

## SFP-GE53-2BX10

1.25Gb/s Compact SFP Transceiver, Single Mode, 10km Reach

1550nm Tx/1310nm Rx



### Product Features

- ❖ Up to 1.25Gb/s data links
- ❖ 1550nm DFB laser transmitter and PIN photo-detector
- ❖ Achieve operational compatibility with conventional SFP
- ❖ Up to 10km on 9/125μm SMF
- ❖ Hot-pluggable CSFP footprint
- ❖ BIDI LC/UPC type pluggable optical interface
- ❖ Low power dissipation
- ❖ RoHS compliant and lead-free

- ❖ Support Digital Diagnostic Monitoring interface
- ❖ Single +3.3V power supply
- ❖ Compliant with SFF-8472
- ❖ Metal enclosure, for lower EMI
- ❖ Meet ESD requirements, resist 8KV direct contact voltage
- ❖ Case operating temperature
  - Commercial: 0 ~ +70°C
  - Extended: -10 ~ +80°C
  - Industrial: -40 ~ +85°C

## Applications

- ❖ Switch to Switch Interface
- ❖ Gigabit Ethernet
- ❖ Point to Point FTTH Application
- ❖ Switched Backplane Applications
- ❖ Router/Server Interface
- ❖ Other Optical Links

## General Description

SFP-GE53-2BX10 Small Form Factor Pluggable (CSFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). The transceiver consists of 2-channel Bi-directional Optical Transceiver unit with 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.

Conventional SFP will function when plugged into a C-SFP socket, at the same time no damage to C-SFP and host board if C-SFP module is plugged into a conventional SFP socket

## Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min	Max	Unit	Notes
Storage Temperature	$T_s$	-40	85	°C	
Power Supply Voltage	$V_{CC}$	-0.3	3.6	V	
Relative Humidity (non-condensation)	RH	5	95	%	
Damage Threshold	$TH_d$	5		dBm	

## Recommended Operating Conditions and Power Supply Requirements

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Operating Case Temperature	$T_{OP}$	0		70	°C	commercial
		-10		80		extended
		-40		85		industrial
Power Supply Voltage	$V_{CC}$	3.135	3.3	3.465	V	
Data Rate			1.25		Gb/s	
Control Input Voltage High		2		$V_{CC}$	V	
Control Input Voltage Low		0		0.8	V	
Link Distance (SMF)	D			10	km	9/125um



## Electrical Characteristics

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

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
<b>Transmitter</b>						
Power Consumption				1.32	W	
Supply Current	I <sub>cc</sub>			400	mA	
Single-ended Input Voltage Tolerance		-0.3		4.0	V	
Differential Input Voltage Swing	V <sub>in,pp</sub>	200		2400	mVpp	
Differential Input Impedance	Z <sub>in</sub>	90	100	110	Ohm	
Transmit Disable Assert Time				5	us	
Transmit Disable Voltage	V <sub>dis</sub>	V <sub>cc</sub> -1.3		V <sub>cc</sub>	V	
Transmit Enable Voltage	V <sub>en</sub>	V <sub>ee</sub> -0.3		0.8	V	
<b>Receiver</b>						
Differential Output Voltage Swing	V <sub>out,pp</sub>	500		900	mVpp	
Differential Output Impedance	Z <sub>out</sub>	90	100	110	Ohm	
Data output rise/fall time	Tr/Tf		100		ps	20% to 80%
LOS Assert Voltage	V <sub>losH</sub>	V <sub>cc</sub> -1.3		V <sub>cc</sub>	V	
LOS De-assert Voltage	V <sub>losL</sub>	V <sub>ee</sub> -0.3		0.8	V	

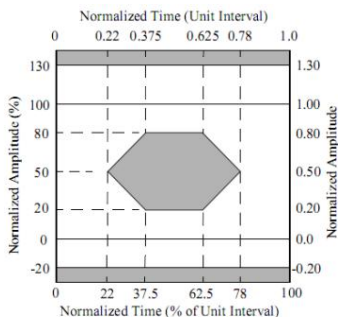
## Optical Characteristics

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

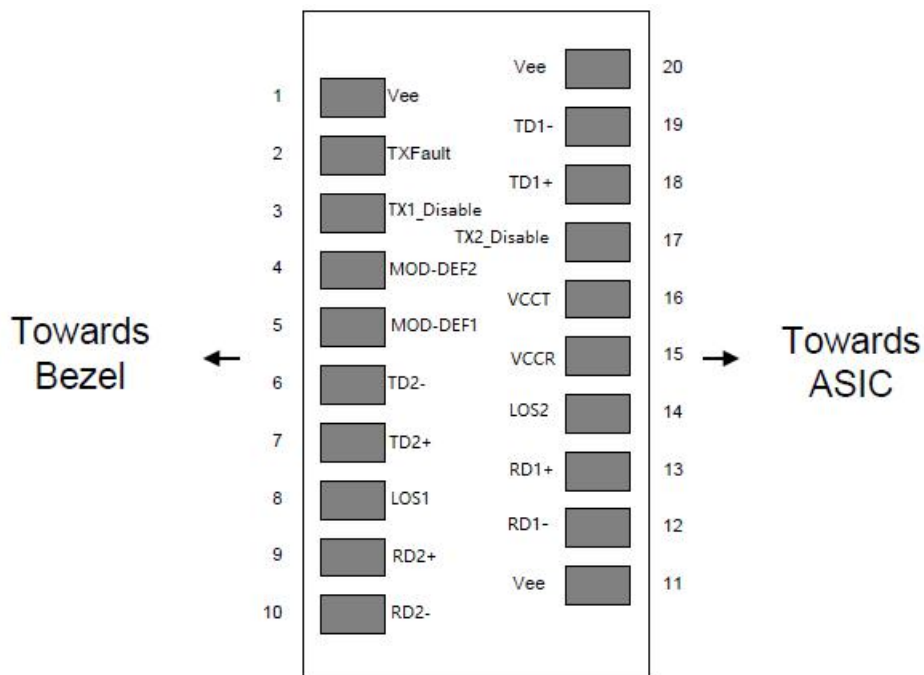
Parameter	Symbol	Min.	Typical	Max	Unit	Notes
Transmitter						
Center Wavelength	$\lambda_c$	1530	1550	1570	nm	
Spectrum Bandwidth(RMS)	$\sigma$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Optical Power	$P_{AVG}$	-9		-3	dBm	1
Optical Extinction Ratio	ER	9			dB	
Transmitter OFF Output Power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

### 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).



## Pin Assignment and Pin Description



**Figure1.** Diagram of host board connector block pin numbers and names

PIN	Name	Name/Description	Notes
1	VEE	Transmitter Ground	VEE may be internally connected within the SFP module
2	TX FAULT	Transmitter Fault.	TX Fault is an open collector/drain output, which should be pulled up with a 4.7K–10K resistor on the host board. Note 1 for more information
3	TX1_Disable	Transmitter Disable of Ch A	Module channel A disables function
4	MOD_DEF2	Two-wires interface Data	2 wire serial ID interface, SDA
5	MOD_DEF1	Two-wires interface Clock	2 wire serial ID interface, SCL
6	TD2-	Inverted Transmit Data Input of Ch B	These are the differential transmitter puts. They are AC-coupled, differential lines with 100 differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board
7	TD2+	Transmit Data Input of Ch B	
8	LOS1	Loss of Signal of Ch A	Loss of Signal detected function. Note 2 for more information.



9	RD2+	Received Data Output of Ch B	These are the differential receiver outputs. They are AC coupled 100 differential lines which should be terminated with 100(differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.
10	RD2-	Inverted Received Data Output of Ch B	
11	VEE	Transceiver Ground	VEE may be internally connected within the SFP module.
12	RD1-	Inverted Received Data Output of Ch A	These are the differential receiver outputs. They are AC coupled 100 differential lines which should be terminated with 100(differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.
13	RD1+	Received Data Output of Ch A	
14	LOS2	Loss of Signal of CH B	Loss of Signal detected function. Note 2 for more information.
15	VCCR	Receiver Power	3.3V± 5%. Note 3 for more information
16	VCCT	Transmitter Power	3.3V± 5%. Note 3 for more information
17	TX2_Disable	Transmitter Disable of Ch B	Module channel B disables function
18	TD1+	Transmit Data Input of Ch A	These are the differential transmitter puts. They are AC-coupled differential lines with 100 differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board
19	TD1-	Inverted Transmit Data Input of Ch A	
20	VEE	Transceiver Ground	VEE may be internally connected within the SFP module.

## Notes:

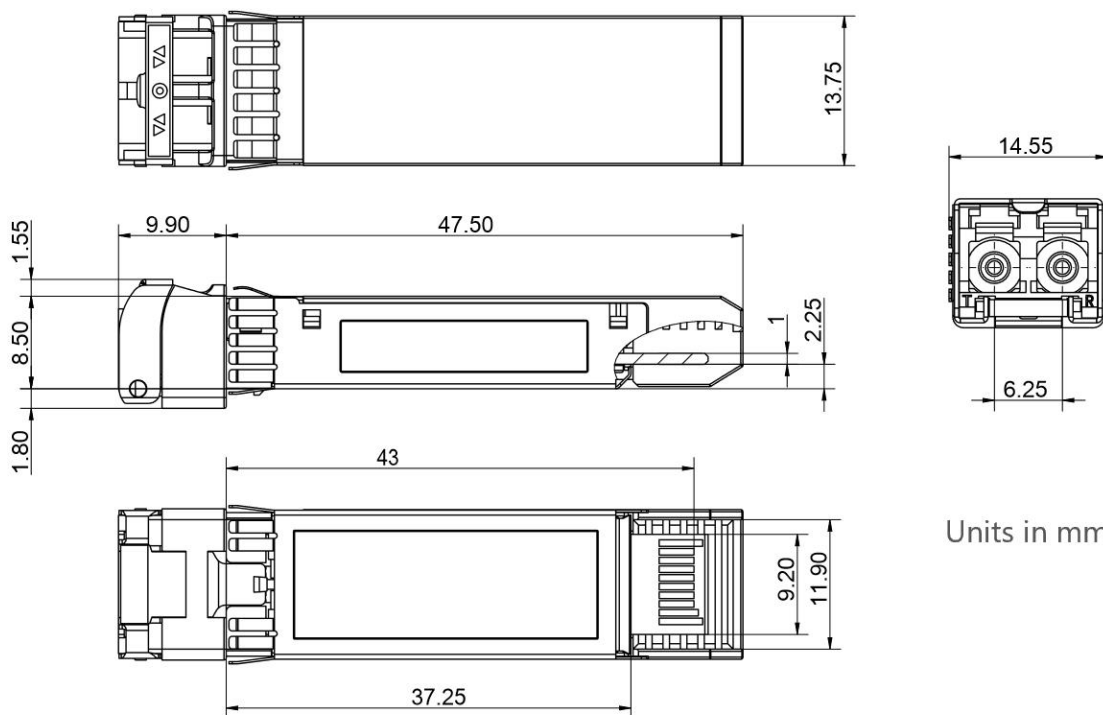
1. When high, output indicates a laser fault of some kind either in Channel A or Channel B. The Host shall read Channel A/B for details: TX Fault from channel A if bit 2 is set in [A2H:110]; TX Fault from channel B if bit 2 is set in [B2H: 110]. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.
2. 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 < 0.4V.
3. VccT VccR are the power supplies. They are defined as 3.3V ±5% at the SFP connector pin. Maximum supply current is 400Ma@3.3V. Vcc may be internally connected within the SFP transceiver module.

## 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	Symbol	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



Units in mm



**Ordering Information**

Part Number	Product Description
SFP-GE53-2BX10C	1550nm-Tx/1310nm-Rx, 1.25Gb/s, LC/UPC, 10km, 0°C~+70°C, with DDM
SFP-GE53-2BX10E	1550nm-Tx/1310nm-Rx, 1.25Gb/s, LC/UPC, 10km, -10°C~+80°C, with DDM
SFP-GE53-2BX10I	1550nm-Tx/1310nm-Rx, 1.25Gb/s, LC/UPC, 10km, -40°C~+85°C, with DDM