

SFP-2-5GBASE-LX-20-C

MSA and TAA 2.5GBase-LX SFP Transceiver (SMF, 1310nm, 20km, LC, DOM)

Features:

- INF-8074 and SFF-8472 Compliance
- Duplex LC Connector
- Single-mode Fiber
- Commercial Temperature 0 to 70 Celsius
- Hot Pluggable
- Metal with Lower EMI
- Excellent ESD Protection
- RoHS Compliant and Lead Free



Applications:

- 2.5GBase Ethernet
- Access and Enterprise

Product Description

This MSA compliant SFP transceiver provides 2.5GBase-LX throughput up to 20km over single-mode fiber (SMF) using a wavelength of 1310nm via an LC connector. It is built to MSA standards and is uniquely serialized and data-traffic and application tested to ensure that they will integrate into your network seamlessly. Digital optical monitoring (DOM) support is also present to allow access to real-time operating parameters. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

ProLabs' transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S.-made or designated country end products.")



Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.4
- ESD to the LC Receptacle: compatible with IEC 61000-4-3
- EMI/EMC compatible with FCC Part 15 Subpart B Rules, EN55022:2010
- Laser Eye Safety compatible with FDA 21CFR, EN60950-1& EN (IEC) 60825-1,2
- RoHS compliant with EU RoHS 2.0 directive 2015/863/EU

Absolute Maximum Ratings

| Parameter | Symbol | Min. | Typ | Max. | Unit |
|-----------------------------|--------|------|-------|------|------|
| Maximum Supply Voltage | Vcc | -0.5 | | 3.6 | V |
| Storage Temperature | TS | -40 | | 85 | °C |
| Operating Case Temperature | Tc | 0 | | 70 | °C |
| Operating Relative Humidity | RH | | | 95 | % |
| Data Rate | | | 2.488 | | Gbps |

Electrical Characteristics (TOP=25°C, Vcc=3.3Volts)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---------------------------------|---------|------|------|---------|-------|-------|
| Power Supply Voltage | Vcc | 3.13 | 3.3 | 3.45 | V | |
| Power Supply Current | Icc | | | 300 | mA | |
| Transmitter | | | | | | |
| LVPECL Inputs (Differential) | Vin | 400 | | 1600 | mVp-p | 1 |
| Input Impedance (Differential) | Zin | 85 | 100 | 115 | ohms | 2 |
| TX Disable | Disable | 2 | | Vcc+0.3 | V | |
| | Enable | 0 | | 0.8 | V | |
| TX Fault | Fault | 2 | | Vcc+0.3 | V | |
| | Normal | 0 | | 0.5 | V | |
| Receiver | | | | | | |
| LVPECL Outputs (Differential) | Vout | 400 | 800 | 1200 | mVp-p | 2 |
| Output Impedance (Differential) | Zout | 85 | 100 | 115 | ohms | |
| TX_Disable Assert Time | T_off | | | 10 | us | |
| RX_LOS | LOS | 2 | | Vcc+0.3 | V | |
| | Normal | 0 | | 0.8 | V | |
| MOD_DEF (0,2) | VoH | 2.5 | | | V | 3 |
| | VoL | 0 | | 0.5 | v | 3 |

Notes:

1. AC coupled.
2. $R_{in} > 100 \text{ kohms @ DC}$
3. With Serial ID

Optical Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|-----------------------------------|-----------------------|------|-------|------|------|-------|
| 9 μm Core Diameter SMF | L | | 40 | | km | |
| Data Rate | | | 2.488 | | Gbps | |
| Transmitter | | | | | | |
| Center Wavelength | λ_c | 1260 | 1310 | 1360 | nm | |
| Spectral Width (-20dB) | $\Delta\lambda$ | | | 1 | nm | |
| Side Mode Suppression Ratio | SMSR | 30 | | | dB | |
| Average Output Power | Pout | -2 | | 3 | dBm | 2 |
| Extinction Ratio | ER | 8.2 | | | dB | 3 |
| Rise/Fall Time (20%~80%) | tr/tf | | | 160 | ps | |
| Total Jitter | TJ | | | 0.07 | UI | |
| Output Optical Eye | ITU-T G.957 Compliant | | | | | |
| Pout@TX Disable Asserted | Pout | | | -45 | dBm | |
| Receiver | | | | | | |
| Center Wavelength | λ_C | 1260 | | 1600 | nm | |
| Receiver Sensitivity | Pmin | | | -28 | dBm | |
| Receiver Overload | Pmax | -9 | | | dBm | |
| LOS De-Assert | LOSD | | | -29 | dBm | |
| LOS Assert | LOSA | -40 | | | dBm | |
| LOS Hysteresis | | 0.5 | | | dB | |

Notes:

1. LVPECL logic, internally AC coupled.
2. Output power is measured by coupling into a 9/125 mm multi-mode fiber.
3. Filtered, measured with a PRBS $2^{23}-1$ test pattern @2500Mbps.
4. Minimum average optical power is measured at BER less than $1E-12$, with $2^{23}-1$ PRBS and ER=9 dB.

Pin Descriptions

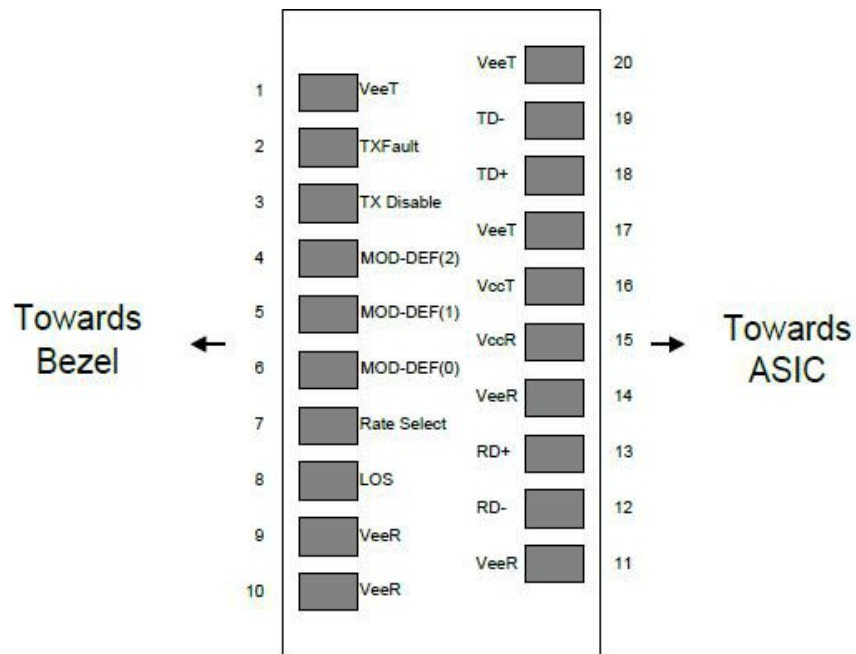
| Pin | Symbol | Name/Descriptions | Plug Seq. | Notes |
|-----|-------------|------------------------------|-----------|------------------------------------|
| 1 | VeeT | Transmitter Ground | 1 | 5 |
| 2 | TX Fault | Transmitter Fault Indication | 3 | 1 |
| 3 | TX Disable | Transmitter Disable | 3 | 2; Module disables on high or open |
| 4 | MOD-DEF2 | Module Definition 2 | 3 | 3; 2 wire serial ID interface |
| 5 | MOD-DEF1 | Module Definition 1 | 3 | 3; 2 wire serial ID interface |
| 6 | MOD-DEF0 | Module Definition 0 | 3 | 3; Grounded within the module |
| 7 | Rate Select | Not Connect | 3 | Function no available |
| 8 | LOS | Loss of Signal | 3 | 4 |
| 9 | VeeR | Receiver Ground | 1 | 5 |
| 10 | VeeR | Receiver Ground | 1 | 5 |
| 11 | VeeR | Receiver Ground | 1 | 5 |
| 12 | RD- | Inv. Received Data Out | 3 | 6 |
| 13 | RD+ | Received Data Out | 3 | 7 |
| 14 | VeeR | Receiver Ground | 1 | 5 |
| 15 | VccR | Receiver Power | 2 | 7; 3.3 ± 5% |
| 16 | VccT | Transmitter Power | 2 | 7; 3.3 ± 5% |
| 17 | VeeT | Transmitter Ground | 1 | 5 |
| 18 | TD+ | Transmit Data In | 3 | 8 |
| 19 | TD- | Inv. Transmit Data In | 3 | 8 |
| 20 | VeeT | Transmitter Ground | 1 | 5 |

Notes:

- TX Fault is an open collector/drain output, which should be pulled up with a 4.7K-10K resistor on the host board. Pull up voltage between 2.0V and $V_{ccT}/R+0.3V$. 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 withing the module with a 4.7-10K resistor. Its states are:
 - Low (0-0.8V): Transmitter on (>0.8, 2.0V): Undefined
 - High (2.0-3.465V): Transmitter Disabled: Transmitter Disabled.
- Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7K -10k resistor on the host board. The pull-up voltage shall be V_{ccT} or V_{ccR} .
 - Mod-Def 0 is grounded by the module to indicate that the module is present;
 - Mod-Def 1 is the clock line of two wire serial interface for serial ID;
 - Mod-Def 2 is the data line of two wire serial interface for serial ID.
- LOS (Loss if Signal) is an open collector/drain output, which should be pulled up with a 4.7K-10K resistor. Pull up voltage between 2.0V and $V_{ccT}/R+0.3V$. When high, this output indicated the received optical

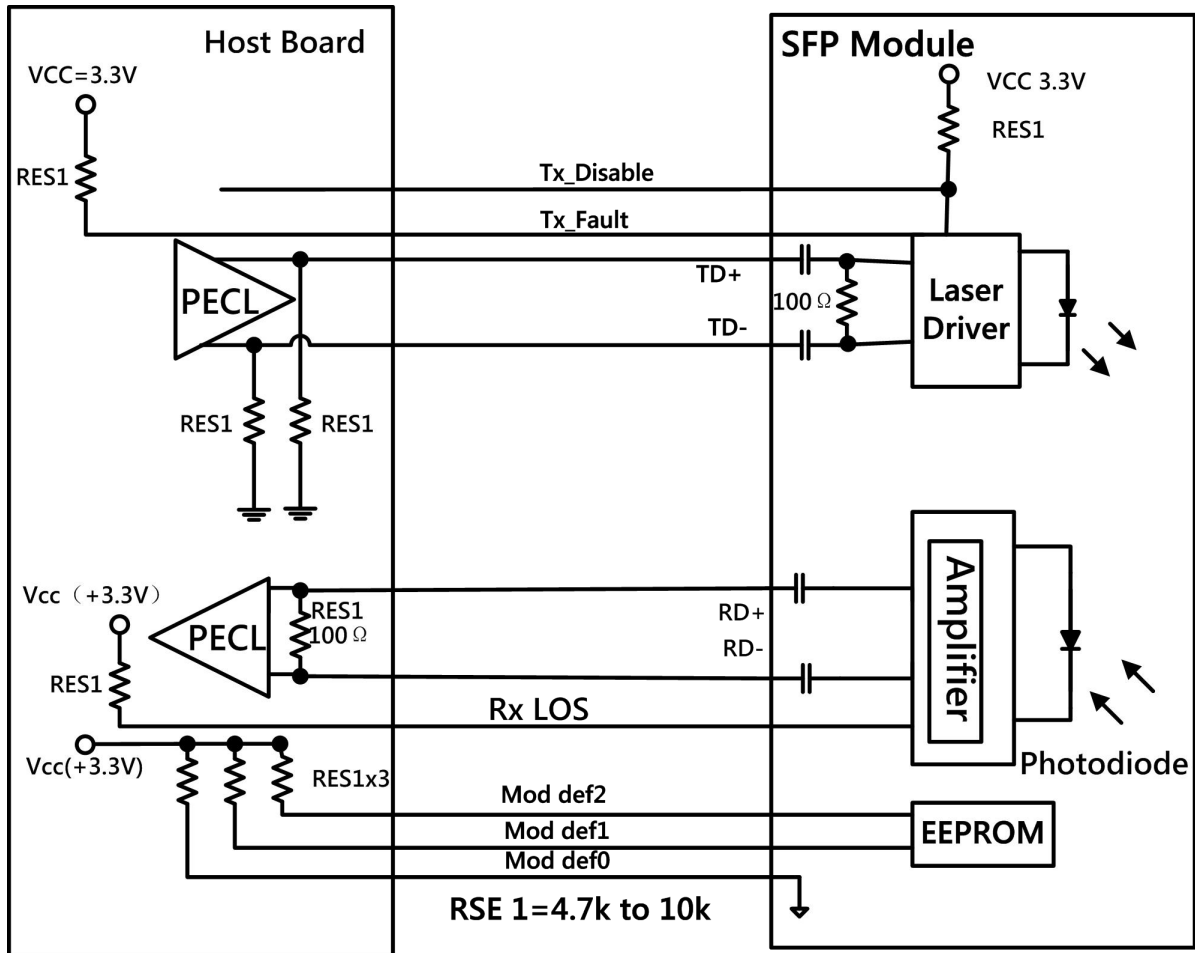
power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicated normal operation. In the low state, the output will be pulled to <0.8V.

5. VeeR and VeeT may be internally connected within the SFP module.
6. RD -/+: 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. The voltage swing on these lines will be between 400 and 2000 mV differential (200 –1000 mV single ended) when properly terminated.
7. 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.
8. TD -/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100 differential terminations 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 400-2000mV (200-1000mV single-ended)



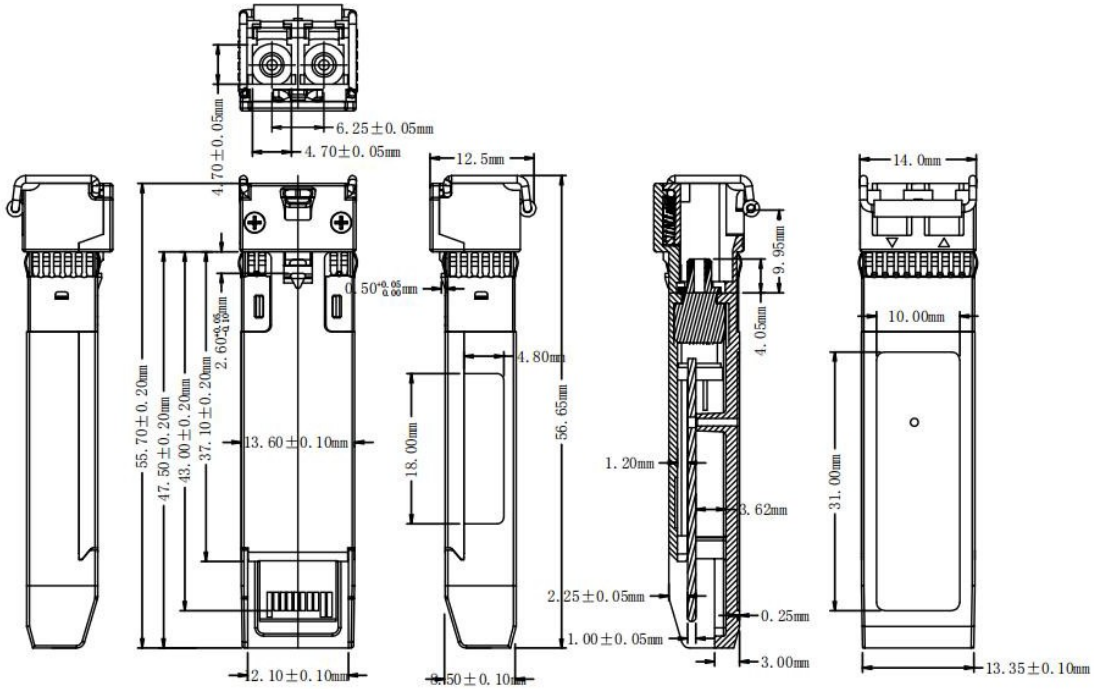
Pin-out of connector Block on Host board

Recommended Circuit Schematic



Mechanical Specifications

Small Form Factor Pluggable (SFP) transceivers are compatible with the dimensions defined by the SFP Multi-Sourcing Agreement (MSA).



EEPROM Information

EEPROM memory map specific data field description is as below:

2 wire address 1010000X(A0h)

| | |
|-----|--|
| 0 | Serial ID Defined by SFP MSA(96 bytes) |
| 95 | |
| 127 | |
| 127 | Vendor Specific (32 bytes) |
| 255 | Reserved (128 bytes) |

2 wire address 1010000X (A2h)

| | |
|-----|--|
| 0 | Alarm and warning Thresholds(56 bytes) |
| 55 | |
| 95 | Cal Constants (40 bytes) |
| 119 | Real Time Diagnostic Interface(24 bytes) |
| 127 | Vendor Specific(8 bytes) |
| 247 | User Writable EEPROM(120 bytes) |
| 255 | Vendor Specific(8 bytes) |

About ProLabs

Our extensive experience comes as standard. For over 20 years ProLabs has delivered optical connectivity solutions that give our customers freedom and choice through our ability to provide seamless interoperability. At the heart of our company is the ability to provide state-of-the-art optical transport and connectivity solutions that are compatible with more than 100 optical switching and transport platforms.

A Complete Portfolio of Network Solutions

ProLabs is focused on innovations in optical transport and connectivity. The combination of our knowledge of optics and networking equipment enables ProLabs to be your single source for optical transport and connectivity solutions from 100Mb to 1.6T while providing innovative solutions that increase network efficiency. We provide the optical connectivity expertise that is compatible with and enhances your switching and transport equipment.

The Trusted Partner

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure compatible products, and immediate answers to your questions. With Engineering and Manufacturing offices in the U.K. and U.S. augmented by field offices throughout the U.S., U.K. and Asia, ProLabs is able to be our customers best advocate 24 hours a day.



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