

# 155M SFP BIDI TX-1550nm/RX-1310nm 20km Optical Transceiver

## Features

- Up to 155Mb/s data links
- 1550nm FP laser transmitter and PIN photo-detector
- Up to 20km on 9/125µm SMF
- Hot-pluggable SFP footprint
- BIDI LC/UPC type pluggable optical interface
- Low power dissipation
- Metal enclosure, for lower EMI
- RoHS-10 compliant and lead-free
- Support Digital Diagnostic Monitoring interface
- Single +3.3V power supply
- Power dissipation: <0.86W
- RoHS compliant and lead-free
- Compliant with SFF-8472 V9.5

## Applications

- Switch to Switch interface
- Switched Backplane Applications
- Fast Ethernet
- Other optical transmission systems

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## Compliance

- SFP MSA(INF-8074i)
- SFF-8472 V9.5
- ITUT-G.957 STM-1

## Description

The SFP-0C3-D20-53 Small Form Factor Pluggable (SFP) 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 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, 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

Parameter	Symbols	Min.	Typical	Max.	Unit	Notes
Storage Temperature	Ts	-40	-	+85	°C	
Storage Ambient Humidity	HA	+5	-	+95	%	
Power Supply Voltage	VCC	-0.3		+3.6	V	
Signal Input Voltage		-0.3		Vcc+0.3	V	
Receiver Damage Threshold		5			dBm	

## Recommended Operating Conditions

Parameter	Symbols	Min.	Typical	Max.	Unit	Notes	
Operating Case temperature	Tc	0	-	+70	°C		
Power Supply Voltage	VCC	3.135	3.3	3.465	V		
Data Rate			155		Mbps		
Control Input Voltage High		2		Vcc	V		
Control Input Voltage Low		0		0.8	V		
Transmission Distance			20		KM		
Coupled Fiber		Single mode fiber					9/125 μ m SMF

## Electrical Characteristic

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Supply current	Icc			260	mA	
Power Consumption	p			0.86	W	
Transmitter						
Single-ended Input Voltage	Vcc	-0.3		4.0	V	

Tolerance						
Differential Input Voltage Swing	Vin, pp	200		2400	mVpp	
Differential Input Impedance	Zin	90	100	110	Ohm	
Transmit Disable Assert Time				5	us	
Transmit Disable Voltage	Vdis	Vee-1.3		Vcc	V	
Transmit Enable Voltage	Ven	Vee-0.3		0.8	V	
Receiver						
Differential Output Voltage Swing	Vout,pp	500		900	mVpp	
Differential Output Impedance	Zout	90	100	110	Ohm	
Data output rise/fall time	Tr/Tf		100		ps	20% to 80%
LOS Assert Voltage	VlosH	Vcc-1.3		Vcc	V	
LOS De-assert Voltage	VlosL	Vcc-0.3		0.8	V	

## Optical Characteristic

Table4-Optical Characteristic

Parameter	Symbols	Min.	Typical	Max.	Unit	Notes
Transmitter						
Center Wavelength	$\lambda C$	1500	1550	1600	nm	
Spectrum Bandwidth(RMS)	$\sigma$			3.5	nm	
Average Optical Power	PAVG	-15		-7	dBm	1
Extinction Ratio	ER	8.2			dB	
Transmitter OFF Output Power	Poff			-45	dBm	
Transmitter Eye Mask		Compliant with G.957(class 1 laser safety)				
Receiver						
Center Wavelength	$\lambda C$	1260	1310	1360	nm	
Sensitivity (Average Power)	Sen.			-28	dBm	2
Input Saturation Power(overload)	Psat	-8			dBm	
LOS Assert	LOSA	-44			dBm	3
LOS De-assert	LOSD			-29	dBm	3
LOS Hysteresis	LOSH	0.5	2	6	dB	

Notes:

[1] Measure at 2<sup>23</sup>-1 NRZ PRBS pattern

[2] Measured with Light source 1550nm, ER=8.2dB; BER =  $\leq 10^{-12}$  @PRBS=2<sup>23</sup>-1 NRZ

[3] When LOS de-asserted, the RX data+/- output is High-level (fixed).

## Pin Description

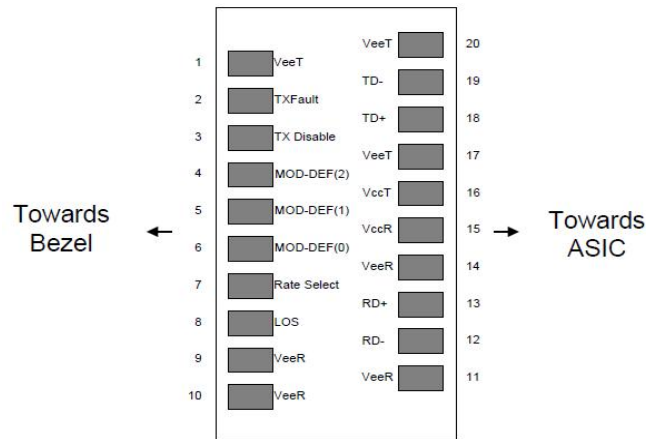


Figure 1 Pin view

## Pin Function Definitions

Pin	Name	Description	Notes
1	VEET	Transmitter Ground (Common with Receiver Ground)	1
2	TFAULT	Transmitter Fault. Open Drain. Logic "0" indicates normal operation.	
3	TDIS	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	VEER	Receiver Ground (Common with Transmitter Ground)	1
10	VEER	Receiver Ground (Common with Transmitter Ground)	1
11	VEER	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	VEER	Receiver Ground (Common with Transmitter Ground)	1
15	VCCR	Receiver Power Supply	
16	VCCT	Transmitter Power Supply	
17	VEET	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	VEET	Transmitter Ground (Common with Receiver Ground)	1
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**Table 5 - Pin Function Definitions**

[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

(>0.8V, <2.0V): Undefined

High (2.0 - 3.465V): Full Bandwidth

Open: Reduced Bandwidth

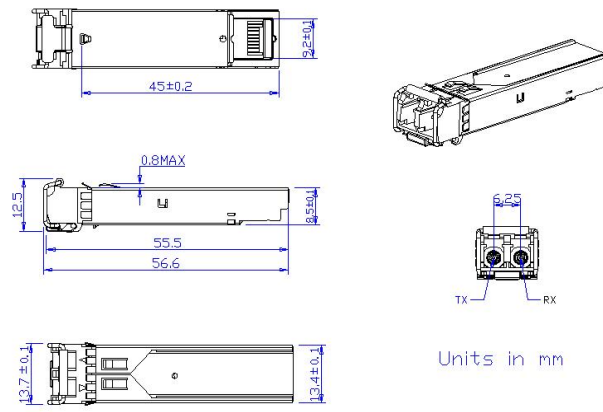
[5] LOS is open collector output. Should be pulled up with 4.7k - 10kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

## 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. For external calibration mode please contact our sales staff.

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	

## Mechanical Dimensions



**Figure 2 Mechanical Outline**

## Further Information:

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