

1.25Gb/s 1310nm Single-mode SFP Transceiver

Widely used in Switch to Switch Interface, Gigabit Ethernet, Switched Backplane Applications, Router/Server Interface, Other Optical Links.



• Description

- MSF-1312-20BD Small Form Factor Pluggable (SFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). The transceiver consists of four sections: the LD driver, the limiting amplifier, the FP laser and the PIN photo- detector. The module data link up to 20km in 9/125um single mode fiber.
- The optical output can be disabled by a TTL logic high-level input of Tx Disable. Tx Fault is provided to indicate that degradation of the laser. Loss of signal (LOS) output is provided to indicate the loss of an input optical signal of receiver or the link status with partner.

• Advantages

- Up to 1.25Gb/s data links
- FP laser transmitter and PIN photo- detector
- Up to 20km on 9/125μm SMF
- Hot-pluggable SFP footprint
- Duplex LC/UPC type pluggable optical interface
- Low power dissipation
- Metal enclosure, for lower EMI
- RoHS compliant and lead-free
- Single +3.3V power supply
- Compliant with SFF-8472
- Case operating temperature
 - Commercial: 0°C to +70°C
 - Extended: -10°C to +80°C
 - Industrial: -40°C to +85°C

• Table 1- Ordering Information

Product part Number	Data Rate (Mbps)	Media	Wavelength (nm)	Transmission Distance (km)	Temperature Range (Tcase) (°C)	
MSF-1312-20BD	1250	Single mode fiber	1310	20	0~70	commercial
MSF-1312-20BDE	1250	Single mode fiber	1310	20	-10~80	extended
MSF-1312-20BDA	1250	Single mode fiber	1310	20	-40~85	industrial

Note:

1. Specified without connectors
2. Add an additional 0.2dB loss including connectors

Tips:

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• Table 2- Pin Description

Pin	Symbol	Name/Description	Notes
1	V _{EET}	Transmitter Ground (Common with Receiver Ground).	1
2	T _{FAULT}	Transmitter Fault.	
3	T _{DIS}	Transmitter Disable. Laser output disabled on high or open.	2
4	MOD-DEF(2)	Module Definition 2. Data line for Serial ID.	3
5	MOD-DEF(1)	Module Definition 1. Clock line for Serial ID.	3
6	MOD-DEF(0)	Module Definition 0. Grounded within the module.	3
7	Rate Select	No connection required.	4
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	5
9	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
10	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
11	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
15	V _{CCR}	Receiver Power Supply	
16	V _{CCT}	Transmitter Power Supply	
17	V _{EET}	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	V _{EET}	Transmitter Ground (Common with Receiver Ground)	1

Tips:

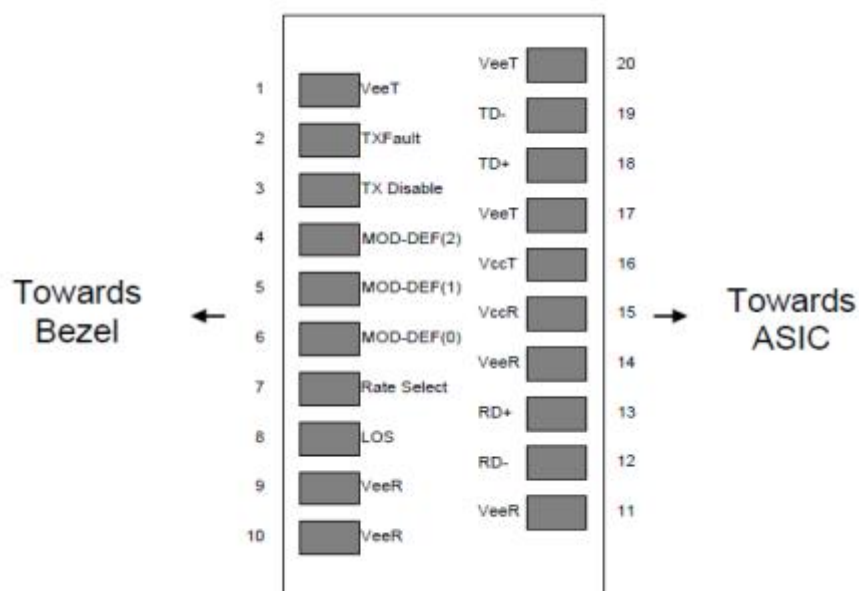
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• Notes:

1. Circuit ground is internally isolated from chassis ground.
2. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
3. Should be pulled up with 4.7k - 10kohms on host board to a voltage between 2.0V and 3.6V. MOD_DEF (0) pulls line low to indicate module is plugged in.
4. This is an optional input used to control the receiver bandwidth for compatibility with multiple data rates (most likely Fiber Channel 1x and 2x Rates). If implemented, the input will be internally pulled down with >30kΩ resistor. The input states are:
 - Low (0 – 0.8V): Reduced Bandwidth
 - (>0.8, < 2.0V): Undefined
 - High (2.0 – 3.465V): Full Bandwidth
 - Open: Reduced Bandwidth
5. LOS is open collector output should be pulled up with 4.7k - 10kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

• Figure 1. Pin out of Connector Block on Host Board



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• Table 3- Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Storage Temperature	T _s	-40	-	85	°C	
Relative Humidity	RH	5	-	95	%	
Power Supply Voltage	V _{CC}	-0.5	-	4	V	
Signal Input Voltage		-0.3	-	V _{CC} +0.3	V	
Receiver Damage Threshold		+5	-		dBm	

• Table 4- Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	T case	0	-	70	°C	MSF-1312-20BD
		-10	-	80		MSF-1312-20BDE
		-40	-	85		MSF-1312-20BDA
Power Supply Voltage	V _{CC}	3.13	3.3	3.47	V	
Power Supply Current	I _{CC}		-	280	mA	
Power Supply Noise Rejection				100	mVp - p	100Hz to 1Mz
Data Rate			1250/1250		Mbps	TX Rate/RX Rate
Transmission Distance				20	KM	
Coupled Fiber	Single mode fiber					9/125um SMF

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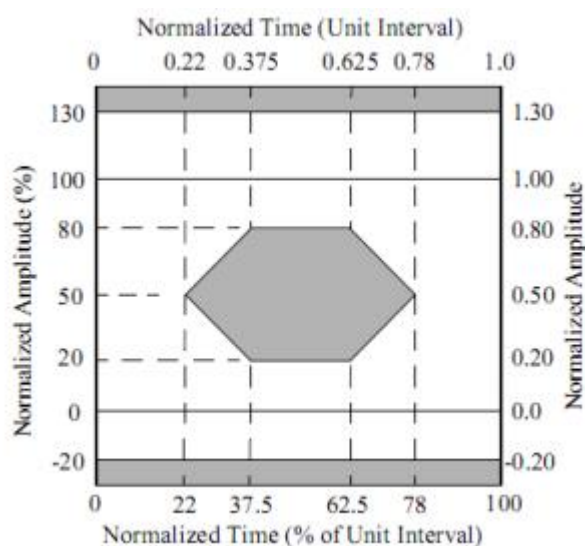
• Table 5- Specification of Transmitter

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Average Output Power	P_{OUT}	-9		-3	dBm	Note (1)
Extinction Ratio	ER	9			dB	
Center Wavelength	λ_C	1270	1310	1360	nm	FP Laser
Spectrum Bandwidth (RMS)	σ			3.5	nm	
Transmitter OFF Output Power	P_{Off}			-45	dBm	
Differential Line Input Impedance	RIN	90	100	110	Ohm	
Output Eye Mask	Compliant with IEEE802.3 z (class 1 laser safety)					Note (2)

Note (1): Measure at 2⁷-1 NRZ PRBS pattern.

Note (2): Transmitter eye mask definition.

• Figure 2.



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• Table 6- Specification of Receiver

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Input Optical Wavelength	λ_{IN}	1270		1610	nm	PIN-TIA
Receiver Sensitivity	P_{IN}			-20	dBm	Note (1)
Input Saturation Power (Overload)	P_{SAT}	-3			dBm	
Los Of Signal Assert	P_A			-22	dBm	
Los Of Signal De-assert	P_D	-38			dBm	Note (2)
LOS Hysteresis	$P_A - P_D$	0.5	2	6	dB	

Note (1): Measured with Light source 1310nm, ER=9dB; BER = $<10^{-12}$ @PRBS=2⁷-1 NRZ.

Note (2): When LOS de-asserted, the RX data+/- output is High-level (fixed)

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• Table 7- Electrical Interface Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
<i>Transmitter</i>						
Total Supply Current	I_{CC}			A	mA	Note (1)
Transmitter Disable Input-High	V_{DISH}	2		$V_{CC}+0.3$	V	
Transmitter Disable Input-Low	V_{DISL}	0		0.8	V	
Transmitter Fault Input-High	V_{TxFH}	2		$V_{CC}+0.3$	V	
Transmitter Fault Input-Low	V_{TxFL}	0		0.8	V	
<i>Receiver</i>						
Total Supply Current	I_{CC}			B	mA	Note (1)
LOSS Output Voltage-High	V_{LOSH}	2		$V_{CC}+0.3$	V	LVTTTL
LOSS Output Voltage-Low	V_{LOSL}	0		0.8	V	

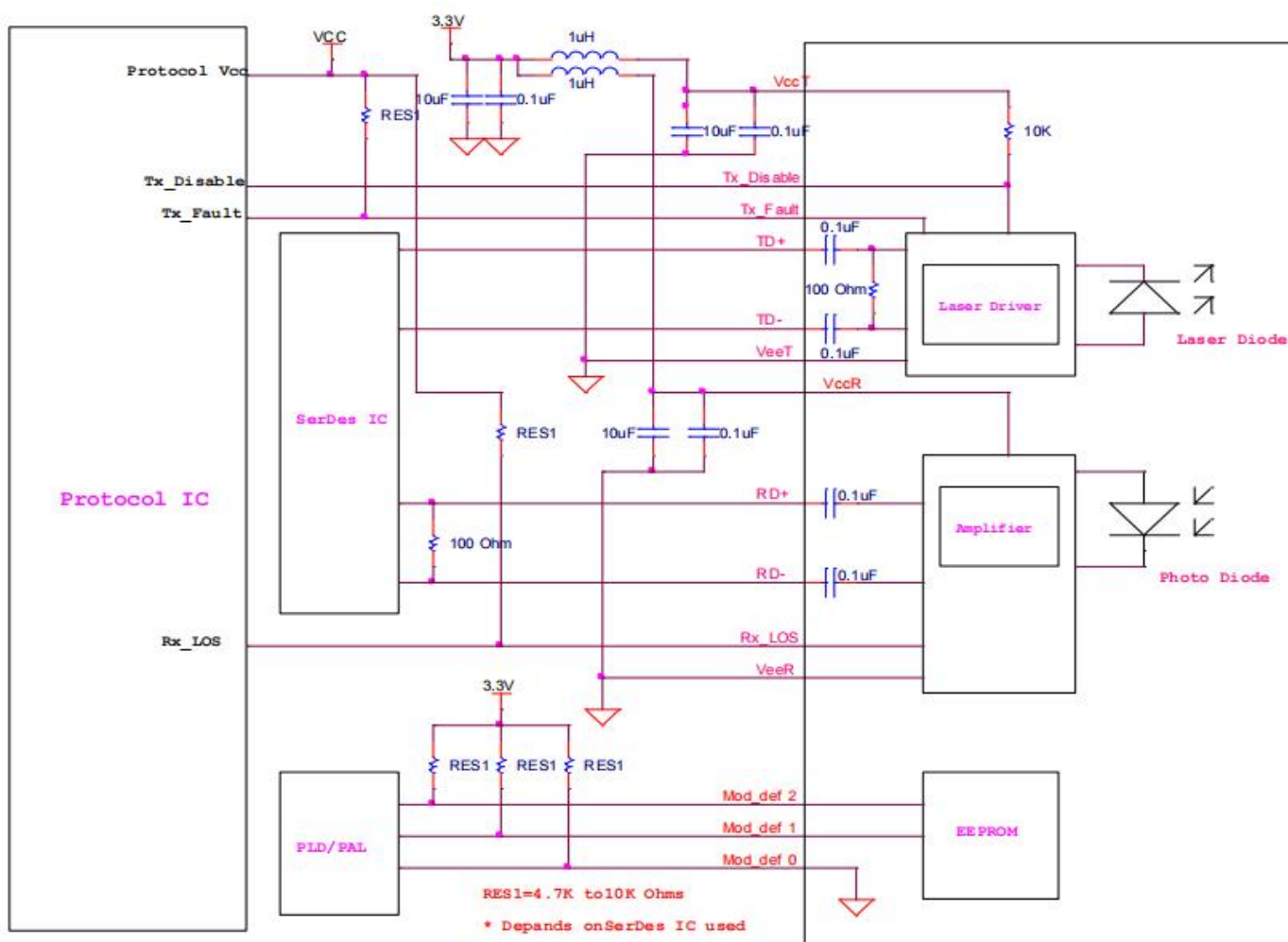
Note (1): A (TX) + B (RX) = 280mA (Not include termination circuit)

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• Figure 3 Recommend Circuit Schematic



Note:

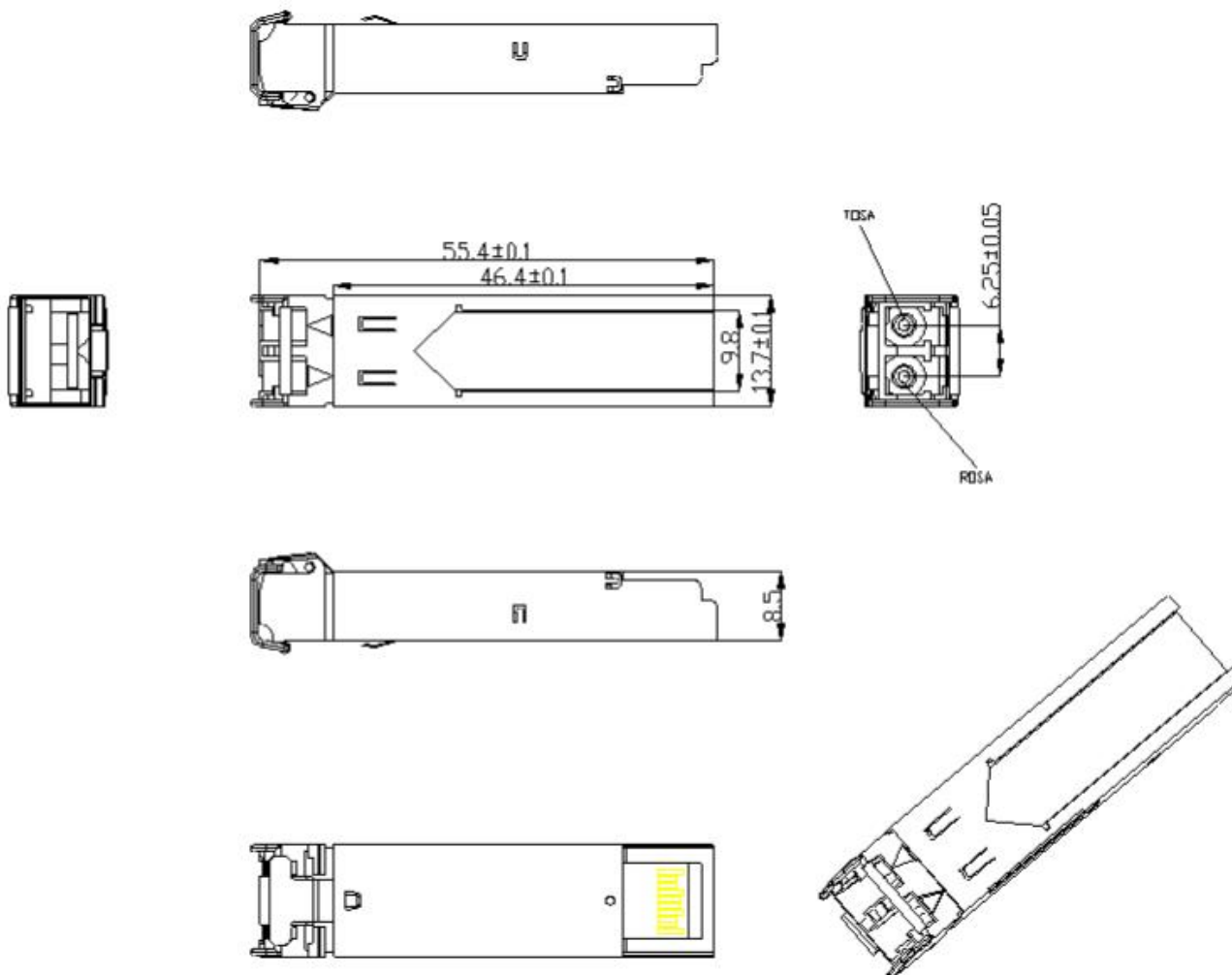
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- Figure 4 Mechanical Specifications (Unit: mm)
MSF-1312-20BD



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• Table 8- Regulatory Compliance

Feature	Reference	Performance
Electrostatic discharge (ESD)	IEC/EN 61000-4-2	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN 55022 Class B (CISPR 22A)	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10, 1040.11 IEC/EN 60825-1, 2	Class 1 laser product
ROHS	2002/95/EC	Compatible with standards
EMC	EN61000-3	Compatible with standards

• Appendix A. Document Revision

Version No.	Date	Description
1.0	2011-04-26	Preliminary datasheet
2.0	2011-09-27	Update format and company's logo

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