



10GBPS SFP+ BI-DIRECTIONAL TRANSCEIVER, 20KM REACH

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

Features

- Supports 9.953Gb/s to 10.32Gb/s data rates
- Simplex LC/SC Connector Bi-Directional SFP+ Optical Transceiver
- Compliant to IEEE 802.3ae
- Single 3.3V Supply
- Hot-Pluggable
- Up to 20km 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 _{CC} | -0.5 | +3.6 | V |
| Storage Temperature | T _c | -40 | +85 | °C |
| Operating Case Temperature | T _c | 0 | +70 | °C |
| Relative Humidity | RH | 0 | 85 | % |

Recommended Operating Conditions

| Parameter | Symbol | Min. | Typical | Max | Unit |
|----------------------------|-----------------|------|---------|-----|------|
| Supply Voltage | V _{CC} | 3.0 | 3.3 | 3.6 | V |
| Supply Current | I _{cc} | | | 220 | mA |
| Operating Case Temperature | T _c | 0 | 25 | 70 | °C |
| Module Power Dissipation | P _m | - | 0.7 | 1.1 | W |

[1] Supply current is shared between VCCTX and VCCR_X.

[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. |
|--------------------------------|------------------------|-----------------|---------|-------------------------------------|------------------|------|
| Transmitter | | | | | | |
| Input differential impedance | R _{in} | | 100 | | Ω | 2 |
| Single ended data input swing | V _{in,pp} | 150 | | 1200 | mV _{pp} | |
| Transmit Disable Voltage | V _D | 2 | | V _{CC} | V | |
| Transmit Enable Voltage | V _{EN} | V _{ee} | | V _{ee} +0.8 | V | 3 |
| Receiver | | | | | | |
| Output differential impedance | R _{out} | | 100 | | Ω | 2 |
| Single ended data output swing | V _{out,pp} | 300 | | 700 | mV | 4 |
| LOS Fault | V _{LOS fault} | 2 | | V _{CC} _{HO} ST | V | 5 |
| LOS Normal | V _{LOS norm} | V _{ee} | | V _{ee} +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.

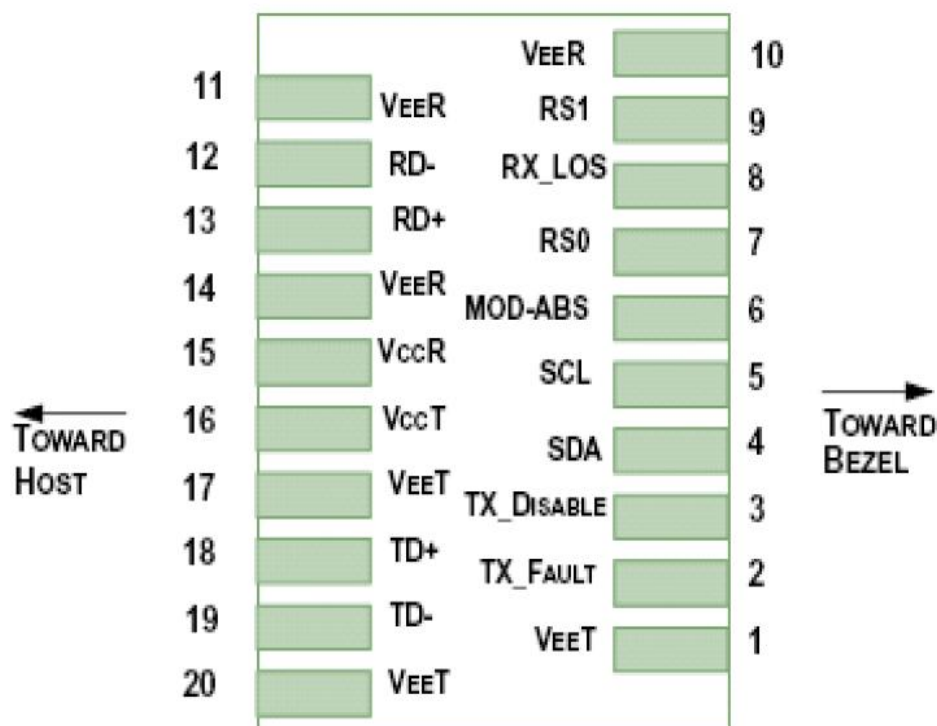
Optical Parameters(TOP = 0 to 70° C, VCC = 3.0 to 3.60 Volts)

| Parameter | Symbol | Min. | Typical | Max. | Unit | Note |
|------------------------------------|---------------------------|------|---------|------------|-------|-----------|
| Transmitter | | | | | | |
| Optical Wavelength | λ_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 _{op} | -6 | | 0 | 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 | |
| Receiver | | | | | | |
| Optical Wavelength | λ_R | 1320 | 1330 | 1340 | nm | 1330nm RX |
| | | 1260 | 1270 | 1280 | nm | 1270nm RX |
| Receiver Sensitivity | | | | -14.5 | dBm | 1,2 |
| Receiver Overload | P _{MAX} | 0 | | | dBm | |
| LOS De-Assert | LOS _D | | | -15 | dBm | |
| LOS Assert | LOS _A | -25 | | | 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 PRBS2³¹-1 test pattern @10.3125Gbps, BER ≤ 10⁻¹²

Pin Descriptions

**Figure1.Electrical 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 kΩ to 10 kΩ 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 kΩ to 10 kΩ. 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 kΩ resistors in the module.

Recommended Interface Circuit

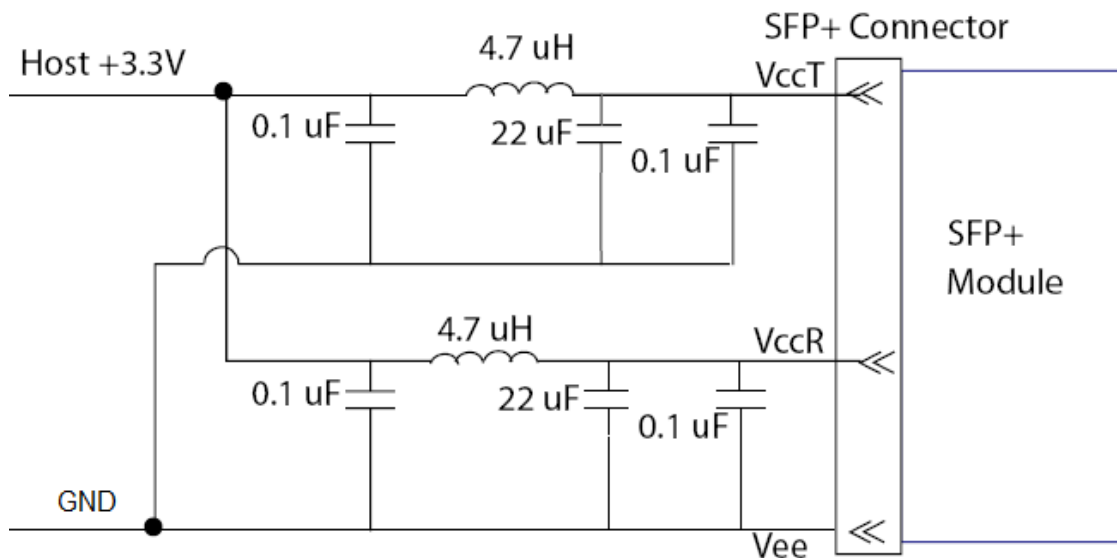


Figure2. Host Board Power Supply Filters Circuit

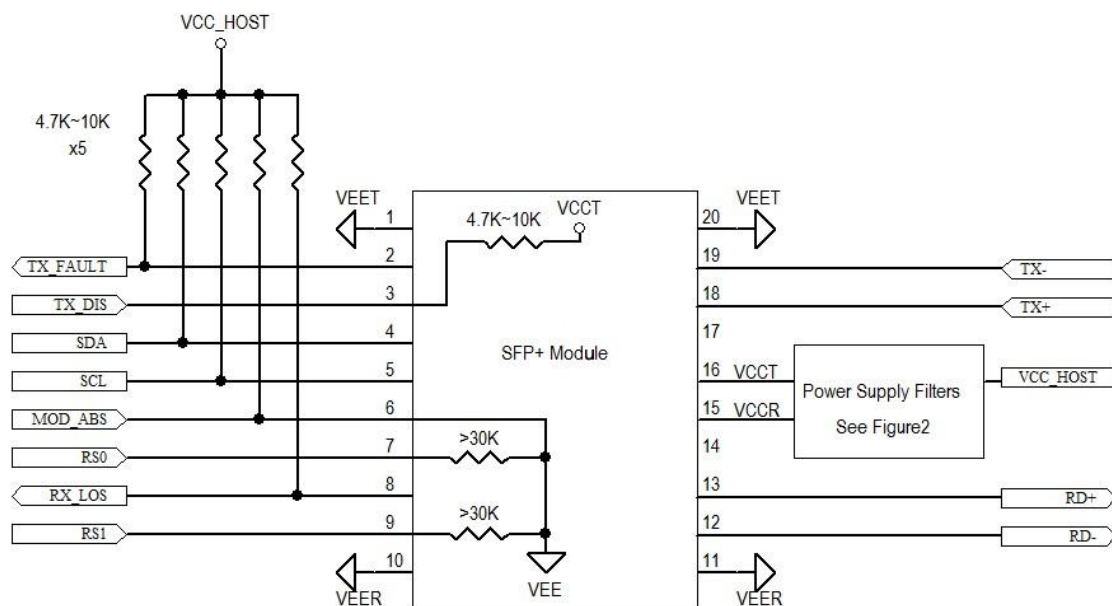
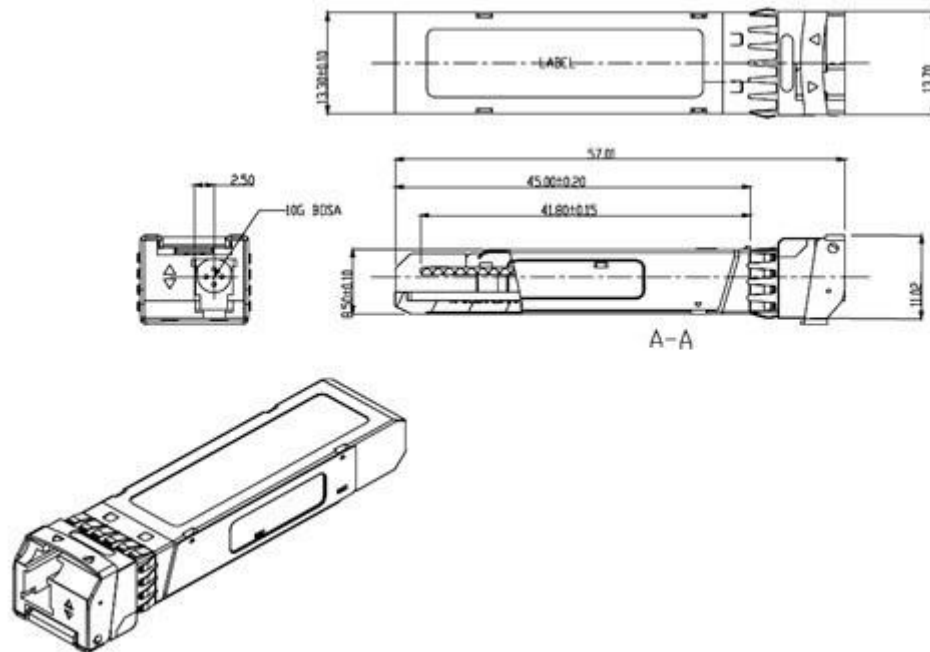


Figure3. Host-Module Interface

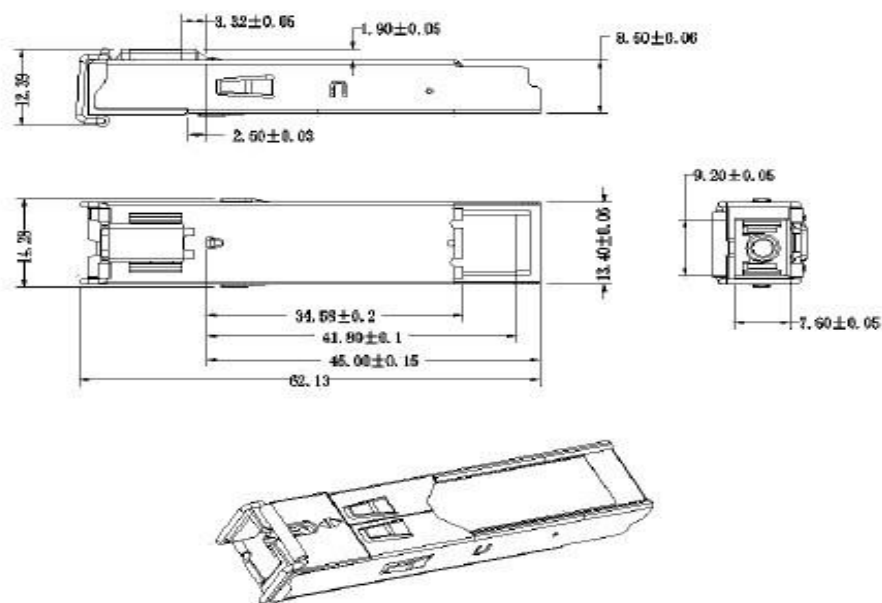


Mechanical Dimensions

A. LC Receptacle



B. SC Receptacle



**Order Information**

| Part Number | Product Description |
|-------------------|---|
| SPT-PB2733TG-L20 | 1270nm TX/1330nm RX, 10Gbps, 20km,LC, 0°C ~ +70°C, with DDM |
| SPT-PB3327TG-L20 | 1330nm TX/1270nm RX, 10Gbps, 20km,LC,0°C ~ +70°C, with DDM |
| SPT-PB2733TG-L20T | 1270nm TX/1330nm RX, 10Gbps, 20km,LC, -40°C ~ +85°C, with DDM |
| SPT-PB3327TG-L20T | 1330nm TX/1270nm RX, 10Gbps, 20km,LC,-40°C ~ +85°C, with DDM |

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

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