

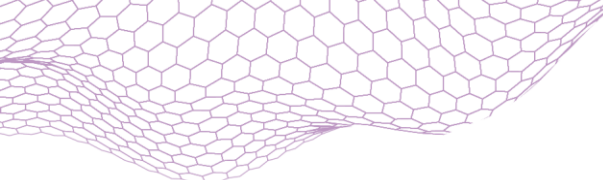


OPTICAL MULTIMODE SFP MODULE

155Mbps SFP TRANSCEIVERS FOR 2KM

SFP SERIES





FEATURES

- Up to 155Mbps data links
- 1310nm FP Laser and PIN photo detector
- Up to 2 km on Multimode fiber
- Duplex LC receptacle optical interface compliant
- Single +3.3V power supply
- Hot-pluggable
- Metal enclosure, for lower EMI
- Built-in PHY supporting SGMII Interface
- Operating temperature:
 - Commercial: -5 to +70°C
 - Industrial: -40 to +85°C

APPLICATION

- SDH STM-1, I-1
- Sonet OC-3, SR1
- Fast Ethernet
- Other Optical Links

STANDARD

- Compliant with MSA SFP specification
- Compatible with G.959.1
- Compliant with SFF-8472
- Compliant with FC-P1 v2.0

ABSOLUTE MAXIMUM RATING

Parameter	Symbol	Min	Max	Unit
Storage temperature	TS	-40	85	°C
Power Supply Voltage	Vcc	-0.5	+4	V
Relative Humidity	RH	5	95	%
Signal Input Voltage		-0.3	Vcc+0.3	V
Receiver Damage Threshold	Ts	+5		dbm

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Typical	Max	Unit
	Commercial	Tc	-5	70	°C
	Industrial		-40	85	°C
Power Supply Voltage	Vcc	3.135	3.13	3.37	v
Power Supply Current	Icc			350	mA
Ambient Humidity	5			70	%
Supply Current				400	mA
Data Rate	-	155	-		Mbps
Fiber Length on MMF	-	2	-		km

ELECTRICAL CHARACTERISITICS

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Total Supply Current	ICC			A(TX)	mA	A (TX) + B (RX) = 400mA
Transmitter Disable Input-High	VDISH	2		Vcc+0.3	mV	
Transmitter Disable Input-Low	VDISL	0		0.8	V	
Transmitter Fault Input-High	VDISL	2		Vcc+0.3	V	
Transmitter Fault Input-Low	VT x FH	0		0.8	V	
Total Supply Current				B(RX)	mA	
Loss of Signal (LOS)	Voh	2		Vcc+0.3	V	
	Vol	0		0.8	V	

OPTICAL TRANSMITTER CHARACTERISITICS

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Average Output Power	Pout	-20		-8	dBm	1
Operating Wavelength Range	λ_c	1270	1310	1360	nm	
Spectrum Bandwidth (RMS)	σ			3.5	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Extinction Ratio	ER	8.2			dB	2

Differential Line Input Impedance	RIN	90	100	110	Ohm
Jitter P-P	tJ			0.1	UI
Optical Tx Output disable	Pdis			-45	dBm
Output Eye Diagram	Complies with IEEE802.3 z (class 1 laser safety)				

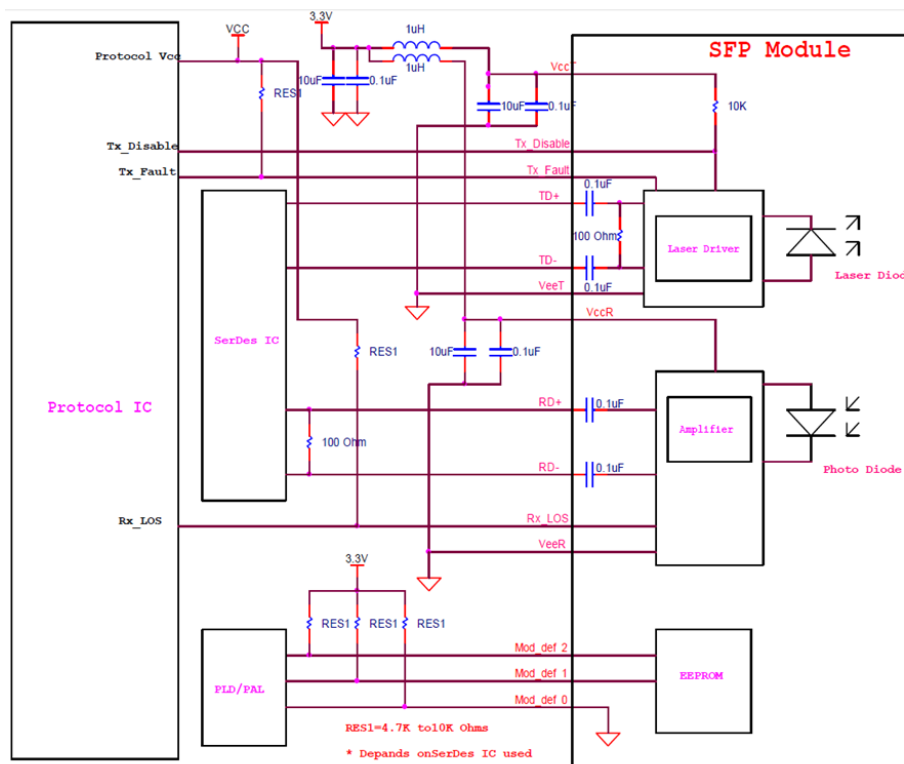
OPTICAL TRANSMITTER CHARACTERISTICS

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Receiver Sensitivity	S			-30	dBm	4
Wavelength Range	λ_c	1270		1610	nm	
Receiver Reflectance				-12	dB	
Input Saturation Power (Overload)						
LOS	Optical De-assert	Psat	-3		dBm	4
	Optical Assert	Pd		-31	dBm	4
LOS hysteresis		Pa	-42			
			0.5	2	6	dB 5

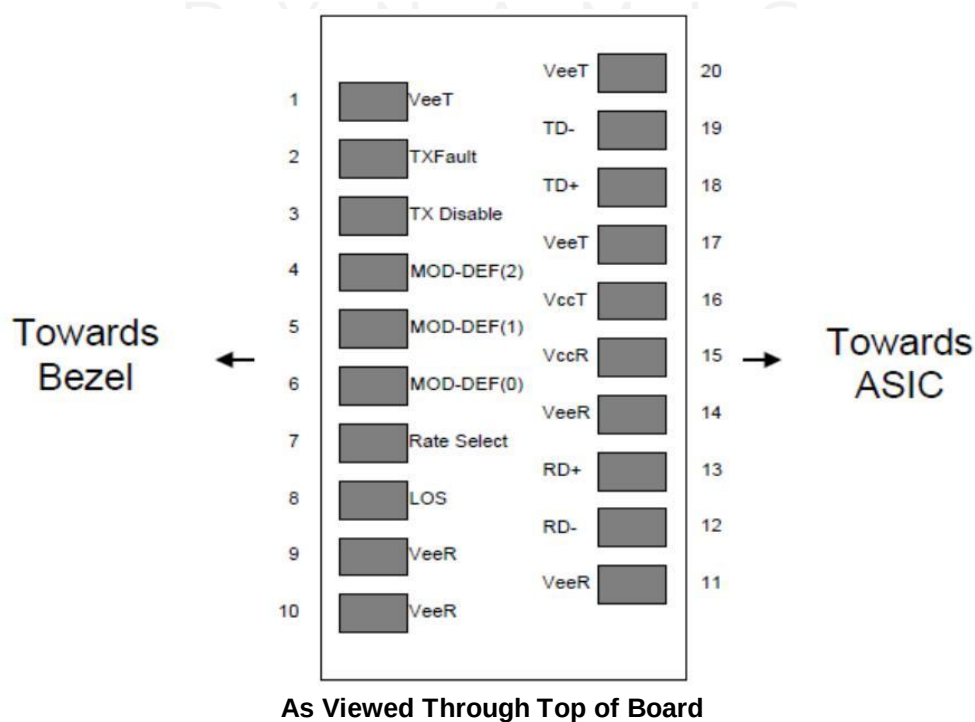
NOTES

- The supply current is SFP module's working current.
- For the measurements, the device was driven with 155Mbps data pattern with 223-1 PRBS payload.
- Optical transition time is the time interval required for the rising or falling edge of an optical pulse to transition between the 20% and 80% amplitudes relative to the logical 1 and 0 levels.
- Measured with a PRBS 223-1 test pattern, @155Mbps, ER=8.2dB, BER<10⁻¹².
- The LOS Hysteresis minimizes 'chatter' on the output line. In principle, Hysteresis alone does not guarantee chatter-free operation.

CIRCUIT SCHEMATIC



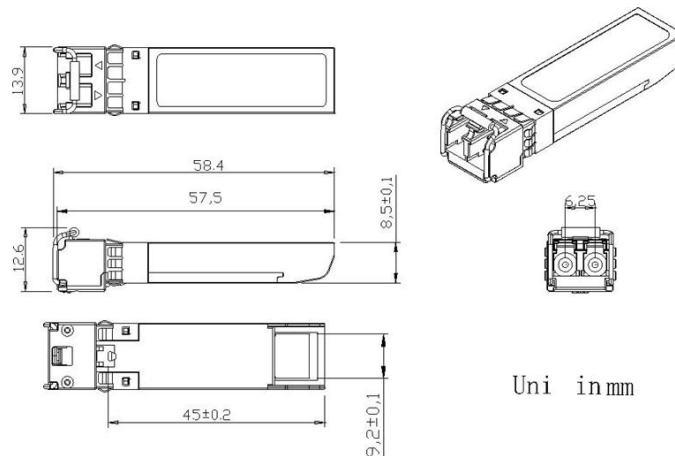
PIN DESCRIPTION



Pin	Symbol	Function / Description	Ref.
1	VeeT	Transmitter Ground	1
2	TX Fault	Transmitter Fault Indication	3
3	TX Disable	Transmitter Disable-Module disables on high or open	3
4	MOD-DEF2	Module Definition 2-Two wire serial ID interface	3
5	MOD-DEF1	Module Definition 1-Two wire serial ID interface	3
6	MOD-DEF0	Module Definition 0-Two wire serial ID interface	3
7	Rate Select	Not Connected	3
8	LOS	Loss of Signal	3
9	VeeR	Receiver Ground	1
10	VeeR	Receiver Ground	1
11	VeeR	Receiver Ground	1
12	RD-	Inverse Received Data out	3
13	RD+	Received Data out	3
14	VeeR	Receiver Ground	1
15	VccR	Receiver Power-+3.3V±5%	2
16	VccT	Transmitter Power-+3.3V±5%	2
17	VeeT	Transmitter Ground	1
18	TD+	Transmitter Data In	3
19	TD-	Inverse Transmitter Data In	3
20	VeeT	Transmitter Ground	1

PACKAGE OUTLINE

Dimensions are in millimeters. All dimensions are $\pm 0.1\text{mm}$ unless otherwise specified. (Unit: mm)

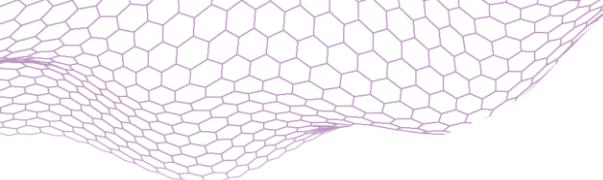


NOTES

- TX Fault is open collector / drain output which should be pulled up externally with a 4.7K – 10K Ω resistor on the host board to supply $<V_{ccT}+0.3V$ or $V_{ccR}+0.3V$. When high, this output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to $<0.8V$.
- TX Disable input is used to shut down the laser output per the state table below. It is pulled up within the module with a 4.7K – 10K Resistor.
- Low (0 – 0.8V) : Transmitter on
- Between (0.8V and 2V) : Undefined High
- (2.0 – V_{ccT}) : Transmitter Disabled
- Open : Transmitter Disabled.
- Mod-Def 0, 1, 2. These are the module definition pins. They should be pulled up with a 4.7 – 10K Resistor on the host board to supply less than $V_{ccT}+0.3V$ or $V_{ccR}+0.3V$.
- Mod-Def 0 is grounded by the module to indicate that the module is present.
- Mod-Def 1 is clock line of two wire serial interface for optional serial ID.
- Mod-Def 2 is data line of two wire serial interface for optional serial ID.
- LOS (Loss of signal) is an open collector/drain output which should be pulled up externally with a 4.7 – 10K resistor on the host board to supply $<V_{ccT}+0.3V$ or $V_{ccR}+0.3V$. When high, this output indicates the received optical power is below the worst case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to $<0.8V$.
- RD-/+ : These are the differential receiver outputs. They are AC coupled 100 Ω differential lines which should be terminated with 100 Ω differential at the user SERDES. The AC coupling is done inside the module and thus not required on the host board.
- V_{ccR} and V_{ccT} are the receiver and transmitter power supplies. They are defined as $3.3V \pm 5\%$ at the SFP connector pin. The in-rush current will typically be no more than 30mA above steady state supply current after 500ns.
- TD-/+ : These are the differential transmitter inputs. They are AC coupled differential lines with 100 Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on host board.

APPROVALS & TESTED AS PER

Feature	Test	Method
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1 (>1000V for SFI pins, >2000V for other pins.)
Electrostatic Discharge (ESD) Immunity	IEC61000-4-2	Class 2 (>4.0kV)
Electromagnetic Interference (EMI)	CISPR22 ITE Class B FCC Class B CENELEC EN55022 VCCI Class 1	Comply with standard
Immunity	IEC61000-4-3	Comply with standard
Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1,2	Compatible with Class I laser Product



ORDERING CODE

SFP M 1310 E D A

SFP	Base Code for Fast Ethernet SFP
M	Multimode
1310	Wavelength: 1310nm with distance of 2Km
E	Extended temperature of -40 to 85°C
D	DDMI Feature
A	Fixed

