



## FEATURES

- Supports 9.95Gb/s to 11.1Gb/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
- CWDM EML transmitter and high performance PIN-TIA receiver
- Up to 16dB Power Budget
- Built-in CDR
- Low power dissipation
- 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

- CWDM Network
- 10G Fiber Channel
- 10GBASE-LR/LW
- SONET/SDH OC-192
- CPRI

## STANDARDS

- Complies with SFP+ MSA
- Complies with SFF 8472
- Complies with IEEE802.3ae
- Complies with ITU-T G691
- 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	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	
Current	I <sub>CC</sub>			570	mA	
Date Rate			10.3125		Gbps	

**TRANSMITTER OPTICAL CHARACTERISTICS**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Centre Wavelength	$\lambda_c$	$\lambda-6.5$	$\lambda$	$\lambda+6.5$	nm	
Spectral Width (-20dB)	$\Delta\lambda$			0.5	nm	
Side Mode Suppression Ratio	SMSR	35			dB	
Average Output Power	P <sub>o</sub>	0		4	dBm	
Extinction Ratio	ER	5			dB	
TxDisabled Average Output Power				-45	dBm	
Transmitter and Dispersion Penalty	TDP			3	dB	40km SMF

**TRANSMITTER ELECTRICAL CHARACTERISTICS**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Input Differential Impedance	Z <sub>IN</sub>	90	100	110	$\Omega$	
Data Input Swing Differential	V <sub>IN</sub>	180		700	mV	CML input, AC coupled
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	$\lambda_c$	1270		1600	nm	
Sensitivity	SEN			-16	dBm	Measured with PRBS 2 <sup>31</sup> -1 @ . 10.3125Gpbs, ER=5dB, BER≤10 <sup>-12</sup>
Saturation Optical Power	SAT	0			dBm	
Loss of Signal De-Assert Level	LOSD			-18	dBm	
Loss of Signal Assert Level	LOSA	-30			dBm	
Signal-Detected Hysteresis		0.5			dBm	

**RECEIVER ELECTRICAL CHARACTERISTICS**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Data Output Differential Swing	V <sub>out</sub>	340		850	mV	CML output, AC coupled
Output Differential Impedance	Z <sub>out</sub>	90	100	110	Ω	
Rx_LOS Output Voltage - High	High	2.4		V <sub>CC_HOST</sub>	V	
Rx_LOS Output Voltage - Low	Low	-0.3		0.4	V	

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

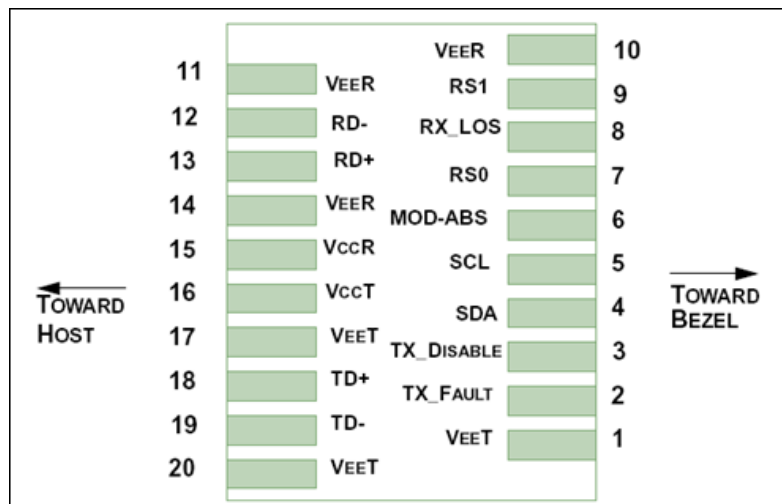


Figure 1 Host PCB SFP+ Pinout Top View

## TYPICAL INTERFACE CIRCUIT

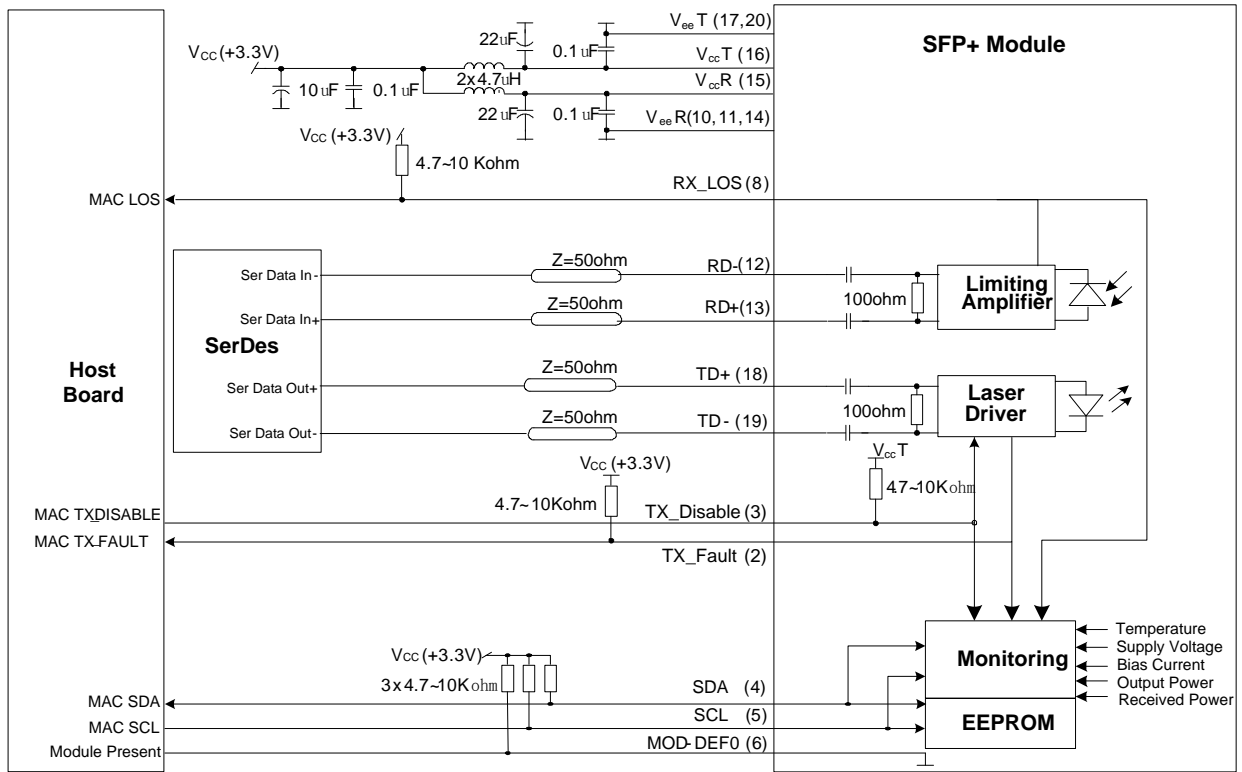


Figure 2 Typical Interface Circuit

## PACKAGE OUTLINE

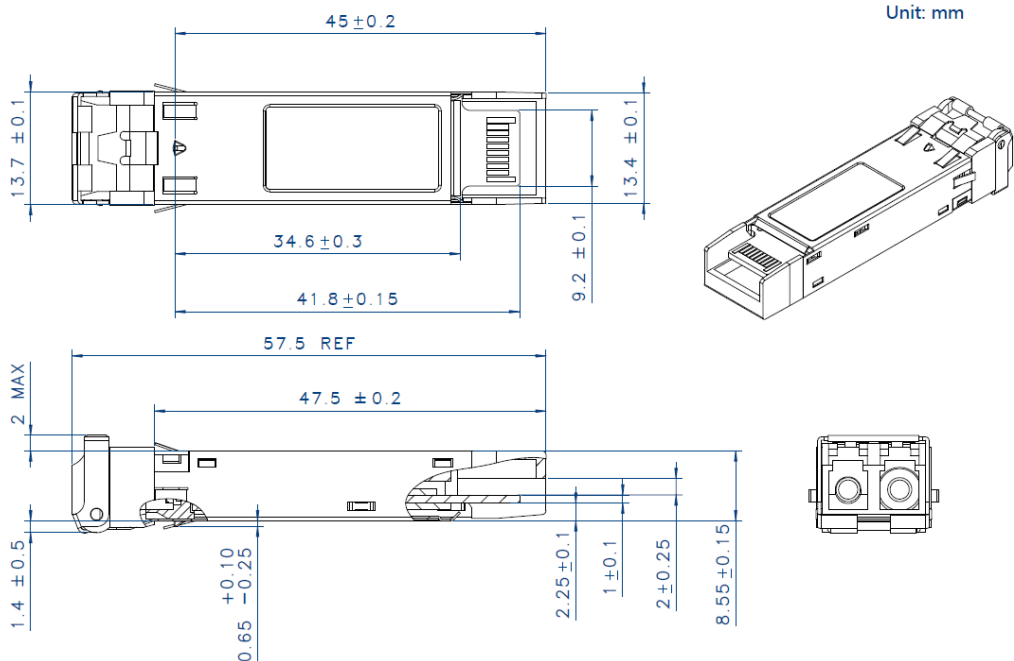
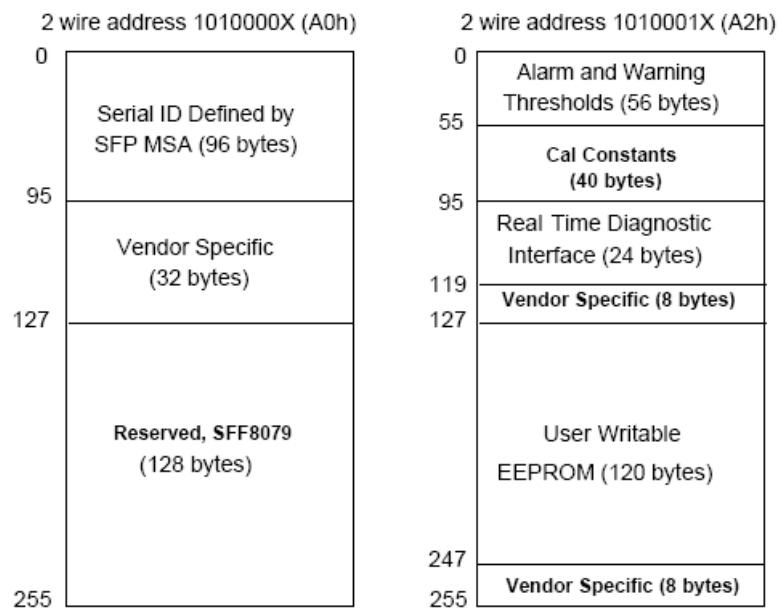


Figure 3 Package Outline

**EEPROM INFORMATION**

**Figure 4 EEPROM Memory Map Specific Data Field Descriptions**
**DIGITAL DIAGNOSTIC MONITORING INTERFACE**

Parameter	Range	Accuracy	Calibration	NOTES
Temperature	0 to 70°C	±5°C	Internal	LSB: 1/256°C
Voltage	2.97 to 3.63V	±3%	Internal	LSB: 0.1mV
Bias Current	0 to 128mA	±10%	Internal	LSB: 2uA
TX Power	-1 to +5dBm	±3dB	Internal	LSB: 0.1uW
RX Power	-17 to +1dBm	±3dB	Internal	LSB: 0.1uW

**ORDERING INFORMATION**

Wavelength Code	Product Code	Center Wavelength (nm)
47	SO04CW77-PLGA-47	1471
49	SO04CW77-PLGA-49	1491
51	SO04CW77-PLGA-51	1511
53	SO04CW77-PLGA-53	1531
55	SO04CW77-PLGA-55	1551
57	SO04CW77-PLGA-57	1571
59	SO04CW77-PLGA-59	1591
61	SO04CW77-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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