# SPP130101R0D000

MSA Compliant 1/10GBase-LR SFP+ Dual-Rate Transceiver (SMF, 1310nm, 10km, LC, DOM)

**Product Description**

This MSA compliant SFP+ transceiver provides 1/10GBase-LR throughput up to 10km over single-mode fiber (SMF) using a wavelength of 1310nm via an LC connector. It can operate at temperatures between 0 and 70C. 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. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

Skylane's transceivers are RoHS compliant and lead-free.

**Features:**

- Supports Rate Selectable 1.25Gbps or 9.83Gbps to 11.3Gbps Bit Rates
- Compliant with SFF-8431
- Compliant with IEEE 802.3.2-2012 10GBASE-LR/LW and 1000BASE-LX
- 1310 DFB Laser Transmitter
- Built-In Digital Diagnostic Functions
- Hot-Pluggable SFP+ Footprint
- Up to 10km on SMF
- Duplex LC Connector
- Operating Temperature: 0 to 70 Celsius
- 3.3V Power Supply
- RoHS Compliant and Lead-Free

**Applications:**

- 10GBase-LR Ethernet

*For your product safety, please read the following information carefully before any manipulation of the transceiver:*

*ESD*

*This transceiver is specified as ESD threshold 1kV for SFI pins and 2kV for all others electrical input pins, tested per MIL-STD-883G, Method 3015.4 /JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module.*

*LASER SAFETY*

*This is a Class1 Laser Product according to IEC 60825-1:2007. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007).*

***The optical ports of the module need to be terminated with an optical connector or with a dust plug in order to avoid contamination.***

**Absolute Maximum Ratings**

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| **Maximum Supply Voltage** | Vcc | -0.5 | | 4 | V | 1 |
| **Storage Temperature** | Tstg | -40 | | 85 | °C | |
| **Operating Case Temperature** | Tc | 0 | | 70 | °C | |
| **Data Rate (RS0 = Low)** | DR | | 1.25 | | Gbps | 2 |
| **Data Rate (RS0 = High)** | DR | 9.83 | 10.3125 | 11.3 | Gbps | 2 |
| **Bit Error Rate** | BER | | | $10^{-12}$ | | |

**Notes:**

1. For the electrical power interface.
2. IEEE 802.3-2012.

**Electrical Characteristics**

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| **Module Supply Voltage** | Vcc | 3.14 | 3.3 | 3.46 | V | |
| **Module Supply Current** | Icc | | 290 | 380 | mA | 1 |
| **Power Dissipation** | $P_{DISS}$ | | 1.0 | 1.3 | W | |
| **Transmitter** | | | | | | |
| **Input Differential Impedance** | RIN | | 100 | | Ω | |
| **Differential Data Input Swing** | VIN,pp | 180 | | 700 | mVp-p | |
| **Transmit Disable Voltage** | VD | 2 | | Host_Vcc | V | |
| **Transmit Enable Voltage** | VEN | Vee | | Vee+0.8 | V | |
| **Receiver** | | | | | | |
| **Differential Data Output Swing** | VOUT,pp | 300 | | 850 | mVp-p | |
| **Data Output Rise/Fall Time (20-80%)** | Tr/Tf | 28 | | | ps | |
| **LOS Assert** | VLOSA | 2 | | Host_Vcc | V | |
| **LOS De-Assert** | VLOSD | Vee | | Vee+0.5 | V | |

**Notes:**

1. For the electrical power interface.

**Optical Characteristics**

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| **Transmitter** | | | | | | |
| **Output Optical Power @1.25Gbps** | $P_{TX1}$ | -9.5 | | -3 | dBm | 1 |
| **Output Optical Power @10.3Gbps** | $P_{TX2}$ | -8.2 | | 0.5 | dBm | 1 |
| **Optical Center Wavelength** | λC | 1260 | | 1355 | nm | |
| **Optical Modulation Amplitude** | OMA | -5.2 | | | dBm | 2 |
| **Extinction Ratio @1.25Gbps** | ER1 | 9 | | | dB | |
| **Extinction Ratio @10.3Gbps** | ER2 | 3.5 | | | dB | |
| **Spectral Width (-20dB)** | Δλ | | | 1 | nm | |
| **Side-Mode Suppression Ratio** | SMSR | 30 | | | dB | |
| **Relative Intensity Noise** | RIN | | | -128 | dB/Hz | |
| **Transmitter Dispersion Penalty** | TDP | | | 3.2 | dB | |
| **Launch Power of Off Transmitter** | Poff | | | -30 | dBm | 1 |
| **Transmitter Jitter** | | | | | | 2 |
| **Receiver** | | | | | | |
| **Optical Center Wavelength** | λC | 1260 | | 1600 | nm | |
| **Receive Overload** | $P_{OL}$ | 0.5 | | | dBm | |
| **Receiver Sensitivity @1.25Gbps** | $R_{X_SEN1}$ | | | -19 | dBm | 3 |
| **Receiver Sensitivity @10.3Gbps** | $R_{X_SEN2}$ | | | -14.4 | dBm | 4 |
| **Receiver Reflectance** | $TR_{RX}$ | | | -12 | dB | |
| **LOS Assert @1.25Gbps** | LOSA | -30 | | | dBm | |
| **LOS Assert @10.3Gbps** | LOSA | -30 | | | dBm | |
| **LOS De-Assert @1.25Gbps** | LOSD | | | -17 | dBm | |
| **LOS De-Assert @10.3Gbps** | LOSD | | | -17 | dBm | |
| **LOS Hysteresis** | LOSH | 0.5 | | | dB | |

**Notes:**

1. Average.
2. According to IEEE 802.3ae requirements.
3. Average. Test the resulting value using the minimum ER value within the defined range: BER<$10^{-12}$ and $2^7$-1 PRBS.
4. Average. Test the resulting value using the minimum ER value within the defined range: BER<$10^{-12}$ and $2^{31}$-1 PRBS.

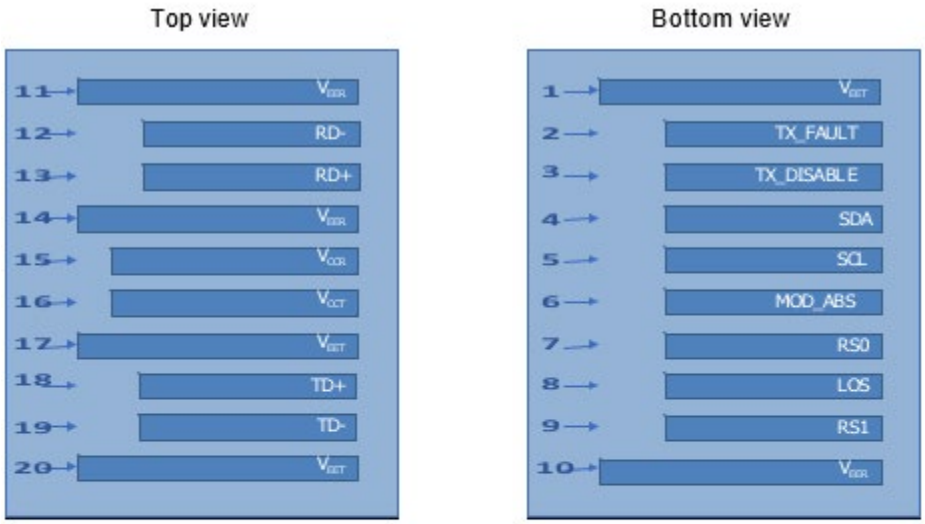
**Pin Descriptions**

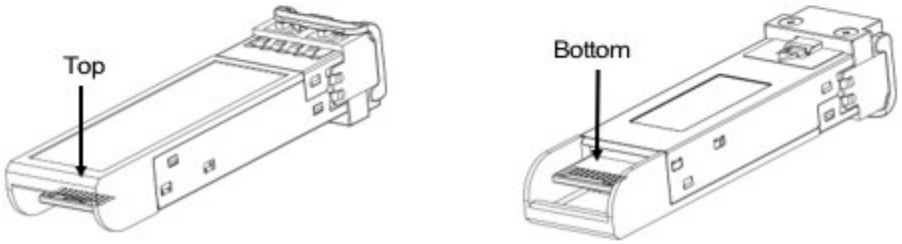
| Pin | Symbol | Name/Description | Notes |
|---|---|---|---|
| **1** | VeeT | Transmitter Ground (Common with Receiver Ground). | 1 |
| **2** | Tx_Fault | Transmitter Fault. | 2 |
| **3** | Tx_Disable | Transmitter Disable. Laser output disables on “high” or “open.” | 3 |
| **4** | SDA | 2-Wire Serial Interface Data. | 4 |
| **5** | SCL | 2-Wire Serial Interface Clock. | 4 |
| **6** | MOD_ABS | Module Absent. Grounded within the module. | 4 |
| **7** | RS0 | Module Rate Selection:<br>“Open” or “Low” Level = 1.25Gbps rate (low bandwidth).<br>“High” Level = 9.95-10.31Gbps rate (high bandwidth). | |
| **8** | LOS | Loss of Signal Indication. “Logic 0” indicates normal operation. | 5 |
| **9** | RS1 | No Connection Required. | 1 |
| **10** | VeeR | Receiver Ground (Common with Transmitter Ground). | 1 |
| **11** | VeeR | Receiver Ground (Common with Transmitter Ground). | 1 |
| **12** | RD- | Inverse Receiver Data Out. AC Coupled. | |
| **13** | RD+ | Received Data Out. AC Coupled. | |
| **14** | VeeR | Receiver Ground (Common with Transmitter Ground). | 1 |
| **15** | VccR | Receiver Power Supply. | |
| **16** | VccT | Transmitter Power Supply. | |
| **17** | VeeT | Transmitter Ground (Common with Receiver Ground). | 1 |
| **18** | TD+ | Transmitter Data In. AC Coupled. | |
| **19** | TD- | Inverse Transmitter Data In. AC Coupled. | |
| **20** | VeeT | Transmitter Ground (Common with Receiver Ground). | 1 |

**Notes:**

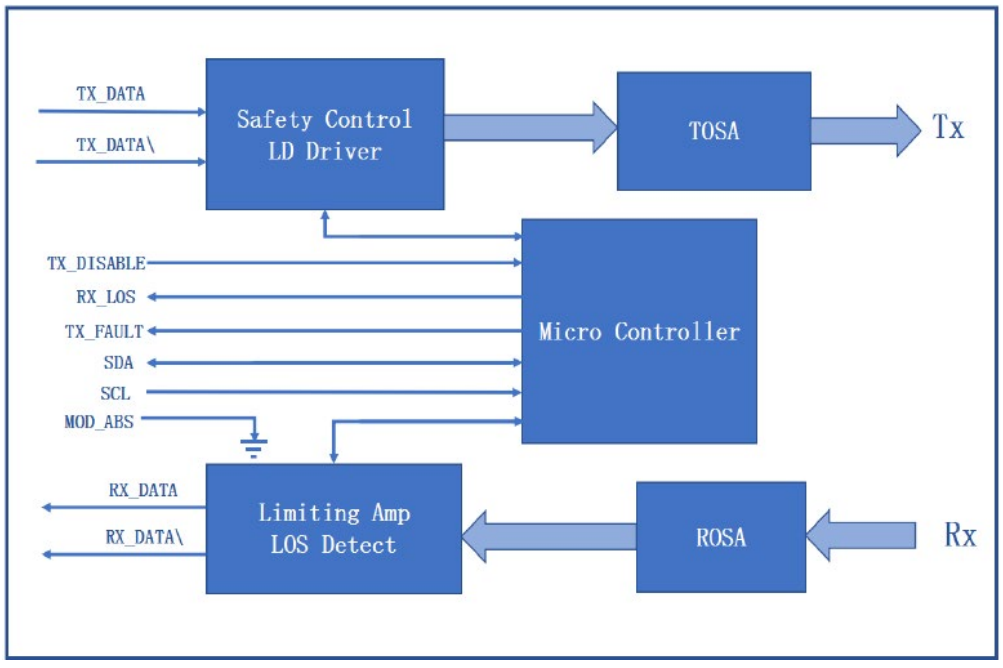
1. The circuit ground is isolated from the chassis ground.
2. Tx_Fault is the open collector output and should be pulled up with 4.7kΩ to 10kΩ on the host board to a voltage between 2V and Vcc+0.3V.
3. Disabled: $T_{DIS}$>2V or open. Enabled: $T_{DIS}$<0.8V.
4. Should be pulled up with 4.7kΩ to 10kΩ on the host board to a voltage between 2V and Vcc+0.3V.
5. LOS is an open collector output and should be pulled up with 4.7kΩ to 10kΩ on the host board to a voltage between 2V and Vcc+0.3V. “Logic 0” indicates normal operation. “Logic 1” indicates that the receiver signal is lost.

**Electrical Pin-Out Details**

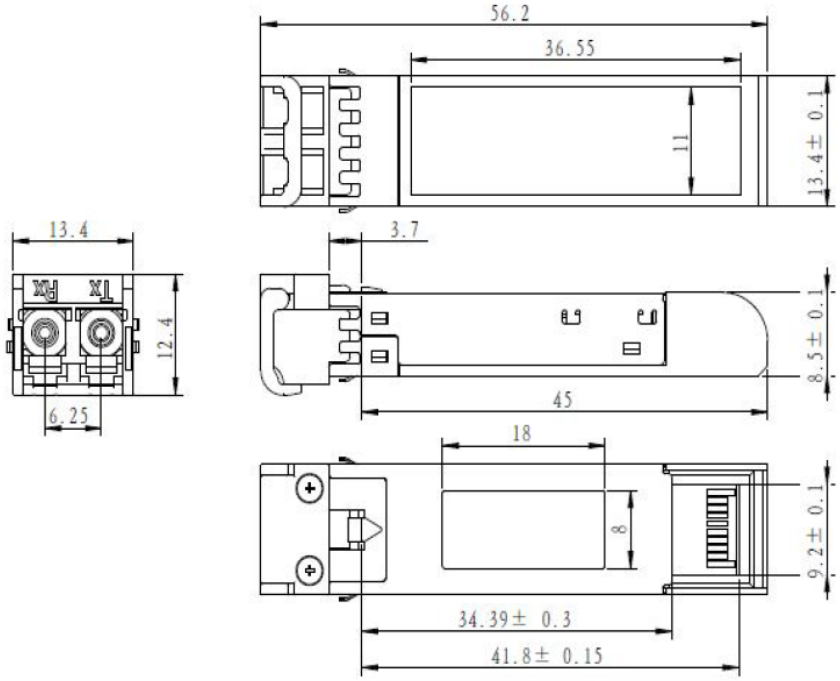


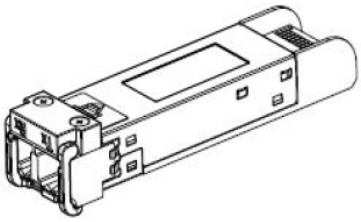




**Block Diagram**



**Mechanical Specifications**



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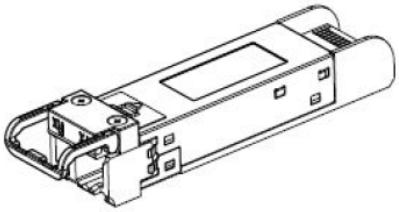

UNLATCHED

# About Skylane Optics

Skylane is a leading provider of transceivers for optical communication.

We offer an extensive portfolio for the enterprise, access, datacenter and metropolitan fiber optical market as well as for smart home applications and home networks.

We cover the European, South American and North American market with a strong partner network and have offices in Belgium, Brazil, Sweden and USA.

Our offerings are characterized by high quality and performance. In combination with our strong technical support, we enable our customers to build cost optimized network solutions.

We offer an extensive range of high-quality products including transceivers (Optical and copper), Active Optical Cable (AOC), Direct Attach Cable (DAC), Mux/Demux, Coding Box.