# T-10G-SFP+-T3-20KM

**10Gbps SFP+ BIDI Optical Transceiver, 20km Reach**

## Features


Supports 9.95Gbpto 10.3Gbps data rates
Simplex LC Connector Bi-Directional SFP+ Optical Transceiver
Distance up to 20km with 9/125 μm SMF
Single 3.3V Power Supply
A: 1330nm DFB Laser Transmitter, 1270nm Receiver
B: 1270nm DFB Laser Transmitter, 1330nm Receiver
Compliant with MSA SFP+ Specification SFF-8431
Compliant with IEEE 802.3ae 10GBASE-LR/LW
SFP+ MSA SFF-8431 Compliant
Digital Diagnostic SFF-8472 Compliant
Operating Temperature
Standard: 0C~+70℃

## Applications

10GBase-LR at 10.3125Gbps
10GBase-LW at 9.953Gbps
Other Optical Links

## Description

T-10G-SFP+-T3-20KM issingle-mode transceiver is SFP+ module for serial optical data communications such as 10GBASE-LR and 10GBASE-LW. It is with the SFP+ 20-pin connector to allow hot plug capability.

This module is designed for single mode fiber and operates at a nominal wavelength of 1270nm or 1310 nm. The Transmitter section uses a multiple quantum well DFB laser and is a class 1 laser compliant according to International Safety Standard IEC-60825.

The receiver section uses an integrated InGaAs 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 |
|---|---|---|---|---|
| Storage Temperature | Tc | -40 | +85 | °C |
| Operating Case Temperature | Tc | 0 | +70 | °C |
| Supply Voltage | Vin | -0.5 | +3.6 | V |
| 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 | $I_{cc}$ | | 200 | 300 | mA |
| Operating Case Temperature | Tc | 0 | 25 | 70 | °C |
| Module Power Dissipation | Pm | | 0.7 | 1.1 | W |

## Electrical Characteristics( Top=0~70℃， Vcc=3.0 to 3.60 Volts)

| Parameter | Symbol | Min. | Typ. | Max | Unit | Notes |
|---|---|---|---|---|---|---|
| Supply Voltage | Vcc | 3.00 | | 3.60 | V | 1 |
| Supply Current | Icc | | 200 | 300 | mV | 1 |
| **Transmitter** | | | | | | |
| Input Impedance (Differential) | $R_{in}$ | | 100 | | Ω | 2 |
| Single Ended Data Input Swing | $V_{in,pp}$ | 150 | | 1200 | mVpp | |
| Transmit Disable Voltage | $V_D$ | 2 | | Vcc | V | |
| Transmit Enable Voltage | $V_{EN}$ | Vee | | Vee+0.8 | V | 3 |

| Receiver | | | | | | |
|---|---|---|---|---|---|---|
| Output Impedance (Differential) | $R_{out}$ | | 100 | | Ω | 2 |
| Single Ended Data Output Swing | $V_{out,pp}$ | 300 | | 700 | mV | 4 |
| LOS Fault | $V_{out,pp}$ | 2 | | $VCC_{HOST}$ | V | 5 |
| LOS Normal | $V_{LOS\ fault}$ | 0 | | Vee+0.8 | V | 5 |

Notes:

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

**Optical and Electrical Characteristics(Top=0~70℃， Vcc=3.0 to3.60 Volts)TX1310/1270nm**

| Parameter | Symbol | Min. | Typical | Max. | Unit | Ref. |
|---|---|---|---|---|---|---|
| **Transmitter** | | | | | | |
| Optical Wavelength | λc | 1320 | 1330 | 1340 | nm | |
| Side Mode Suppress Ratio | SMSR | 30 | | | dB | |
| Spectral Width (-20dB) | △λ | | | 1 | nm | |
| Average Output Power | $P_{out}$ | -2 | | 2 | dBm | 1 |
| Extinction Ratio | ER | 3.5 | | | dB | |
| Eye Mask | Compliant with IEEE 802.3 | | | | | |
| Transmitter Dispersion Penalty | TDP | | | 3.2 | dB | |
| Average Power of OFF Transmitter | | | | -30 | dBm | |
| Relative Intensity Noise | RIN | | | -128 | Db/Hz | |

| Receiver | | | | | | |
|---|---|---|---|---|---|---|
| Average Receiver Power | RSENS | | | -14.1 | dBm | 1,2 |
| Receiver Overload | $P_{max}$ | | | +0.5 | dBm | |
| Centre Wavelength | λc | 1280 | | 1270 | dBm | |
| LOS De-Assert | $LOS_D$ | | | -15 | dBm | |
| LOS Assert | $LOS_A$ | -30 | | | dB | |
| LOS Hysteresis | | 0.5 | | | dB | |

Notes:

1. Output is coupled into a 9/125um SMF.
2. Average Receiver Power (Min) is informative and not the principal indicator of signal strength. A received below this value cannot be compliant.
3. Measured with a PRBS231-1 test pattern@10.3125Gbps

## TX1270/1330nm

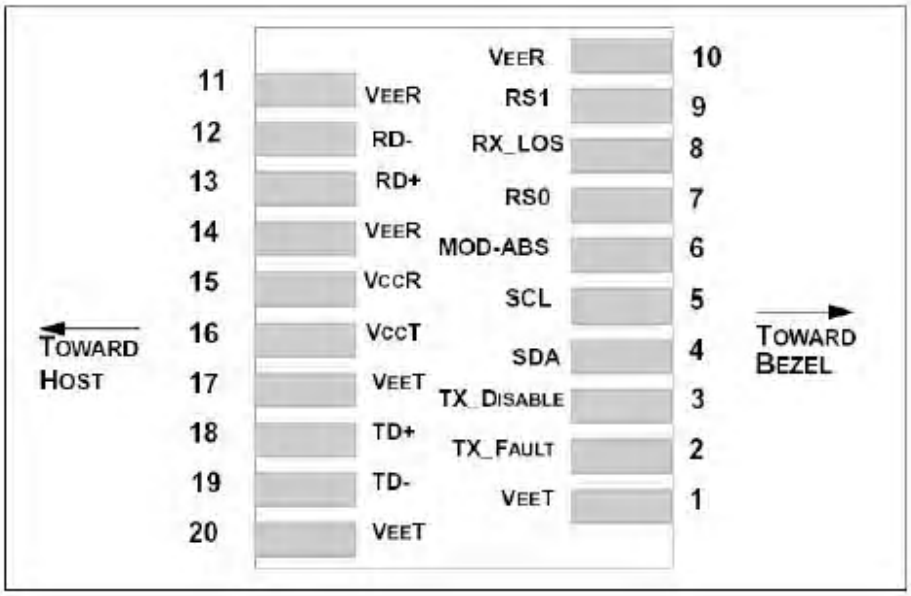
| Parameter | Symbol | Min. | Typical | Max. | Unit | Ref. |
|---|---|---|---|---|---|---|
| **Transmitter** | | | | | | |
| Optical Wavelength | λc | 1260 | 1270 | 1280 | nm | |
| Side Mode Suppress Ratio | SMSR | 30 | | | dB | |
| Spectral Width (-20dB) | △λ | | | 1 | nm | |
| Average Output Power | $P_{out}$ | -2 | | 2 | dBm | 1 |
| Extinction Ratio | ER | 3.5 | | | dB | |
| Eye Mask | Compliant with IEEE 802.3 | | | | | |
| Transmitter Dispersion Penalty | TDP | | | 3.2 | dB | |
| Average Power of OFF Transmitter | | | | -30 | dBm | |
| Relative Intensity Noise | RIN | | | -128 | Db/Hz | |

| Receiver | | | | | | |
|---|---|---|---|---|---|---|
| Average Intensity Noise | RSENS | | | -14.1 | dBm | 1,2 |
| Receiver Overload | $P_{max}$ | | | +0.5 | dBm | |
| Centre Wavelength | λc | 1320 | | 1340 | dBm | |
| LOS De-Assert | $LOS_D$ | | | -15 | dBm | |
| LOS Assert | $LOS_A$ | -30 | | | dB | |
| LOS Hysteresis | | 0.5 | | | dB | |

Notes:

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

## SFP+ Transceiver Electrical Pad Layout



**Pin Function Definitions**

| Pin Num. | Symbol | Name/Description |
|---|---|---|
| 1 | VeeT (1) | Transmitter Ground |
| 2 | TX Fault (2) | Transmitter Fault Indication |
| 3 | TX Disable (3) | Transmitter Disable.Laser output disable 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. Ground within the module |
| 7 | RSo (5) | RS0 for Rate Select: Open or Low = Module supports ≤4.25Gbps<br>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+ | Transmit Data In. AC Coupled |
| 19 | TD- | Transmit 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 3.15Vand 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 to10 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.

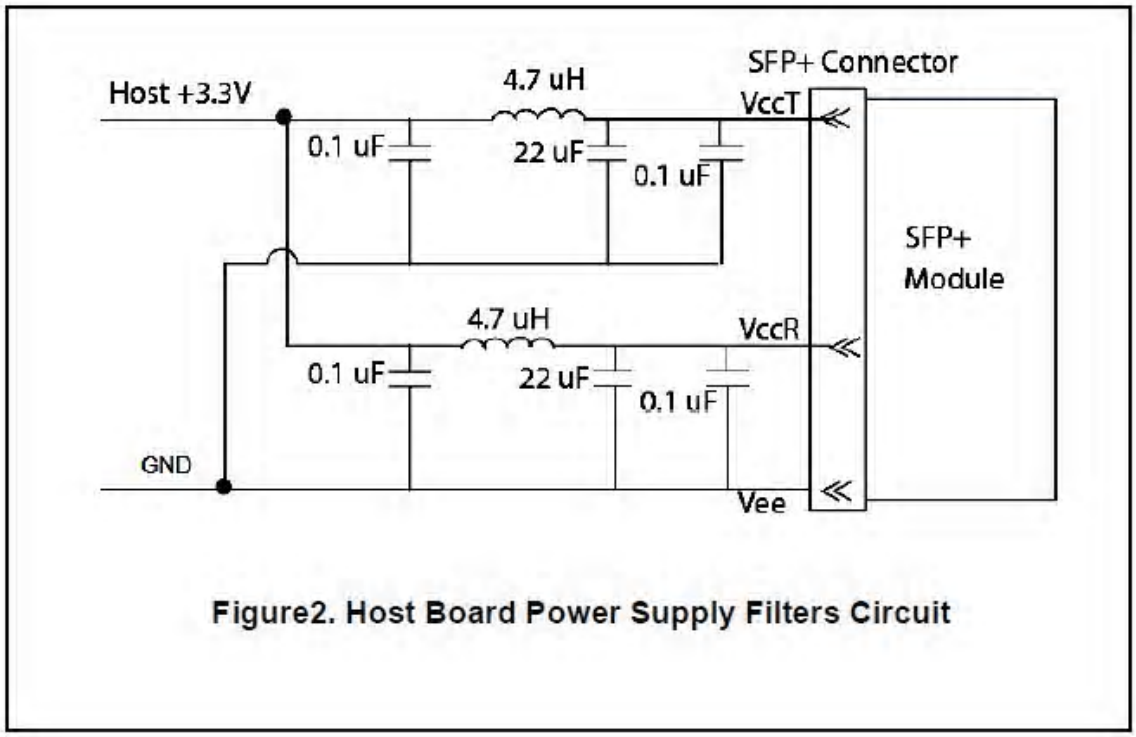
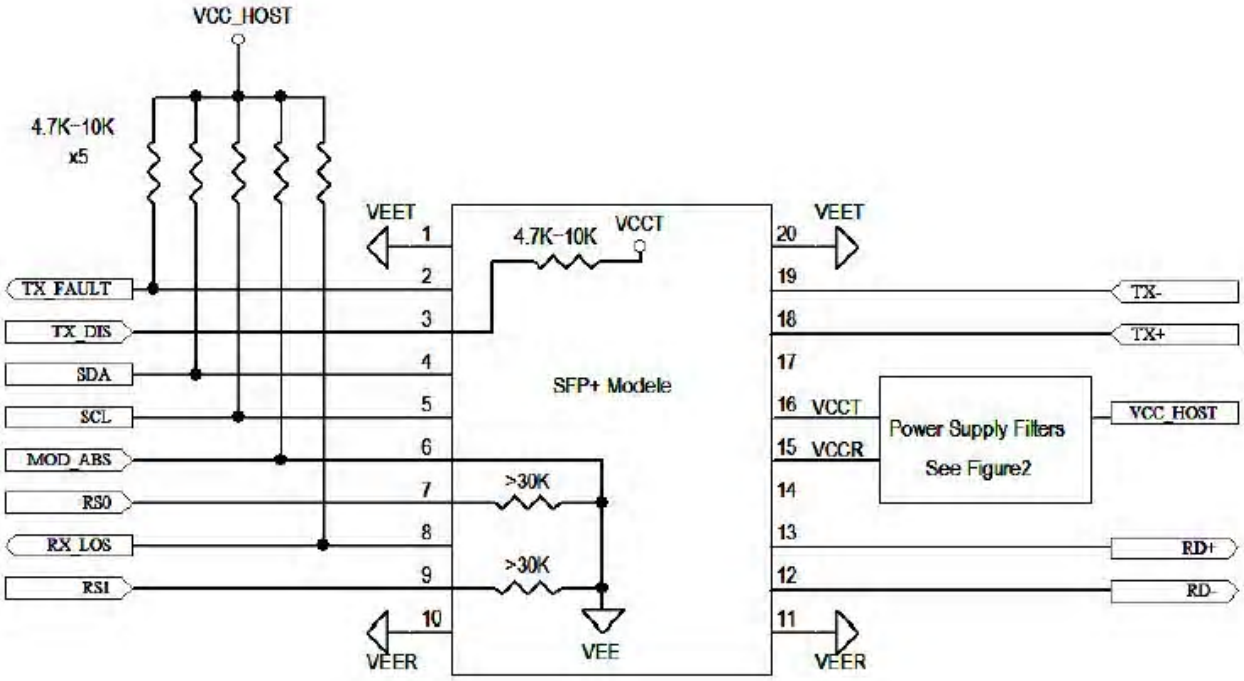
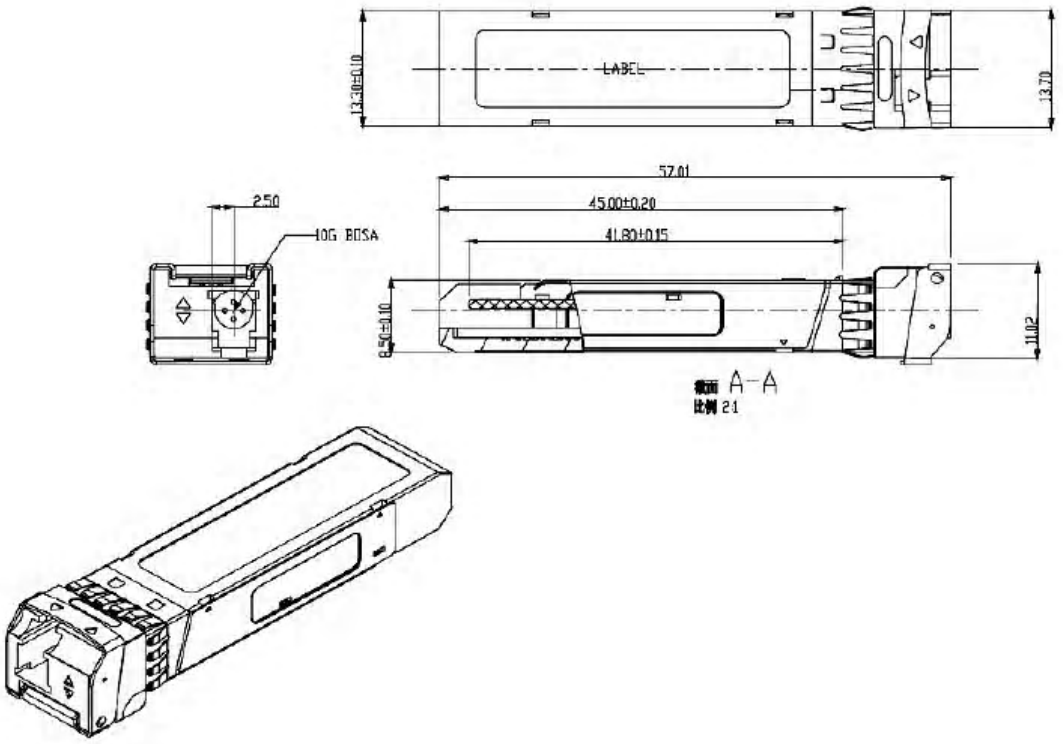



**Figure2. Host Board Power Supply Filters Circuit**



## Mechanical Specifications




### Ordering information

| Part Number | Product Description |
|---|---|
| T-10G-SFP+-T3-20KM | 9.95~10.3Gbps Tx:1330nm / Rx:1270nm 20KM 0℃~+70℃ |
| T-10G-SFP+-T2-20KM | 9.95~10.3Gbps Tx:1270nm / Rx:1330nm 20KM 0℃~+70℃ |

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