



## **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 <sub>STG</sub>	-40	85	°C	
Operating Case Temperature	T <sub>c</sub>	0	70	°C	
Operating Humidity	OH	5	95	%	
Power Supply Voltage	V <sub>CC</sub>	-0.5	3.6	V	

**RECOMMENDED OPERATING CONDITION**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating Case Temperature	T <sub>c</sub>	0		70	°C	
Power Supply Voltage	V <sub>CC</sub>	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 <sub>C</sub>	λ -6.5	λ	λ +6.5	nm	
Spectral Width (-20dB)	Δλ			1	nm	
Average Output Power	P <sub>OUT</sub>	0		4	dBm	Launched into SMF Fiber
Average Power of OFF Transmitter	P <sub>OUT-OFF</sub>			-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		V <sub>CC</sub> +0.3	V	
	Enable	-0.3		0.8	V	
TX Fault	Fault	2.4		V <sub>CC</sub> <sub>HOST</sub>	V	
	Normal	-0.3		0.4	V	

**RECEIVER OPTICAL CHARACTERISTICS**

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

**RECEIVER ELECTRICAL CHARACTERISTICS**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Differential data output swing	V <sub>out</sub>	340	650	850	mV	
Rx_LOS Output Voltage - High	High	2.4		VCC <sub>HOST</sub>	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 <sub>EE</sub> 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 <sub>EE</sub> T or V <sub>EE</sub> 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 <sub>EE</sub> R	Receiver Ground	
11	V <sub>EE</sub> R	Receiver Ground	
12	RD-	Inv. Received Data Out	AC-coupled, CML
13	RD+	Received Data Out	AC-coupled, CML
14	V <sub>EE</sub> R	Receiver Ground	
15	V <sub>CC</sub> R	Receiver Power	
16	V <sub>CC</sub> T	Transmitter Power	
17	V <sub>EE</sub> T	Transmitter Ground	
18	TD+	Transmit Data In	AC-coupled, CML
19	TD-	Inv. Transmit Data In	AC-coupled, CML
20	V <sub>EE</sub> T	Transmitter Ground	

## PIN OUT DRAWING (TOP VIEW)

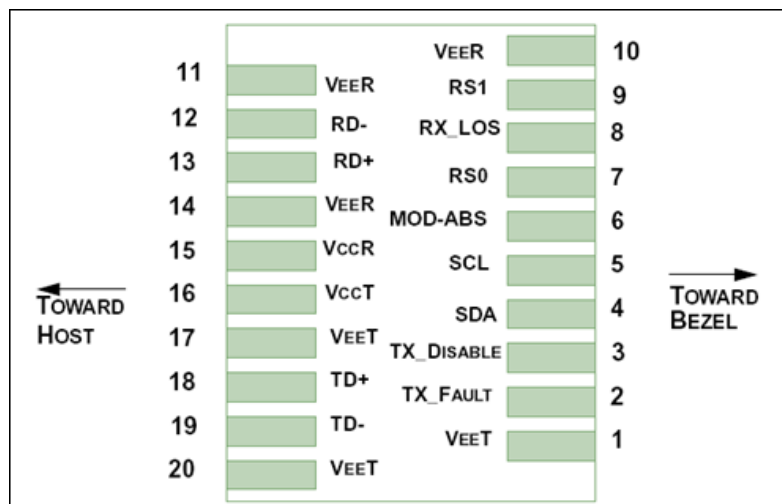


Figure 1 Pin Out Drawing (Top view)

## TYPICAL INTERFACE CIRCUIT

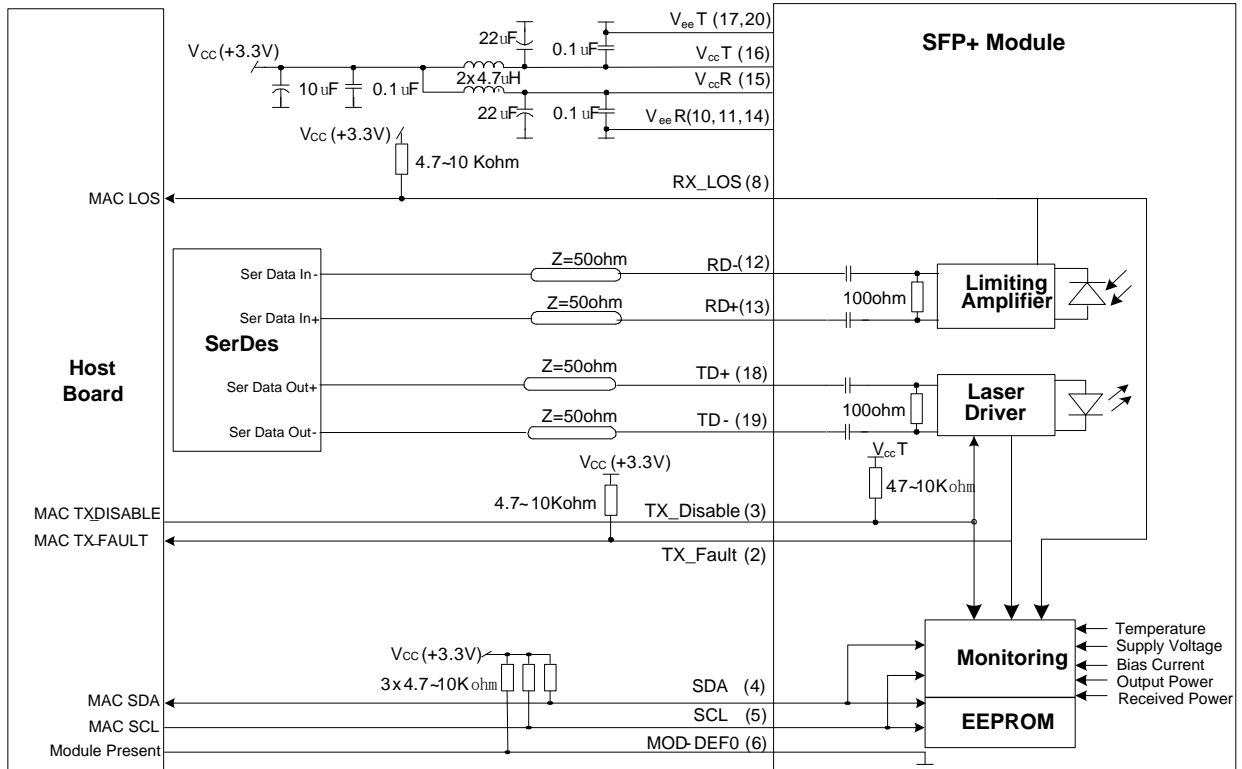


Figure 2 Typical Interface Circuit

## PACKAGE OUTLINE

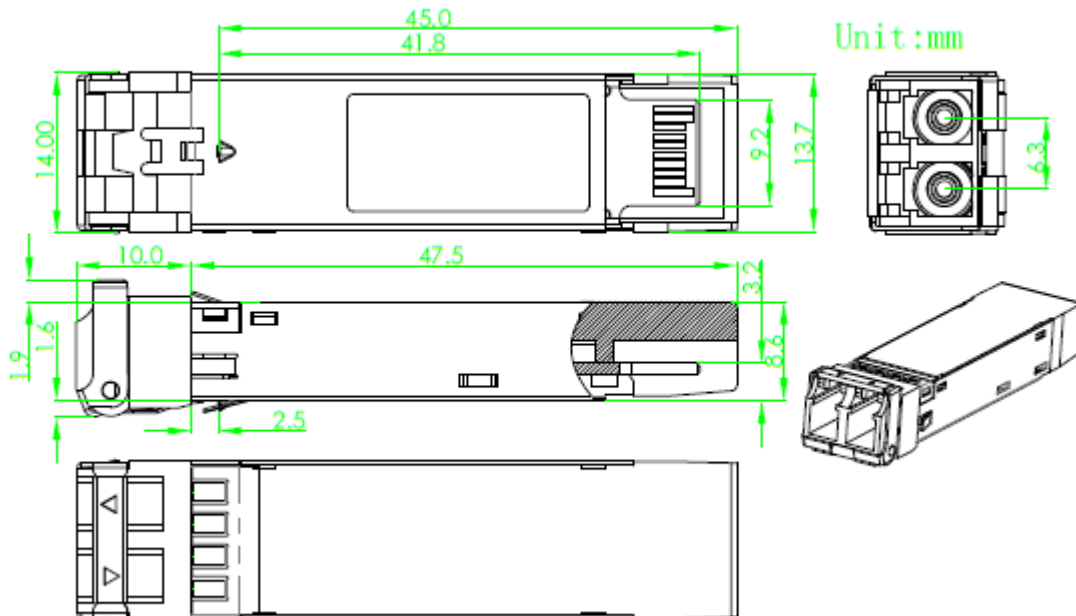


Figure 3 Package Outline

## EEPROM INFORMATION

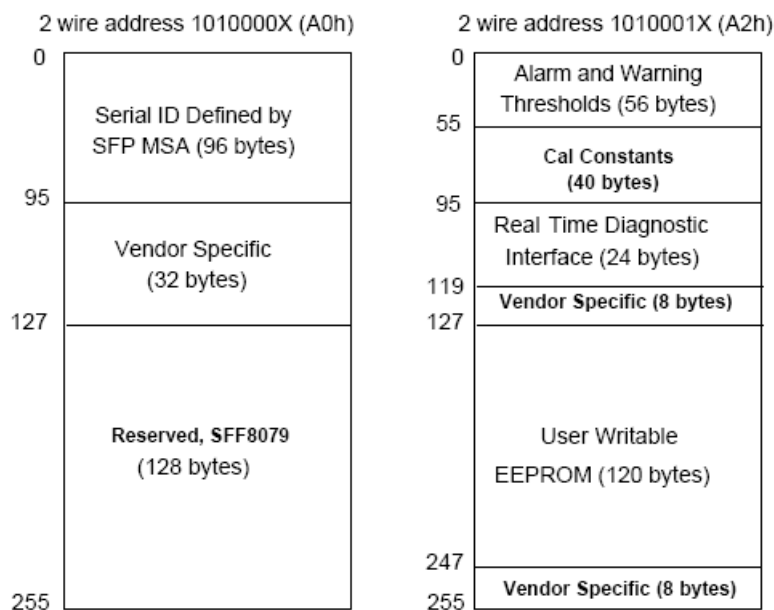


Figure 4 EEPROM Memory Map Specific Data Field Descriptions

## DIGITAL DIAGNOSTIC MONITORING INTERFACE

Parameter	Range	Accuracy	Calibration	NOTES
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**

Wavelength Code	Product Code	Center Wavelength (nm)
1	SO08CW77-PLGA-47	1471
2	SO08CW77-PLGA-49	1491
3	SO08CW77-PLGA-51	1511
4	SO08CW77-PLGA-53	1531
5	SO08CW77-PLGA-55	1551
6	SO08CW77-PLGA-57	1571
7	SO08CW77-PLGA-59	1591
8	SO08CW77-PLGA-61	1611

**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.

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