

# 1.25Gb/s SFP BIDI TX-1550nm/RX-1310nm 10km Optical Transceiver

## Features

- Up to 1.25Gbps data rate
- BIDI LC/UPC type pluggable optical interface
- 1550nm DFB laser transmitter and PIN photo-detector
- Hot- pluggable
- Up to 10km on 9/125µm SMF
- Low power dissipation
- Metal enclosure, for lower EMI
- RoHS-10 compliant and lead-free
- Support Digital Diagnostic Monitoring interface
- Single +3.3V power supply
- Compliant with SFF-8472
- Case operating temperature: 0 ~ +70°C

## Applications

- Switch to Switch interface
- Gigabit Ethernet
- Switched backplane applications
- Router/Server interface
- Other optical transmission systems

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## Compliance

- SFP MSA
- SFF-8472
- IEEE802.3z
- RoHS

## Description

The SFP-1G-D10-53 series single-mode transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). The transceiver consists of five sections: the LD driver, the limiting amplifier, the digital diagnostic monitor, the DFB laser and the PIN photo-detector. The module data link up to 10km in 9/125um single mode fiber.

The optical output can be disabled by a TTL logic high-level input of Tx Disable, and the system also can disable the module via I2C. 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. The system can also get the LOS (or Link)/Disable/Fault information via I2C register access.

## Absolute Maximum Ratings

Table1-Absolute Maximum Ratings					
Parameter	Symbols	Min.	Max.	Unit	Notes
Storage Temperature	T <sub>s</sub>	-40	85	°C	
Power Supply Voltage	V <sub>cc</sub>	-0.3	3.6	V	
Relative Humidity (non-condensation)	RH	5	95	%	
Damage Threshold	TH <sub>d</sub>	5		dBm	

## Recommended Operating Conditions and Power Supply Requirements

Table2-Recommended Operating Conditions and Power Supply Requirements						
Parameter	Symbols	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	T <sub>OP</sub>	0		+70	°C	
Power Supply Voltage	V <sub>cc</sub>	3.135	3.3	3.465	V	
Data Rate			1.25		Gb/s	
Control Input Voltage High		2		V <sub>cc</sub>	V	
Control Input Voltage Low		0		0.8	V	
Link Distance (SMF)	D			10	km	9/125um

## Electrical Characteristic

Tested under recommended operating conditions, unless otherwise noted

Table3-Electrical Characteristic						
Parameter	Symbols	Min.	Typical	Max.	Unit	Notes
Power Consumption	P			0.86	W	
Supply Current	I <sub>cc</sub>			280	mA	
Transmitter						

Single-ended Input Voltage Tolerance	$V_{CC}$	-0.3		4.0	V	
Differential Input Voltage Swing	$V_{in,pp}$	200		2400	mVpp	
Differential Input Impedance	$Z_{in}$	90	100	110	Ohm	
Transmit Disable Assert Time				5	us	
Transmit Disable Voltage	$V_{dis}$	$V_{CC}-1.3$		$V_{CC}$	V	
Transmit Enable Voltage	$V_{en}$	$V_{EE}-0.3$		0.8	V	
<b>Receiver</b>						
Differential Output Voltage Swing	$V_{out,pp}$	500		900	mVpp	
Differential Output Impedance	$Z_{out}$	90	100	110	Ohm	
Data output rise/fall time	$T_r/T_f$		100		ps	20% to 80%
LOS Assert Voltage	$V_{losH}$	$V_{CC}-1.3$		$V_{CC}$	V	
LOS De-assert Voltage	$V_{losL}$	$V_{EE}-0.3$		0.8	V	

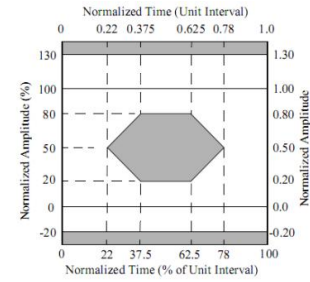
## Optical Characteristic

<b>Table4-Optical Characteristic</b>							
Parameter	Symbols	Min.	Type	Max.	Unit	Notes	
<b>Transmitter</b>							
Center Wavelength	$\lambda_c$	1530	1550	1570	nm		
Spectrum Bandwidth(RMS)	$\sigma$			1	nm		
Side Mode Suppression Ratio	SMSR	30			dB		
Average Optical Power	$P_{AVG}$	-9		-3	dBm	1	
Optical Extinction Ratio	ER	9			dB		
Transmitter OFF Output Power	$P_{Off}$			-45	dBm		
Transmitter Eye Mask		Compliant with 802.3z(class 1 laser safety)					2
<b>Receiver</b>							
Center Wavelength	$\lambda_c$	1260	1310	1360	nm		
Receiver Sensitivity (Average Power)	Sen.			-20	dBm	3	
Input Saturation Power (overload)	$P_{sat}$	-3			dBm		
LOS Assert	LOSA	-36			dBm	4	
LOS De-assert	LOSD			-21	dBm	4	
LOS Hysteresis	LOSH	0.5	2	6	dB		

The following optical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Notes:

- [1] Measure at 2<sup>7</sup>-1 NRZ PRBS pattern
- [2] Transmitter eye mask definition.
- [3] Measured with Light source 1550nm, ER=9dB; BER =<10<sup>-12</sup>  
@PRBS=2<sup>7</sup>-1 NRZ
- [4] When LOS de-asserted, the RX data+/- output is High-level (fixed).



## Digital diagnostic Functions

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF-8472 Rev10.2 with internal calibration mode.

Table5-Digital Diagnostic Functions					
Parameter	Symbols	Min.	Max.	Unit	Notes
Temperature monitor absolute error	DMI_Temp	-3	3	degC	Over operating temp
Supply voltage monitor absolute error	DMI_VCC	-0.15	0.15	V	Full operating range
RX power monitor absolute error	DMI_RX	-3	3	dB	
Bias current monitor	DMI_bias	-10%	10%	mA	
TX power monitor absolute error	DMI_TX	-3	3	dB	

## Pin Description

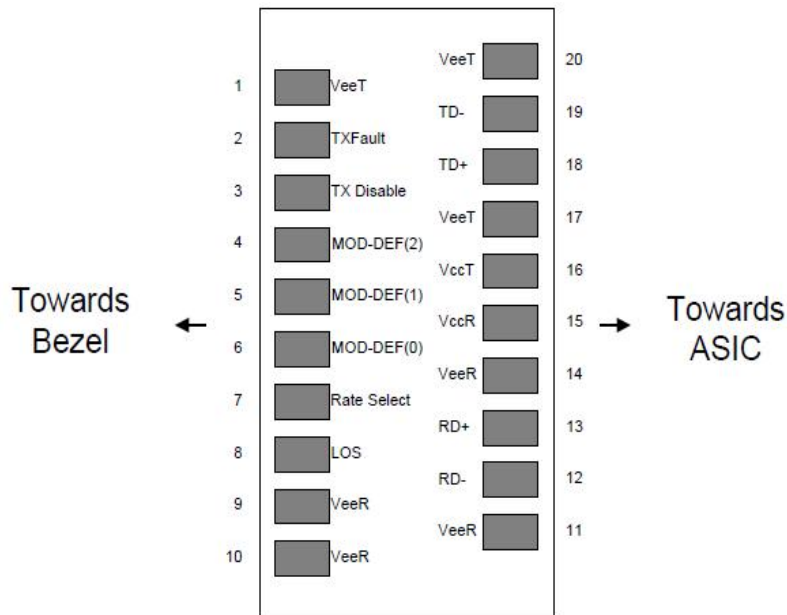


Figure1 Pin view

## Pin Function Definitions

Table6-Pin Function Definitions			
PIN	Name	Description	Notes
1	V <sub>EET</sub>	Transmitter Ground (Common with Receiver Ground)	1
2	T <sub>FAULT</sub>	Transmitter Fault.Open Drain. Logic "0" indicates normal operation.	
3	T <sub>DIS</sub>	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. Open Drain. Logic "0" indicates normal operation.	5
9	V <sub>EER</sub>	Receiver Ground (Common with Transmitter Ground)	1
10	V <sub>EER</sub>	Receiver Ground (Common with Transmitter Ground)	1
11	V <sub>EER</sub>	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out(CML). AC Coupled	
13	RD+	Receiver Non-inverted DATA out(CML). AC Coupled	
14	V <sub>EER</sub>	Receiver Ground (Common with Transmitter Ground)	1
15	V <sub>CCR</sub>	Receiver Power Supply	
16	V <sub>CCT</sub>	Transmitter Power Supply	
17	V <sub>EET</sub>	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 <sub>EET</sub>	Transmitter Ground (Common with Receiver Ground)	1

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-10k ohms 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:

1) Low (0 - 0.8V):Reduced Bandwidth

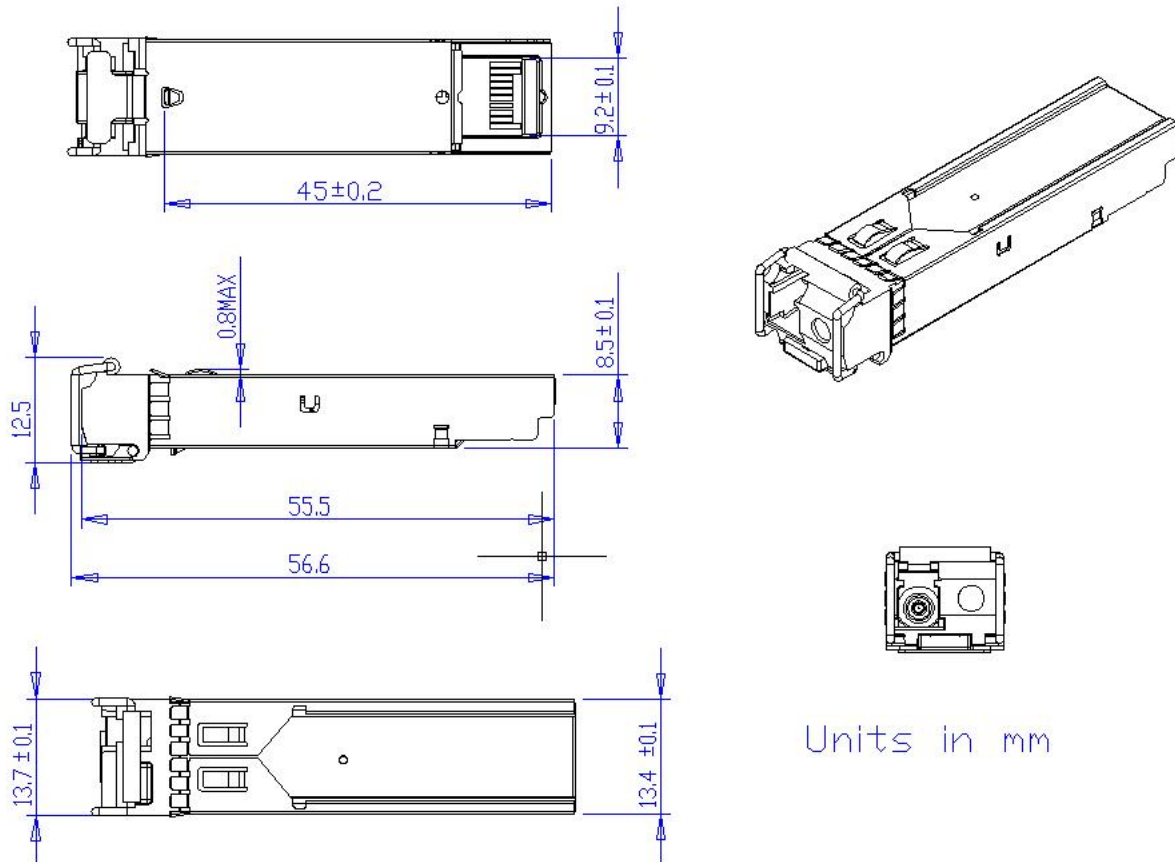
2) (>0.8, <2.0V):Undefined

3) High (2.0 - 3.465V): Full Bandwidth

4) Open: Reduced Bandwidth

[5] LOS is open collector output should be pulled up with 4.7k-10k ohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

## Mechanical Dimensions



Units in mm

Figure2 Mechanical Dimensions

## Further Information:

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