



# 10GBPS SFP+ BI-DIRECTIONAL TRANSCEIVER, 40KM REACH

1270NM TX / 1330 NM RX OR 1330NM TX / 1270 NM RX

## Features

- Supports 9.95Gb/s to 10.3Gb/s data rates
- Simplex LC/SC Connector Bi-Directional SFP+ Optical Transceiver
- Single 3.3V Supply
- Compliant to IEEE 802.3ae
- Hot-Pluggable
- Up to 40km on 9/125um SMF
- 1270nm or 1330 DFB Laser transmitter,
- SFP+ MSA SFF-8431 Compliant
- Digital Diagnostic SFF-8472 Compliant
- Low EMI metal casing, featuring a latch to secure the connector
- RoHS compliant and Lead Free
- Operating case temperature:  
Commercial Temperature: 0 ~ 70 °C  
Industrial Temperature : -40 ~ 85 °C

## Introduction

- Fiber Channel, CPRI, OBSAI
- 10GBASE-LR at 10.3125 Gb/s
- 10GBASE-LW at 9.953 Gb/s
- Other Optical Links

## Description

The series single mode transceiver is small form factor pluggable module for simplex optical data communications such as 10GBASE-ER/EW defined by IEEE 802.3ae. It is with the SFP+ 20-pin connector to allow hot plug capability.

The module is designed for single mode fiber and operates at a nominal wavelength of 1270nm or



1330nm; the transmitter section uses a multiple quantum well DFB, which is class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses an integrated InGa As detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

### Absolute Maximum Ratings

These values represent the damage threshold of the module. Stress in excess of any of the individual Absolute Maximum Ratings can cause immediate catastrophic damage to the module even if all other parameters are within Recommended Operating Conditions.

Parameter	Symbol	Min.	Max.	Unit
Supply Voltage	V <sub>CC</sub>	-0.5	+3.6	V
Storage Temperature	T <sub>c</sub>	-40	+85	°C
Operating Case Temperature	T <sub>c</sub>	0	+70	°C
Relative Humidity	RH	0	85	%

### Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max	Unit
Supply Voltage	V <sub>CC</sub>	3.0	3.3	3.6	V
Supply Current	I <sub>cc</sub>			220	mA
Operating Case Temperature	T <sub>c</sub>	0	25	70	°C
Module Power Dissipation	P <sub>m</sub>	-	0.7	1.1	W

[1] Supply current is shared between VCCTX and VCCR<sub>X</sub>.

[2] In-rush is defined as current level above steady state current requirements.

### Electrical Characteristics(TOP = 0 to 70° C, VCC = 3.0 to 3.60 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Ref.
<b>Transmitter</b>						
Input differential impedance	R <sub>in</sub>		100		Ω	2
Single ended data input swing	V <sub>in,pp</sub>	150		1200	mV <sub>pp</sub>	
Transmit Disable Voltage	V <sub>D</sub>	2		V <sub>CC</sub>	V	
Transmit Enable Voltage	V <sub>EN</sub>	V <sub>ee</sub>		V <sub>ee</sub> +0.8	V	3
<b>Receiver</b>						
Output differential impedance	R <sub>out</sub>		100		Ω	2
Single ended data output swing	V <sub>out,pp</sub>	300		700	mV	4
LOS Fault	V <sub>LOS fault</sub>	2		V <sub>CC</sub> <sub>HO</sub> ST	V	5
LOS Normal	V <sub>LOS norm</sub>	V <sub>ee</sub>		V <sub>ee</sub> +0.8	V	5

Note:



1. Module power consumption never exceeds 1W.
2. AC coupled.
3. Or open circuit.
4. Into 100 ohm differential termination.
5. LOS is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

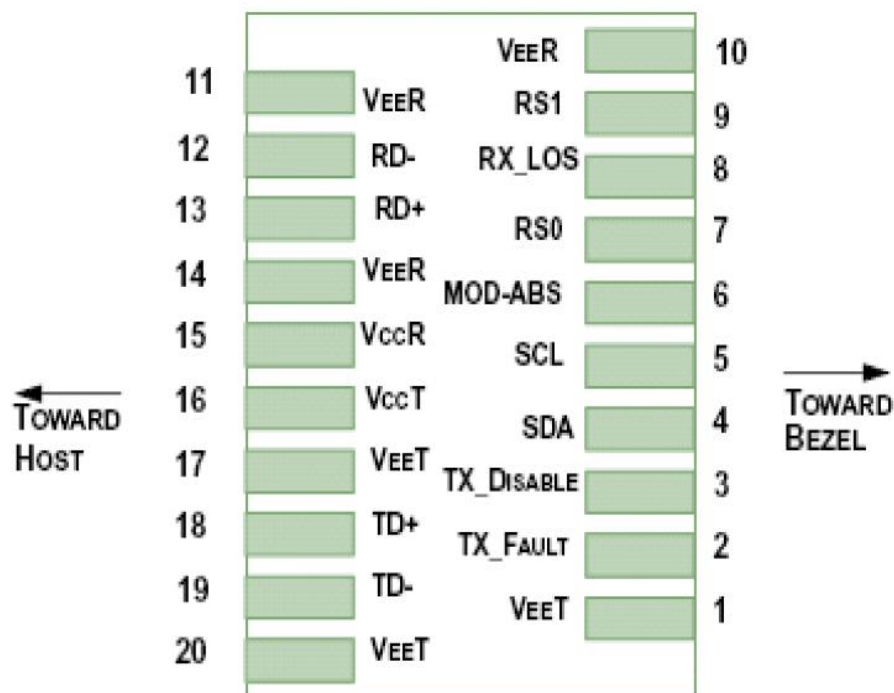
### Optical Parameters(TOP = 0 to 70° C, VCC = 3.0 to 3.60 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
<b>Transmitter</b>						
Optical Wavelength	$\lambda_t$	1260	1270	1280	nm	1270nm TX
		1320	1330	1340	nm	1330nm TX
Bit Error Rate	BER			$10^{-12}$		
Side Mode Suppress Ratio	SMSR	30			dB	
Spectral Width(-20dB)	$\Delta\lambda$			1	nm	
Average Output Power	P <sub>op</sub>	0		5	dBm	1
Extinction Ratio	ER	3.5			dB	
Eye Mask	Compliant with IEEE 802.3					
Transmitter and Dispersion Penalty	TDP			3.2	dB	
Average Power of OFF Transmitter				-30	dBm	
Relative Intensity Noise	RIN			-128	dB/Hz	
<b>Receiver</b>						
Optical Wavelength	$\lambda_r$	1320	1330	1340	nm	1330nm RX
		1260	1270	1280	nm	1270nm RX
Receiver Sensitivity				-16	dBm	1,2
Maximum receiver input power	P <sub>MAX</sub>	-3			dBm	
LOS De-Assert	LOS <sub>D</sub>			-17	dBm	
LOS Assert	LOS <sub>A</sub>	-27			dBm	
LOS Hysteresis		0.5		4	dB	

Note:

1. Average Receiver Power (Min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant.
2. Measured with a PRBS2<sup>31</sup>-1 test pattern @10.3125Gbps, BER ≤ 10<sup>-12</sup>

### Pin Descriptions

**Figure1.Elecctrical Pin-out Details**

Pin	Symbol	Name/Description
1	VEET [1]	Transmitter Ground
2	Tx_FAULT [2]	Transmitter Fault
3	Tx_DIS [3]	Transmitter Disable. Laser output disabled on high or open
4	SDA [2]	2-wire Serial Interface Data Line
5	SCL [2]	2-wire Serial Interface Clock Line
6	MOD_ABS [4]	Module Absent. Grounded within the module
7	RS0 [5]	RS0 for Rate Select: Open or Low = Module supports ≤4.25Gbps High = Module supports 9.95 Gb/s to 10.3125 Gb/s
8	RX_LOS [2]	Loss of Signal indication. Logic 0 indicates normal operation
9	RS1 [5]	No connection required
10	VEER [1]	Receiver Ground
11	VEER [1]	Receiver Ground
12	RD-	Receiver Inverted DATA out. AC Coupled
13	RD+	Receiver DATA out. AC Coupled
14	VEER [1]	Receiver Ground
15	VCCR	Receiver Power Supply
16	VCCT	Transmitter Power Supply
17	VEET [1]	Transmitter Ground
18	TD+	Transmitter DATA in. AC Coupled
19	TD-	Transmitter Inverted DATA in. AC Coupled



20

VEET [1]

Transmitter Ground

## Notes:

1. Module circuit ground is isolated from module chassis ground within the module.
2. should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15V and 3.6V.
3. Tx\_Disable is an input contact with a 4.7 k $\Omega$  to 10 k $\Omega$  pullup to VccT inside the module.
4. Mod\_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull this contact up to Vcc\_Host with a resistor in the range 4.7 k $\Omega$  to 10 k $\Omega$ . Mod\_ABS is asserted “High” when the SFP+ module is physically absent from a host slot.
5. RS0 and RS1 are module inputs and are pulled low to VeeT with > 30 k $\Omega$  resistors in the module.

## Regulatory Compliance

Complies with international Electromagnetic Compatibility (EMC) and international safety requirements and standards (see details in Table following)

Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>1000 V)
Electrostatic Discharge (ESD) to the Single LC Receptacle	IEC 61000-4-2 GR-1089-CORE	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2	Compatible with Class 1 laser product.

## Recommended Interface Circuit

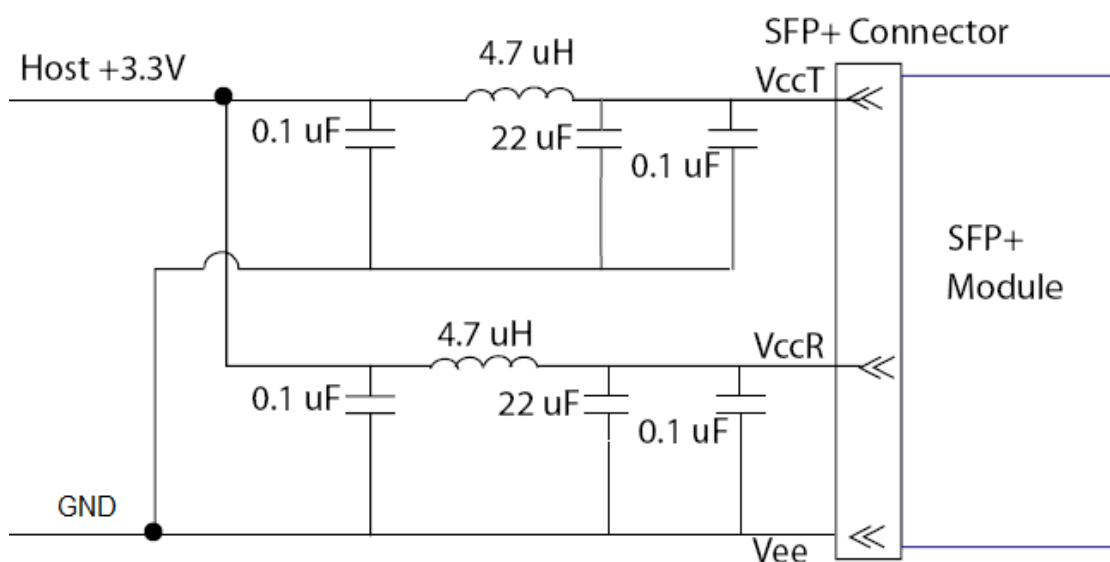
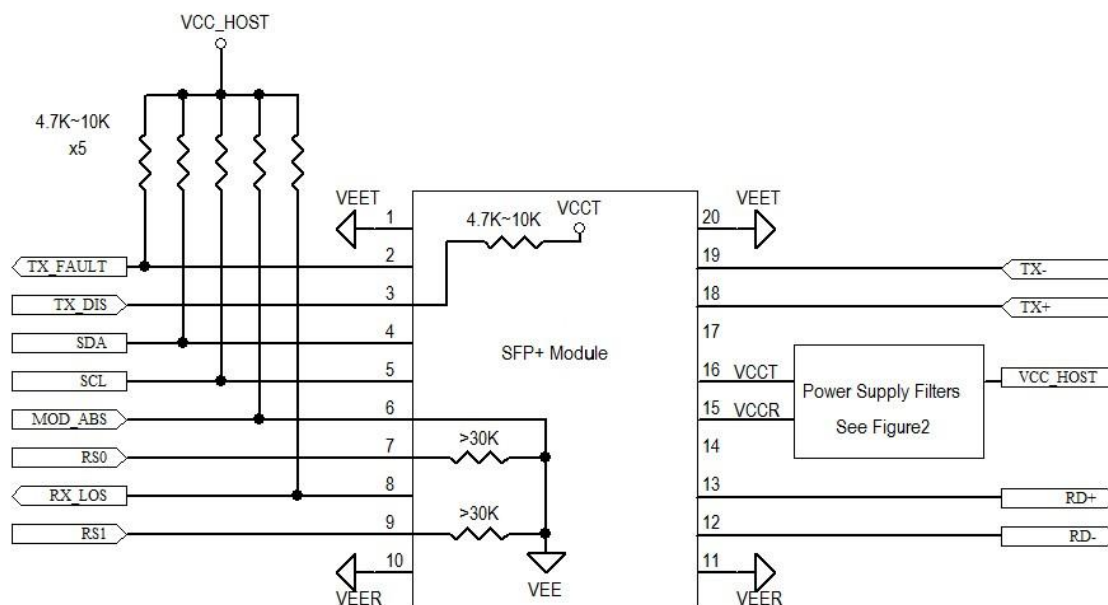


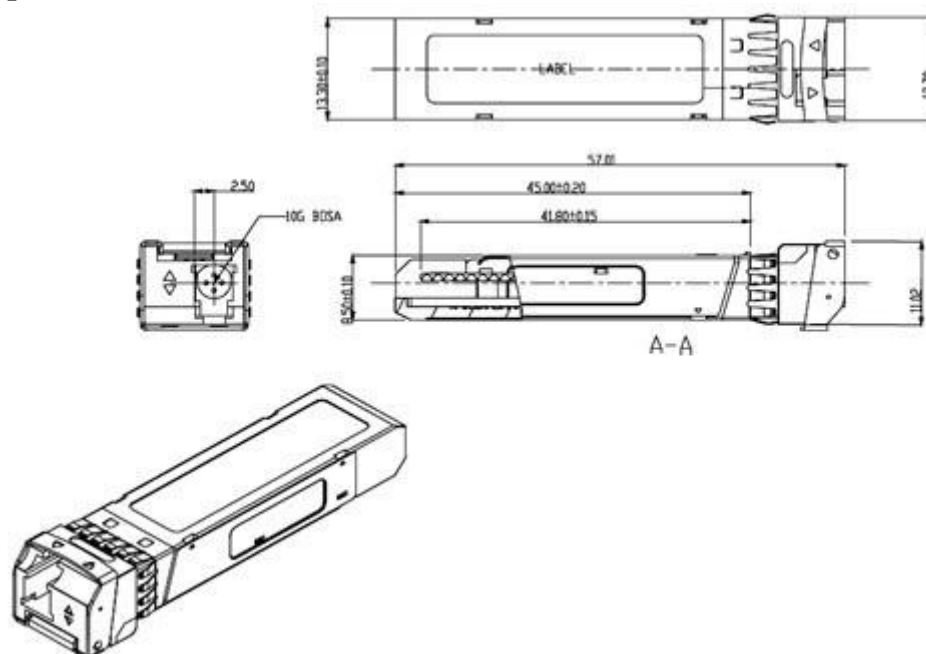
Figure2. Host Board Power Supply Filters Circuit



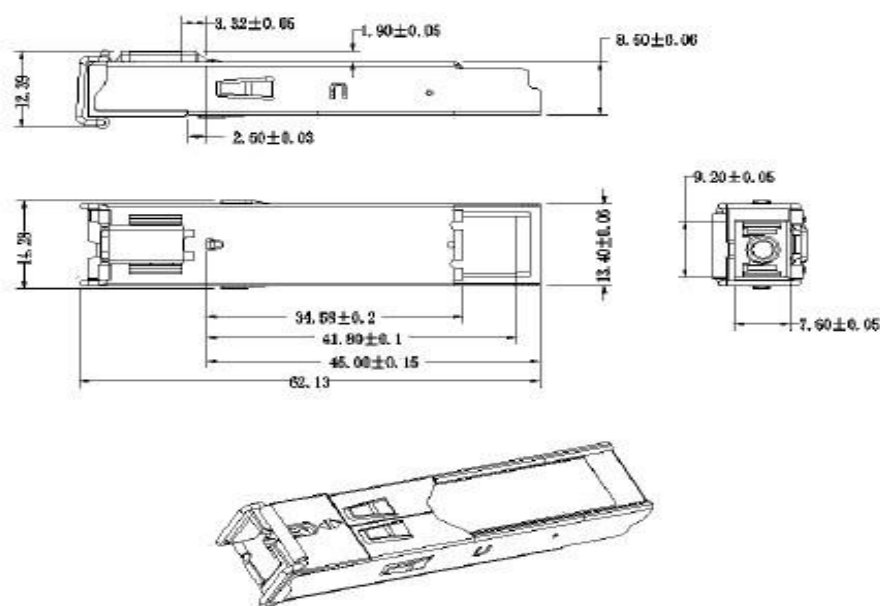
### Figure3. Host-Module Interface

## Mechanical Dimensions

### A. LC Receptacle



### B. SC Receptacle



### Order Information

Part Number	Product Description
SPT-PB2733TG-L40	1270nm TX/1330nm RX, 10Gbps, 40km, LC, 0°C ~ +70°C, with DDM
SPT-PB3327TG-L40	1330nm TX/1270nm RX, 10Gbps, 40km, LC, 0°C ~ +70°C, with DDM
SPT-PB2733TG-L40	1270nm TX/1330nm RX, 10Gbps, 40km, LC, -40°C ~ +85°C, with DDM
SPT-PB3327TG-L40	1330nm TX/1270nm RX, 10Gbps, 40km, LC, -40°C ~ +85°C, with DDM

Note: If you need more customized services, please contact us.

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