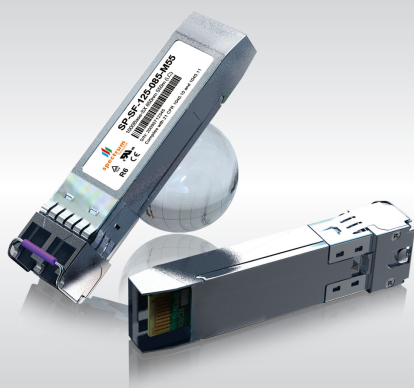


SPECTRUM TRANSCEIVER



SP-SF-10G-150-080-DC

10G SFP+ Small Form Pluggable Plus

FEATURES

- Compliant with MSA SFP+ Specification SFF-8431.
- Operating data rate up to 10.3Gbps.
- Distance up to 80km.
- 1550nm DFB EA Transmitter.
- Single +3.3V Power Supply and TTL Logic Interface.
- Duplex LC Connector Interface.
- Hot Pluggable.
- Compliant with IEEE 802.3ae 10GBASE-ER.
- Compliant with IEEE 802.3ae 10GBASE-EW.

APPLICATIONS

- 10GBASE-EW at 9.953Gbps.
- 10GBASE-ER at 10.3125Gbps.
- Other Optical Links.

SPECIFICATIONS

a) Electrical and Optical Characteristics

| Parameter | Symbol | Min. | Typical | Max. | Unit | Note |
|------------------------------------|-----------------|------|---------------|--------------|----------|------|
| 9µm Core Diameter SMF | | | 80 | | Km | |
| Data Rate | | | 9.953/10.3125 | | Gbps | |
| Transmitter | | | | | | |
| Centre Wavelength | λ_c | 1530 | 1550 | 1565 | nm | |
| Spectral Width (-20dB) | $\Delta\lambda$ | | | 1 | nm | |
| Average Output Power | P_{out} | 0 | | +4 | dBm | |
| Extinction Ratio | ER | 3.5 | | | dB | |
| Transmitter and Dispersion Penalty | TDP | | | 2 | dB | |
| Average Power of OFF Transmitter | | | | -30 | dBm | |
| Side Mode Suppression Ratio | SMSR | 30 | | | dB | |
| Input Differential Impedance | Z_{IN} | 90 | 100 | 110 | Ω | |
| TX Disable (Disable) | | 2.0 | | $V_{cc}+0.3$ | V | |
| TX Disable (Enable) | | 0 | | 0.8 | V | |
| TX_Fault (Fault) | | 2.0 | | $V_{cc}+0.3$ | V | |
| TX_Fault (Normal) | | 0 | | 0.8 | V | |
| TX_Disable Assert Time | t_{off} | | | 10 | us | |
| Receiver | | | | | | |
| Centre Wavelength | λ_c | 1260 | | 1600 | nm | |
| Sensitivity | P_{min} | | | -23 | dBm | |
| Output Differential Impedance | Z_{OUT} | 90 | 100 | 110 | Ω | |
| Receiver Overload | P_{max} | 0.5 | | | dBm | |
| Receiver Reflectance | Rrx | | | -12 | dB | |
| LOS De-Assert | LOSD | | | -15 | dBm | |
| LOS Assert | LOSA | -25 | | | dBm | |
| LOS (High) | | 2.0 | | $V_{cc}+0.3$ | V | |
| LOS (Low) | | 0 | | 0.8 | V | |

For enquires, please email to info@terrabitnetworks.com

SPECTRUM TRANSCEIVER

b) Absolute Maximum Ratings

| Parameter | Symbol | Min. | Max. | Unit |
|---------------------|-----------------|------|------|------|
| Storage Temperature | T _{ST} | -40 | +85 | °C |
| Supply Voltage | V _{CC} | -0.5 | 3.6 | V |

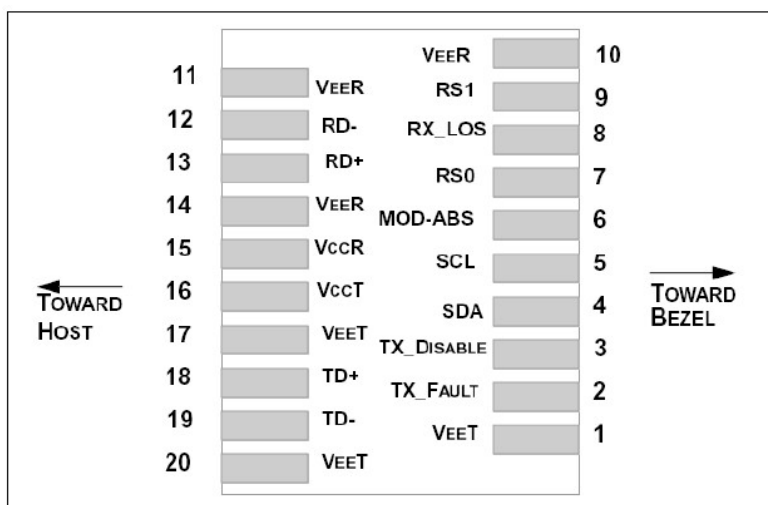
c) Recommended Operating Environment

| Parameter | Symbol | Min. | Typical | Max. | Unit | Note |
|-----------------------|--------------------|-------|---------------|-------|-------|------|
| Power Supply Voltage | V _{CC} | +3.15 | +3.3 | +3.45 | V | |
| Power Supply Current | I _{CC} | | | 300 | mA | |
| Operating Temperature | T _{OP} | 0 | - | +70 | °C | |
| Surge Current | I _{Surge} | | | +30 | mA | |
| Baud Rate | | | 9.953/10.3125 | | GBaud | |

d) Performance Specifications - Electrical

| Parameter | Symbol | Min. | Typical | Max. | Unit | Note |
|----------------------------------|------------------|------|---------|----------------------|------|--|
| Transmitter | | | | | | |
| CML Inputs (Differential) | V _{in} | 150 | | 1200 | mVpp | AC coupled inputs |
| Input Impedance (Differential) | Z _{in} | 85 | 100 | 115 | Ohms | R _{in} > 100 kohms @ DC |
| Tx_DISABLE Input Voltage - High | | 2 | | V _{CC} +0.3 | V | |
| Tx_DISABLE Input Voltage - Low | | 0 | | 0.8 | V | |
| Tx_FAULT Output Voltage - High | | 2 | | V _{CC} +0.3 | V | I _O = 400µA; Host V _{CC} |
| Tx_FAULT Output Voltage - Low | | 0 | | 0.5 | V | I _O = -4.0mA |
| Receiver | | | | | | |
| CML Outputs (Differential) | V _{out} | 350 | | 700 | mVpp | AC coupled outputs |
| Outputs Impedance (Differential) | Z _{out} | 85 | 100 | 115 | Ohms | |
| Rx_LOS Output Voltage - High | | 2 | | V _{CC} +0.3 | V | I _O = 400µA; Host V _{CC} |
| Rx_LOS Output Voltage - Low | | 0 | | 0.8 | V | I _O = -4.0mA |
| MOD_DEF (0:2) | VoH | 2.5 | | | V | With Serial ID |
| MOD_DEF (0:2) | VoL | 0 | | 0.5 | V | With Serial ID |

e) Pin Assignment



Pin out of Connector Block on Host Board

SPECTRUM TRANSCEIVER

f) Pin Description

| Pin Num. | Name | Function | Plug Seq. | Notes |
|----------|------------|-----------------------------|-----------|---|
| 1 | VeeT | Transmitter Ground | 1 | |
| 2 | TX Fault | Transmitter Fault Indicator | 3 | 1 |
| 3 | TX Disable | Transmitter Disable | 3 | 2, Module disables on high or open |
| 4 | SDA | Module Definition 2 | 3 | Note 3, Data line for Serial ID |
| 5 | SCL | Module Definition 1 | 3 | Note 3, Data line for Serial ID |
| 6 | MOD-ABS | Module Definition 0 | 3 | Note 3, Grounded within the module |
| 7 | RS0 | RX Rate Select (LVTTTL). | 3 | This pin has an internal 30k pull down to ground. A signal on this pin will not affect module performance |
| 8 | LOS | Loss of Signal | 3 | Note 4 |
| 9 | RS1 | TX Rate Select (LVTTTL). | 1 | This pin has an internal 30k pull down to ground. A signal on this pin will not affect module performance |
| 10 | VeeR | Receiver Ground | 1 | Note 5 |
| 11 | VeeR | Receiver Ground | 1 | Note 5 |
| 12 | RD- | Inv. Received Data Out | 3 | Note 6 |
| 13 | RD+ | Received Data Out | 3 | Note 6 |
| 14 | VeeR | Receiver Ground | 1 | Note 5 |
| 15 | VccR | Receiver Power | 2 | 3.3 ± 5%, Note 7 |
| 16 | VccT | Transmitter Power | 2 | 3.3 ± 5%, Note 7 |
| 17 | VeeT | Transmitter Ground | 1 | Note 5 |
| 18 | TD+ | Transmit Data In | 3 | Note 8 |
| 19 | TD- | Inv. Transmit Data In | 3 | Note 8 |
| 20 | VeeT | Transmitter Ground | 1 | Note 5 |

Notes:

- TX Fault is an open collector/drain output, which should be pulled up with a 4.7K - 10KΩ resistor on the host board. Pull up voltage between 2.0V and VccT, R +0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.
- TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7 - 10 K Ω resistor. Its states are:
Low (0~0.8V): Transmitter on (>0.8V, <2.0V): Undefined
High (2.0~3.465V): Transmitter Disabled
Open: Transmitter Disabled.
- Modulation Absent, connected to VEET or VEER in the module.
- LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K - 10KΩ resistor. Pull up voltage between 2.0V and VccT, R+0.3V. 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 < 0.8V.
- VeeR and VeeT may be internally connected within the SFP module.
- RD-/+ : These are the differential receiver outputs. They are AC coupled 100M differential lines which should be terminated with 100M (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 350 and 700 mV differential (175 -350 mV single ended) when properly terminated.
- VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±5% at the SFP connector pin. Maximum supply current is 300mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1 ohm should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot plugging of the SFP transceiver module will result in an inrush current of no more than 30mA greater than the steady state value. VccR and VccT may be internally connected within the SFP transceiver module.
- TD-/+ : These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board. The inputs will accept differential swings of 150 – 1200 mV (75 – 600mV single-ended).