

FEATURES

- Supports 9.95Gb/s to 11.3Gb/s bit rates
- 0 to 70°C operating case temperature
- SFP+ package with duplex LC receptacle connector
- Hot-pluggable capability
- Single 3.3V power supply
- Temperature-stabilized CWDM EML transmitter and high performance APD receiver
- Up to 80km transmission distance over SMF
- Low power dissipation with build-in CDR in both transmitter and receiver
- SFI electrical interface
- Low EMI and excellent ESD protection
- Built- in Digital Diagnostic Monitoring (DDM) function
- Class I laser safety standard IEC-60825 compliant
- RoHS-6 compliance

APPLICATIONS

- 10GBASE-ZR/ZW
- CWDM Network
- 10Gb/s Fiber Channel

STANDARDS

- Complies with SFP+ MSA
- Complies with SFF-8472
- Compliant with IEEE 802.3ae
- Complies with FCC 47 CFR Part 15, Class B
- Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007

ABSOLUTE MAXIMUM RATING

Parameter	Symbol	Min.	Max.	Unit	Notes
Storage Ambient Temperature	T _{STG}	-40	85	°C	
Operating Case Temperature	T _c	0	70	°C	
Operating Humidity	OH	5	95	%	
Power Supply Voltage	V _{CC}	-0.5	3.6	V	

RECOMMENDED OPERATING CONDITION

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating Case Temperature	T _c	0		70	°C	
Power Supply Voltage	V _{CC}	3.13	3.3	3.47	V	
Power Supply Consumption	P			2	W	
Date Rate		9.95		11.3	Gbps	
Data Rate Drift		-100		+100	PPM	

TRANSMITTER OPTICAL CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Centre Wavelength	λ_c	$\lambda - 6.5$	λ	$\lambda + 6.5$	nm	
Spectral Width (-20dB)	$\Delta\lambda$			1	nm	
Average Output Power	P _{OUT}	0		4	dBm	Launched into SMF Fiber
Average Power of OFF Transmitter	P _{OUT-OFF}			-30	dBm	
Extinction Ratio	ER	6			dB	
Side Mode Suppression Ratio	SMSR	30			dB	
Transmitter and Dispersion Penalty	TDP			3	dB	80km SMF@10.7Gb/s
Eye Diagram	Comply with IEEE802.3ae					

TRANSMITTER ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Data Input Differential Swing		120		820	mV	
Input Differential Impedance		90	100	110	Ω	
TX Disable	Disable		2	VCC+0.3	V	
	Enable		-0.3	0.8	V	

TX Fault	Fault		2.4		VCC _{HOST}	V	
	Normal		-0.3		0.4	V	

RECEIVER OPTICAL CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating Wavelength	λ_c	1260		1620	nm	
Sensitivity	SEN			-24	dBm	PRBS2 ³¹ -1 @ 10.3125Gbps BER $\leq 1 \times 10^{-12}$
Saturation Optical Power	SAT	-7			dBm	
LOS De-Assert	LOS _D			-26	dBm	
LOS Assert	LOS _A	-38			dBm	
LOS Hysteresis	HYS	0.5		5	dB	

RECEIVER ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Differential data output swing	Vout	340	650	850	mV	
Rx_LOS Output Voltage - High	High	2.4		VCC _{HOST}	V	
Rx_LOS Output Voltage - Low	Low	-0.3		0.4	V	
Output Rise Time, 20%~80%	TR	28			ps	
Output Fall Time, 20%~80%	TF	28			ps	

PIN DESCRIPTION

PIN	Name	Description	Notes
1	V _{EE} T	Transmitter Ground	
2	TX_Fault	Transmitter Fault Indication	Low: normal; High: abnormal
3	TX_Disable	Transmitter Disable	Low: transmitter on; High: transmitter off
4	SDA	SDA	The data line of two wire serial interface
5	SCL	SCL	The clock line of two wire serial interface
6	MOD_ABS	Module Absent	Connected to V _{EE} T or V _{EE} R in the module
7	RS0	Not Connected	
8	RX_LOS	Loss of Signal	Low: signal detected; High: loss of signal
9	RS1	Not Connected	
10	V _{EE} R	Receiver Ground	
11	V _{EE} R	Receiver Ground	
12	RD-	Inv. Received Data Out	AC-coupled, CML
13	RD+	Received Data Out	AC-coupled, CML
14	V _{EE} R	Receiver Ground	
15	V _{CC} R	Receiver Power	
16	V _{CC} T	Transmitter Power	
17	V _{EE} T	Transmitter Ground	
18	TD+	Transmit Data In	AC-coupled, CML
19	TD-	Inv. Transmit Data In	AC-coupled, CML
20	V _{EE} T	Transmitter Ground	

PIN OUT DRAWING (TOP VIEW)

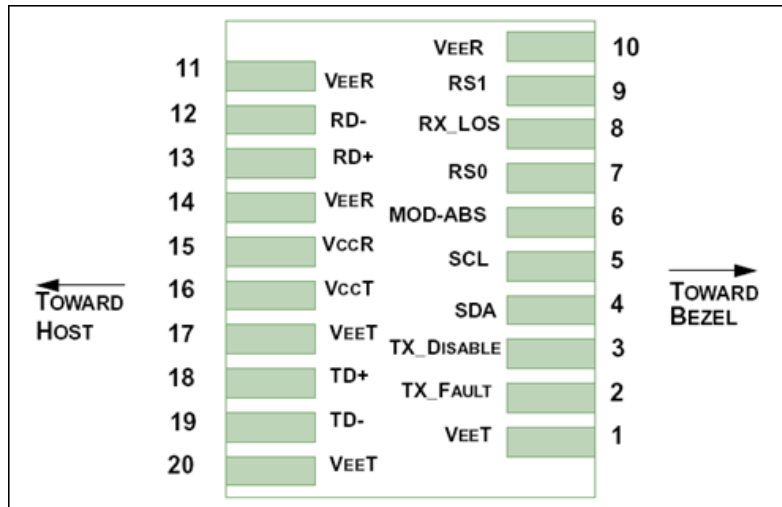


Figure 1 Pin Out Drawing (Top view)

TYPICAL INTERFACE CIRCUIT

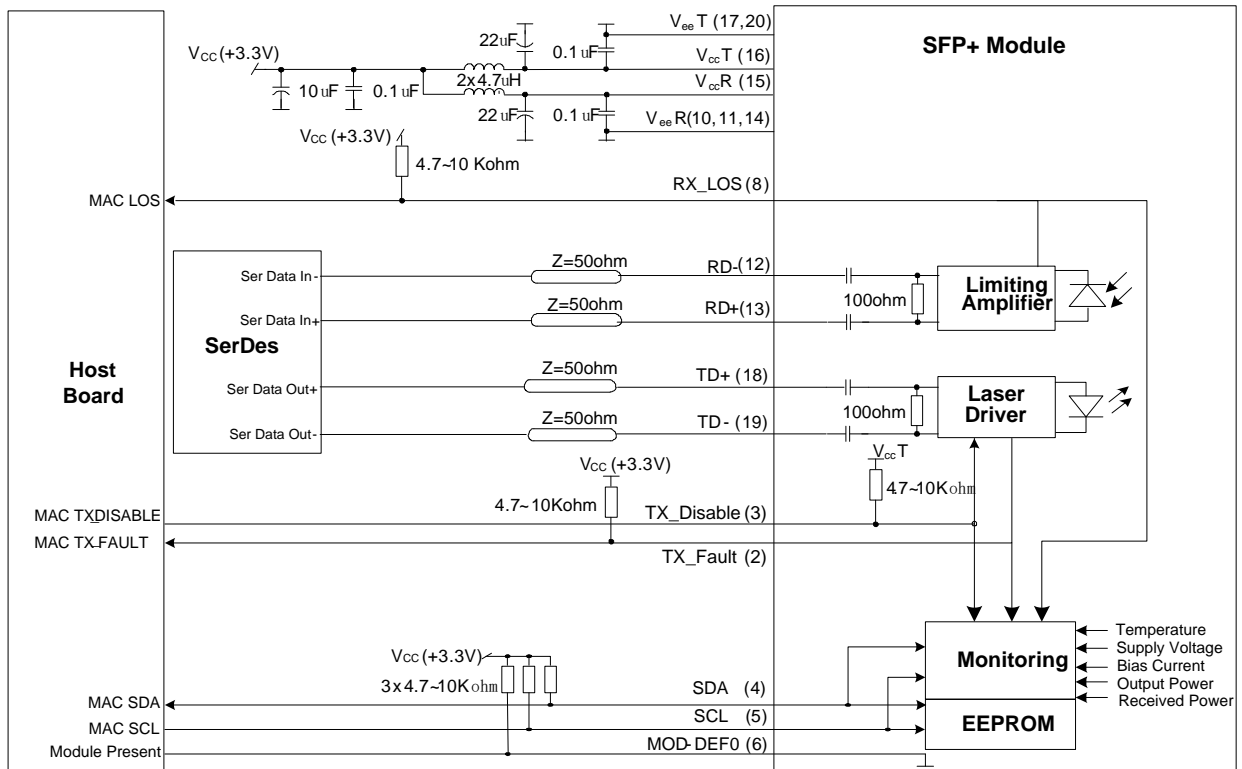


Figure 2 Typical Interface Circuit

PACKAGE OUTLINE

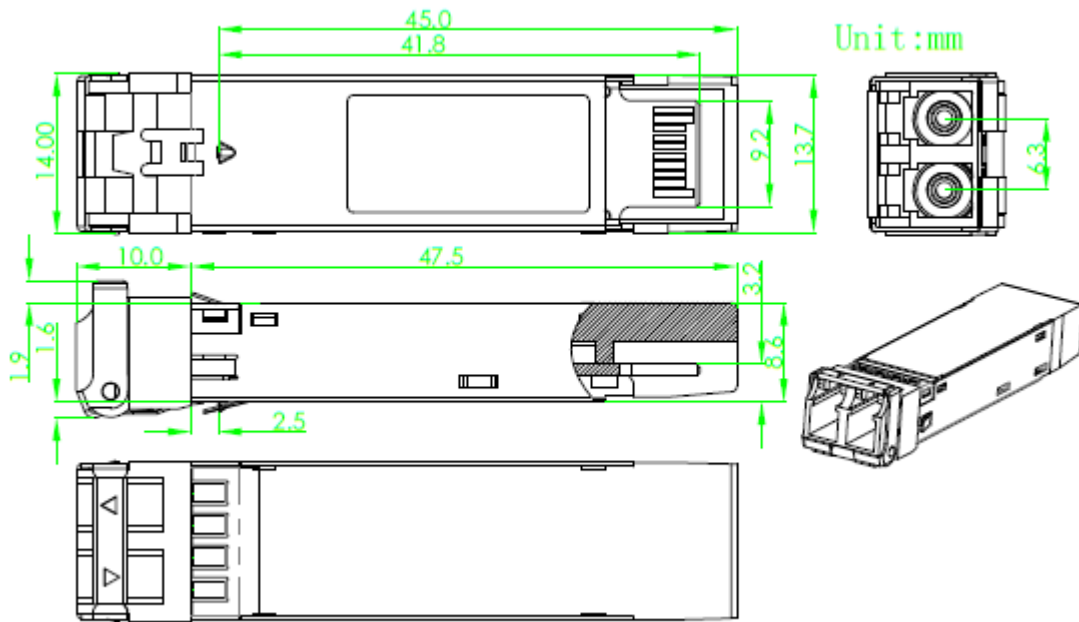


Figure 3 Package Outline

EEPROM INFORMATION

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	Vendor Specific (32 bytes)	55	Cal Constants (40 bytes)
127	Reserved, SFF8079 (128 bytes)	95	Real Time Diagnostic Interface (24 bytes)
255		119	Vendor Specific (8 bytes)
		127	User Writable EEPROM (120 bytes)
		247	Vendor Specific (8 bytes)
		255	

DIGITAL DIAGNOSTIC MONITORING INTERFACE

Parameter	Range	Accuracy	Calibration	NOTES
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Temperature	-5 to 70°C	±5°C	Internal	LSB: 1/256C
Voltage	2.97 to 3.63V	±3%	Internal	LSB: 0.1mV
Bias Current	0 to 100mA	±10%	Internal	LSB: 2uA
TX Power	-1 to +5dBm	±3dB	Internal	LSB: 0.1uW
RX Power	-25 to -6dBm	±3dB	Internal	LSB: 0.1uW

ORDERING INFORMATION

Part No.	Tx/Rx	Data Rate	Operating Temp	Distance
HOLS-PPCxx8077-LD-CE	EML/APD	10.3125G	0 to +70°C	80km
HOLS-PPCxx8077-LD-IE	EML/APD	10.3125G	-40 to +85°C	80km

Note:

XX is CWDM wavelength code as in the table below:

Center Wavelength(nm)	Code	Center Wavelength(nm)	Code
1271	27	1471	47
1291	29	1491	49
1311	31	1511	51
1331	33	1531	53
1351	35	1551	55
1371	37	1571	57
1391	39	1591	59
1411	41	1611	61

WARNINGS

- Handling Precautions: This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.
- Laser Safety: Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.