent ESD protection
- +3.3V single power supply
- Power consumption less than 2W
- Operating case temperature: -5~+70°C

### **Applications:**

- 10G Base-ZR/ZW
- 10G Fiber Channel
- DWDM Networks
- Other optical links

### **Description:**

Modulelink DWDM SFP+ ZR transceiver is a very compact 10Gb/s optical transceiver module for serial optical communication applications, supporting data-rate of 10.3125Gbps (10GBASE-ZR) or 9.953Gbps (10GBASE-ZW), and transmission distance up to 80km on SMF. The transceiver consists of two sections: The high performance cooled DWDM EML Laser Transmitter and high sensitivity APD integrated with a TIA Receiver.

The module is hot pluggable into the 20-pin connector. The high-speed electrical interface is based on low voltage logic, with nominal 100 Ohms differential impedance and AC coupled in the module. The optical output can be disabled by LVTTTL logic high-level input of TX\_Disable. Loss of signal (RX\_LOS) output is provided to indicate the loss of an input optical signal of receiver. The receiver RATE\_SELECT pin is not used by the

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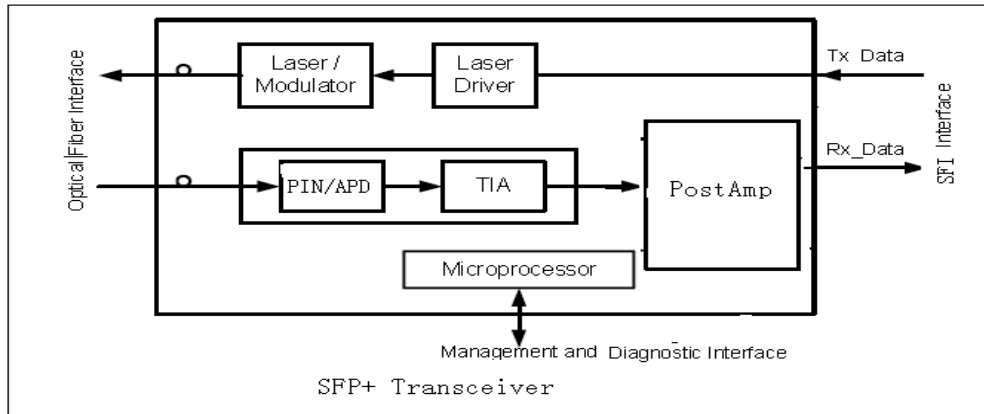
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A 2-wire interface (SCL, SDA) is used for serial ID, digital diagnostics and other control /monitor functions

**Absolute Maximum Ratings**

Parameter	Symbol	Min.	Typical	Max.	Unit
Storage Temperature	$T_s$	-40		+85	°C
Supply Voltage	$V_{CC,T, R}$	-0.5		4	V
Relative Humidity	RH	0		85	%

**Recommended Operating Environment:**

Parameter	Symbol	Min.	Typical	Max.	Unit
Case operating Temperature	$T_c$	-5		+70	°C
Supply Voltage	$V_{CC,T, R}$	+3.13	3.3	+3.47	V
Supply Current	$I_{CC}$		400	600	mA
Power Dissipation	PD			2	W

**Electrical Characteristics ( $T_{OP} = 0$  to  $70$  °C,  $V_{CC} = 3.13$  to  $3.47$  Volts)**

Parameter	Symbol	Min	Typ	Max	Unit	Note
<b>Transmitter:</b>						
Differential input voltage swing		120		1200	mVpp	1
Transmit Disable Input	H	$V_{IH}$	2.0	$V_{CC}+0.3$	V	
	L	$V_{IL}$	0	0.8	V	
Transmit Enable Output	H	$V_{OH}$	2.4	$V_{CC}+0.3$	V	
	L	$V_{OL}$	0	0.4	V	2
Input Differential Impedance	$Z_{in}$	80	100	120	$\Omega$	

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Receiver							
Differential output voltage swing			500		800	mVpp	3
LOS Output	H	V <sub>OH</sub>	2.4		V <sub>CC</sub> +0.3	V	2
	L	V <sub>OL</sub>	0		0.4	V	
Output Differential Impedance		Z <sub>on</sub>	80	100	120	Ω	

**Notes:**

- Note 1) TD+/- are internally AC coupled with 100Ω differential termination inside the module.
- Note 2) Tx Fault and Rx LOS are open collector outputs, which should be pulled up with 4.7k to 10kΩ resistors on the host board. Pull up voltage between 2.0V and V<sub>CC</sub>+0.3V.
- Note 3) RD+/- outputs are internally AC coupled, and should be terminated with 100Ω (differential) at the user SERDES.

**Optical Parameters(TOP = 0 to 70 °C, VCC = 3.13 to 3.47 Volts)**

Parameter	Symbol	Min	Typ	Max	Unit	Ref.	
<b>Transmitter</b>							
Date Rate			10.3125		Gb/s	Optical	
Wavelength	λ <sub>c</sub>	λ <sub>c</sub> -0.1	λ <sub>c</sub>	λ <sub>c</sub> +0.1	nm		
Average output power	P <sub>o</sub>	0		+4	dBm	1	
Optical Extinction Ratio	ER	9			dB	1	
RMS spectral width	Δλ			0.3	nm		
Side Mode Suppression Ratio	SMSR	30			dB		
Optical Eye Mask		IEEE802.3-2005 Compliant Compliant with ITU-T G.691 and GR-253-CORE					
<b>Receiver</b>							
Date Rate			10.3125		Gb/s		
Optical Wavelength	λ	1200		1600	nm		
Receiver Sensitivity	R			-23.0	dBm	2	
Maximum Input Power	P <sub>MAX</sub>	0.5			dBm		
LOS De-Assert	LOSD			-24	dBm		
LOS Assert	LOSA	-34			dBm		
LOS Hysteresis		0.5		4	dB		
Receiver Reflectance				-14	dB		

**Notes:**

- Note 1) Measured at 10.3125b/s with PRBS 2<sup>31</sup> – 1 NRZ test pattern.
- Note 2) Under the ER worst case, measured at 10.3125 Gb/s with PRBS 2<sup>31</sup> – 1 NRZ test pattern for BER <

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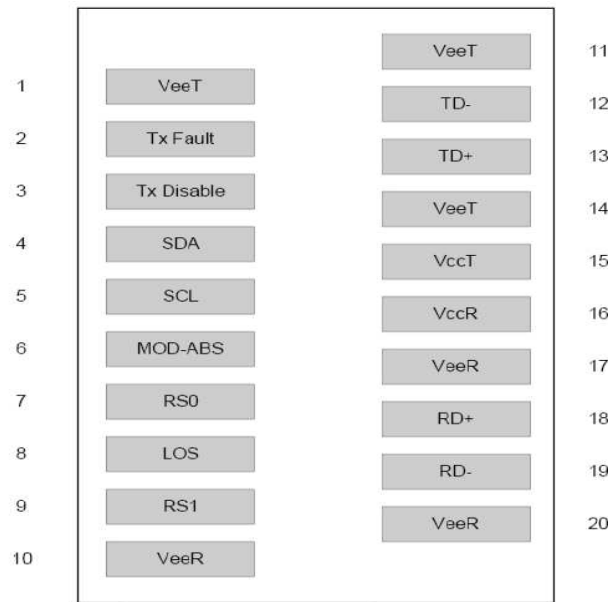
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1x10<sup>-12</sup>

**Pin Assignment:**

Diagram of Host Board Connector Block Pin Numbers and Name



**Pin Function Definitions**

PIN #	Name	Function	Notes
1	VeeT	Module transmitter ground	Note1
2	Tx Fault	Module transmitter fault	Note 2
3	Tx Disable	Transmitter Disable; Turns off transmitter laser output	Note 3
4	SDL	2 wire serial interface data input/output (SDA)	
5	SCL	2 wire serial interface clock input (SCL)	
6	MOD-ABS	Module Absent, connect to VeeR or VeeT in the module	Note 2
7	RS0	Rate select0,optionally control SFP+ receiver. When high, input data rate >4.5Gb/ s;when low, input data rate <=4.5Gb/s	
8	LOS	Receiver Loss of Signal Indication	Note4
9	RS1	Rate select0,optionally control SFP+ transmitter. When high, input data rate >4.5Gb/s;when low, input data rate <=4.5Gb/s	
10	VeeR	Module receiver ground	Note 1
11	VeeR	Module receiver ground	Note 1
12	RD-	Receiver inverted data out put	
13	RD+	Receiver non-inverted data out put	
14	VeeR	Module receiver ground	Note 1
15	VccR	Module receiver 3.3V supply	

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16	VccT	Module transmitter 3.3V supply	
17	VeeT	Module transmitter ground	Note 1
18	TD+	Transmitter inverted data out put	
19	TD-	Transmitter non-inverted data out put	
20	VeeT	Module transmitter ground	Note1

Note 1) The module ground pins shall be isolated from the module case.

Note 2) This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host\_Vcc on the host board.

Note 3) This pin shall be pulled up with 4.7K-10Kohms to VccT in the module.

Note 4) This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host\_Vcc on the host board.

### SFP Module EEPROM Information and Management

The SFP+ modules implement the 2-wire serial communication protocol as defined in the SFP -8472.

The serial ID information of the SFP modules and Digital Diagnostic Monitor parameters can be accessed through the I2C interface at address A0h and A2h. The memory is mapped in Table 1. Detailed ID information(A0h) is listed in Table 2. And the DDM specification at address A2h. For more details of the memory map and byte definitions, please refer to the SFF-8472, "Digital Diagnostic Monitoring Interface for Optical Transceivers". The DDM parameters have been internally calibrated.

**Table 1.** Digital Diagnostic Memory Map (Specific Data Field Descriptions)

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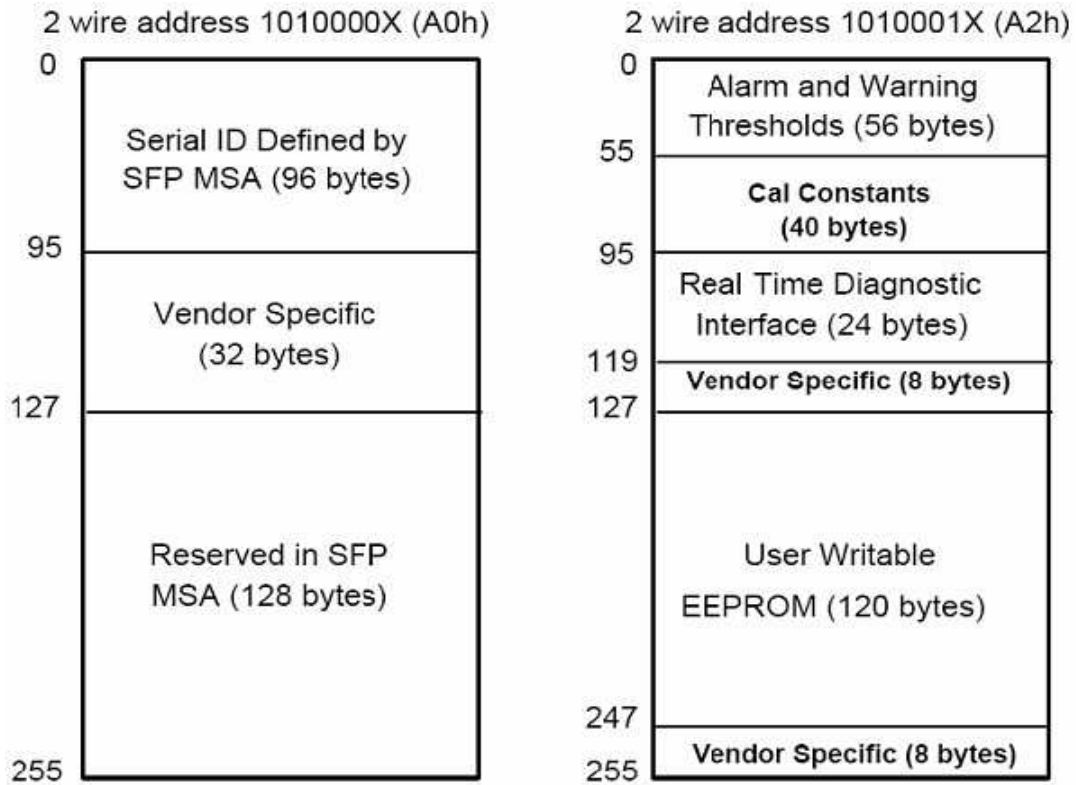
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**Table 2 - EEPROM Serial ID Memory Contents (A0h)**

Data Address	Length (Byte)	Name of Length	Description and Contents
Base ID Fields			
0	1	Identifier	Type of Serial transceiver (03h=SFP)
1	1	Reserved	Extended identifier of type serial transceiver (04h)
2	1	Connector	Code of optical connector type (07=LC)
3-10	8	Transceiver	
11	1	Encoding	NRZ(03h)
12	1	BR,Nominal	Nominal baud rate, unit of 100Mbps
13-14	2	Reserved	(0000h)
15	1	Length(9um)	Link length supported for 9/125um fiber, units of 100m
16	1	Length(50um)	Link length supported for 50/125um fiber, units of 10m
17	1	Length(62.5um)	Link length supported for 62.5/125um fiber, units of 10m
18	1	Length(Copper)	Link length supported for copper, units of meters
19	1	Reserved	

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20-35	16	Vendor Name	SFP vendor name: MODULELINK
36	1	Reserved	
37-39	3	Vendor OUI	SFP transceiver vendor OUI ID
40-55	16	Vendor PN	Part Number: "M10GB-SFP-D80-Dxx" (ASCII)
56-59	4	Vendor rev	Revision level for part number
60-62	3	Reserved	
63	1	CCID	Least significant byte of sum of data in address 0-62
<b>Extended ID Fields</b>			
64-65	2	Option	Indicates which optical SFP signals are implemented (001Ah = LOS, TX_FAULT, TX_DISABLE all supported)
66	1	BR, max	Upper bit rate margin, units of %
67	1	BR, min	Lower bit rate margin, units of %
68-83	16	Vendor SN	Serial number (ASCII)
84-91	8	Date code	MODULELINK's Manufacturing date code
92-94	3	Reserved	
95	1	CCEX	Check code for the extended ID Fields (addresses 64 to 94)
<b>Vendor Specific ID Fields</b>			
96-127	32	Readable	MODULELINK specific date, read only
128-255	128	Reserved	Reserved for SFF-8079

**Digital Diagnostic Monitor Characteristics**

Data Address	Parameter	Range	Accuracy	Unit
96-97	Transceiver Internal Temperature	-10 to +80°C	±3.0	°C
100-101	Laser Bias Current	8 to 90mA	±10	%
100-101	Tx Output Power	-8.5 to +1dBm	±3.0	dBm
100-101	Rx Input Power	-15.5 to 0.5dBm	±3.0	dBm
100-101	VCC3 Internal Supply Voltage	+3.0V to +3.7V	±3.0	%

**Regulatory Compliance**

The M10GB-SFP-D80-Dxx complies with international Electromagnetic Compatibility (EMC) and international safety requirements and standards (see details in Table following).

Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>1000 V)
Electrostatic Discharge (ESD) to the Duplex LC Receptacle	IEC 61000-4-2 GR-1089-CORE	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B	Compatible with standards

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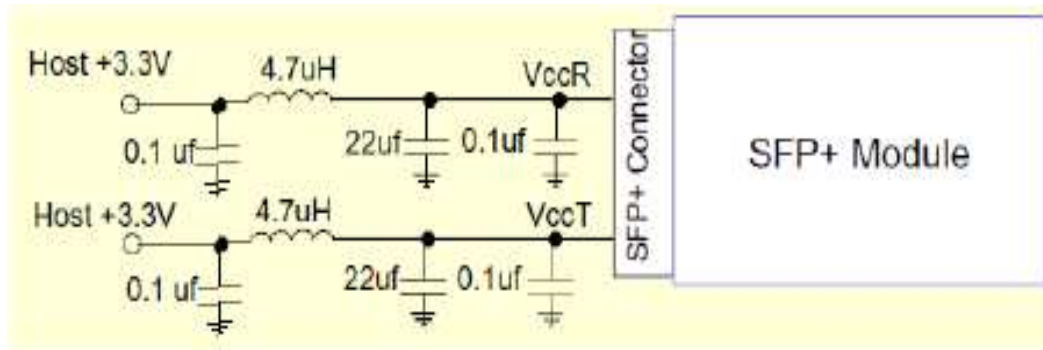
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Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2	Compatible with Class 1 laser product.
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**Recommended Circuit:**



**Recommended Host Board Power Supply Circuit**

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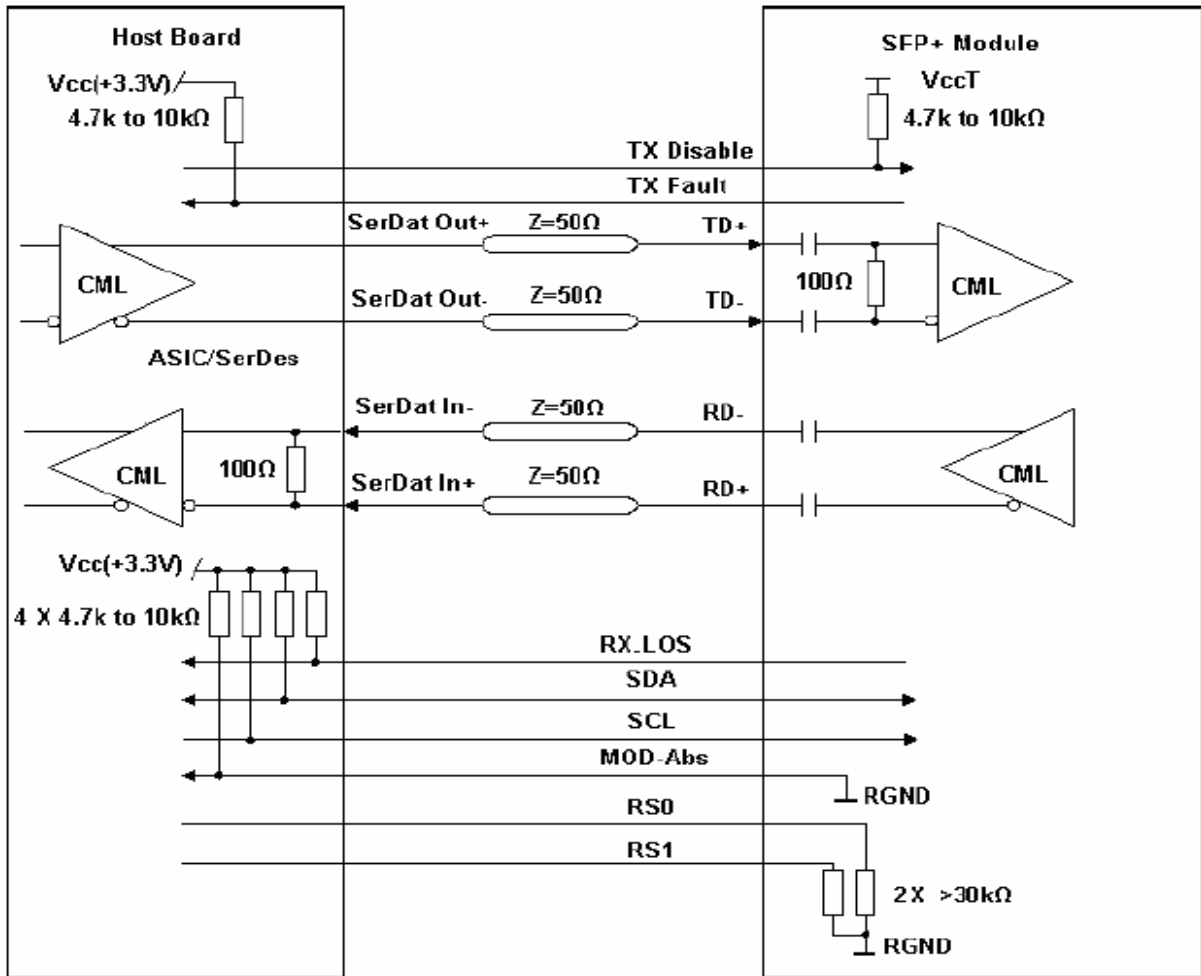




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Recommended High-speed Interface Circuit

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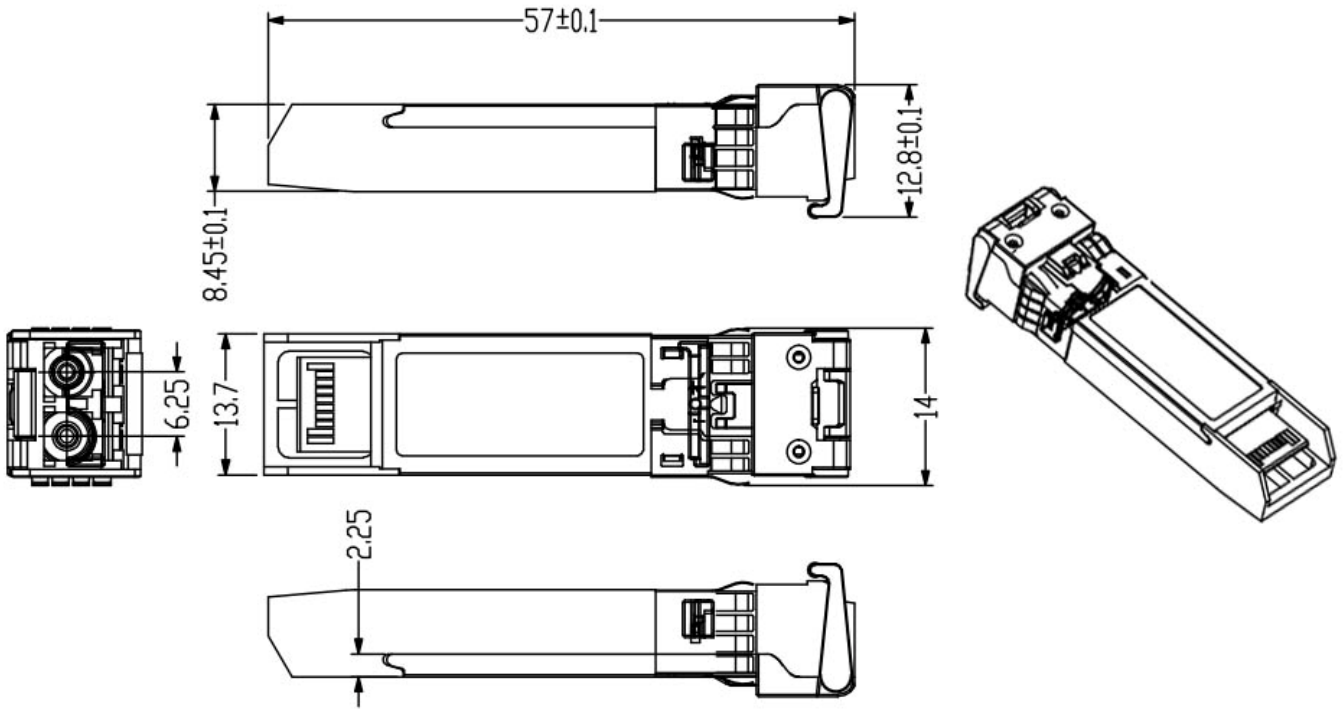


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**Mechanical Dimensions:**



**Order Information:**

**M10GB-SFP-D80-Dxx**

**XX: 100GHZ ITU Grid Wavelength**

Part No.	Central Wavelength(nm)	Frequency (THZ)
M10GB-SFP-D80-D61	1528.77	196.1
M10GB-SFP-D80-D60	1529.55	196.0
M10GB-SFP-D80-D59	1530.33	195.9
M10GB-SFP-D80-D58	1531.12	195.8
M10GB-SFP-D80-D57	1531.90	195.7
M10GB-SFP-D80-D56	1532.68	195.6
M10GB-SFP-D80-D55	1533.47	195.5
M10GB-SFP-D80-D54	1534.25	195.4
M10GB-SFP-D80-D53	1535.04	195.3
M10GB-SFP-D80-D52	1535.82	195.2
M10GB-SFP-D80-D51	1536.61	195.1
M10GB-SFP-D80-D50	1537.40	195.0
M10GB-SFP-D80-D49	1538.19	194.9
M10GB-SFP-D80-D48	1538.98	194.8
M10GB-SFP-D80-D47	1539.77	194.7

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M10GB-SFP-D80-D46	1540.56	194.6
M10GB-SFP-D80-D45	1541.35	194.5
M10GB-SFP-D80-D44	1542.14	194.4
M10GB-SFP-D80-D43	1542.94	194.3
M10GB-SFP-D80-D42	1543.73	194.2
M10GB-SFP-D80-D41	1544.53	194.1
M10GB-SFP-D80-D40	1545.32	194.0
M10GB-SFP-D80-D39	1546.12	193.9
M10GB-SFP-D80-D38	1546.92	193.8
M10GB-SFP-D80-D37	1547.72	193.7
M10GB-SFP-D80-D36	1548.51	193.6
M10GB-SFP-D80-D35	1549.32	193.5
M10GB-SFP-D80-D34	1550.12	193.4
M10GB-SFP-D80-D33	1550.92	193.3
M10GB-SFP-D80-D32	1551.72	193.2
M10GB-SFP-D80-D31	1552.52	193.1
M10GB-SFP-D80-D30	1553.33	193.0
M10GB-SFP-D80-D29	1554.13	192.9
M10GB-SFP-D80-D28	1554.94	192.8
M10GB-SFP-D80-D27	1555.75	192.7
M10GB-SFP-D80-D26	1556.55	192.6
M10GB-SFP-D80-D25	1557.36	192.5
M10GB-SFP-D80-D24	1558.17	192.4
M10GB-SFP-D80-D23	1558.98	192.3
M10GB-SFP-D80-D22	1559.79	192.2
M10GB-SFP-D80-D21	1560.61	192.1
M10GB-SFP-D80-D20	1561.42	192.0
M10GB-SFP-D80-D19	1562.23	191.9
M10GB-SFP-D80-D18	1563.05	191.8
M10GB-SFP-D80-D17	1563.86	191.7

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