



## SPP13002102D124

Cisco® Compatible 10GBase-LRL SFP+ Transceiver (SMF, 1310nm, 2km, LC, DOM, -40 to 85C)

### Product Description

This Cisco® Compatible SFP+ transceiver provides 10GBase-LR throughput up to 2km over single-mode fiber (SMF) using a wavelength of 1310nm via an LC connector. It is also capable of withstanding rugged environments and can operate at temperatures between -40 to 85C. It is guaranteed to be 100% compatible with the equivalent Cisco® transceiver. This easy to install, hot swappable transceiver has been programmed, uniquely serialized and data-traffic and application tested to ensure that it will initialize and perform identically. 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:

- SFF-8432 and SFF-8472 Compliance
- Uncooled DFB transmitter and PIN receiver
- Duplex LC Connector
- Industrial Temperature -40 to 85 Celsius
- Single-mode Fiber
- Hot Pluggable
- Excellent ESD Protection
- Metal with Lower EMI
- RoHS Compliant and Lead Free



### Applications:

- 6GBase/10GBase-LRL Ethernet
- Access, Metro and Enterprise
- 8x/10x Fibre Channel

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*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.*

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### Absolute Maximum Ratings

| Parameter                  | Symbol          | Min. | Typ.    | Max.              | Unit | Notes |
|----------------------------|-----------------|------|---------|-------------------|------|-------|
| Maximum Supply Voltage     | V <sub>CC</sub> | -0.5 |         | 4                 | V    | 1     |
| Storage Temperature        | T <sub>S</sub>  | -40  |         | 85                | °C   | 2     |
| Operating Case Temperature | T <sub>C</sub>  | -40  |         | 85                | °C   | 3     |
| Data Rate                  | DR              | 9.83 | 10.3125 | 11.3              | Gbps | 4     |
| Bit Error Rate             | BER             |      |         | 10 <sup>-12</sup> |      |       |

### Notes:

1. For electrical power interface
2. Ambient Temperature
3. Case Temperature
4. IEEE 802.3ae

### Link Distances

| Data Rate       | Fiber Type  | Distance Range (km) |
|-----------------|-------------|---------------------|
| 9.83 –11.3 Gb/s | 9/125um SMF | 2                   |

### Electrical Characteristics (V<sub>CC</sub>=3.14V to 3.46V, T<sub>C</sub>=-0°C to 70°C)

| Parameter                            | Symbol                         | Min.            | Typ. | Max.                 | Unit | Notes |
|--------------------------------------|--------------------------------|-----------------|------|----------------------|------|-------|
| Power Supply Voltage                 | V <sub>CC</sub>                | 3.14            | 3.30 | 3.46                 | V    |       |
| Power Supply Current                 | I <sub>CC</sub>                |                 | 230  | 300                  | mA   |       |
| Transmitter                          |                                |                 |      |                      |      |       |
| Differential data input swing        | V <sub>IN,pp</sub>             | 180             |      | 700                  | mV   |       |
| Input differential impedance         | R <sub>IN</sub>                |                 | 100  |                      | Ω    |       |
| Transmit Disable Voltage             | V <sub>D</sub>                 | 2               |      | V <sub>CC</sub>      | V    |       |
| Transmit Enable Voltage              | V <sub>EN</sub>                | V <sub>EE</sub> |      | V <sub>EE</sub> +0.8 | V    |       |
| Receiver                             |                                |                 |      |                      |      |       |
| Differential data output swing       | V <sub>OUT, pp</sub>           | 300             |      | 850                  | mV   |       |
| Data output rise/fall time (20%-80%) | T <sub>r</sub> /T <sub>f</sub> | 28              |      |                      | ps   |       |
| LOS Asset                            | V <sub>LOSA</sub>              | 2               |      | Host_V <sub>CC</sub> | V    |       |
| LOS De-Assert                        | V <sub>LOSD</sub>              | V <sub>CC</sub> |      | V <sub>CC</sub> +0.5 | V    |       |

## Optical Characteristics

| Parameter                       | Symbol      | Min.  | Typ. | Max.  | Unit  | Notes |
|---------------------------------|-------------|-------|------|-------|-------|-------|
| Transmitter                     |             |       |      |       |       |       |
| Output Optical Power            | Ptx         | -8.2  |      | 0.5   | dBm   | 1     |
| Optical Center Wavelength       | $\lambda_c$ | 1260  | 1310 | 1355  | nm    |       |
| Optical Modulation Amplitude    | OMA         | -5.2  |      |       | dBm   | 2     |
| Extinction Ratio                | ER          | 3.5   |      |       | dB    |       |
| 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     |
| Receiver                        |             |       |      |       |       |       |
| Optical Center Wavelength       | $\lambda_c$ | 1260  |      | 1355  | nm    |       |
| Average Receive Power           | Prx         | -14.4 |      | 0.5   | dBm   |       |
| Receiver Sensitivity @10.3Gb/s  | S           |       |      | -14.4 | dBm   | 3     |
| Receiver Reflectance            | RL          |       |      | -12   | dB    |       |
| LOS Assert                      | LOSA        | -30   |      |       | dBm   |       |
| LOS De-Assert                   | LOSD        |       |      | -15   | dBm   |       |
| LOS Hysteresis                  | LOSH        | 0.5   |      |       | dB    |       |

### Notes:

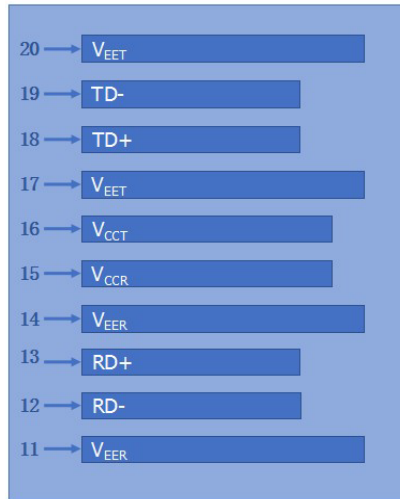
1. Average.
2. According to IEEE 802.3ae requirement.
3. Average. Test the resulting value using the minimum ER value within the defined range:  $BER < 10^{-12}$ , PRBS  $2^{31}-1$ .

## Pin Descriptions

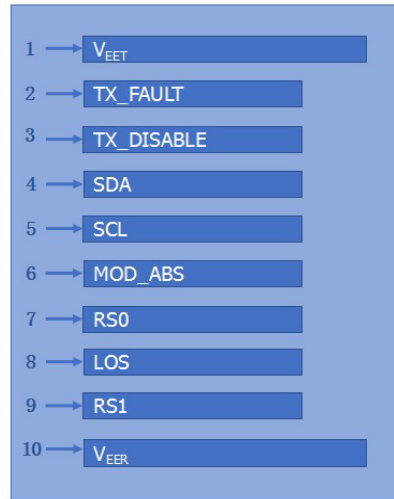
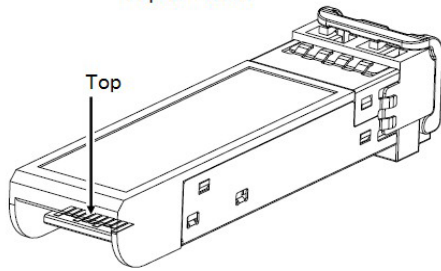
| Pin | Symbol     | Name/Descriptions                                               | Ref. |
|-----|------------|-----------------------------------------------------------------|------|
| 1   | VeeT       | Transmitter Ground (Common with Receiver Ground).               | 1    |
| 2   | Tx_Fault   | Transmitter Fault.                                              | 2    |
| 3   | Tx_Disable | Transmitter Disable. Laser output disabled on “high” or “open.” | 3    |
| 4   | SDA        | 2-Wire Serial Interface Data Line.                              | 4    |
| 5   | SCL        | 2-Wire Serial Interface Clock Line.                             | 4    |
| 6   | MOD_ABS    | Module Absent. Grounded within the module.                      | 4    |
| 7   | RS0        | No connection required.                                         |      |
| 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–        | Receiver Inverted Data Out. AC Coupled.                         |      |
| 13  | RD+        | Receiver Non-Inverted 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 Non-Inverted Data In. AC Coupled.                   |      |
| 19  | TD–        | Transmitter Inverted Data In. AC Coupled.                       |      |
| 20  | VeeT       | Transmitter Ground (Common with Receiver Ground).               | 1    |

## Notes:

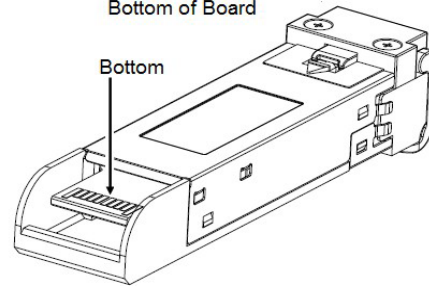
1. Circuit ground is isolated from the chassis ground.
2. Tx\_Fault is the open collector output and should be pulled up with 4.7kΩ-10kΩ on the host board to a voltage between 2V and Vcc+0.3V.
3. Disabled: T<sub>DIS</sub>>2V or open, enabled: T<sub>DIS</sub><0.8V.
4. Should be pulled up with 4.7kΩ-10kΩ 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-10kΩ on the host board to a voltage between 2V and Vcc+0.3V. The logic "0" indicates normal operation, and the logic "1" indicates that the receiver signal is lost.



Top of Board

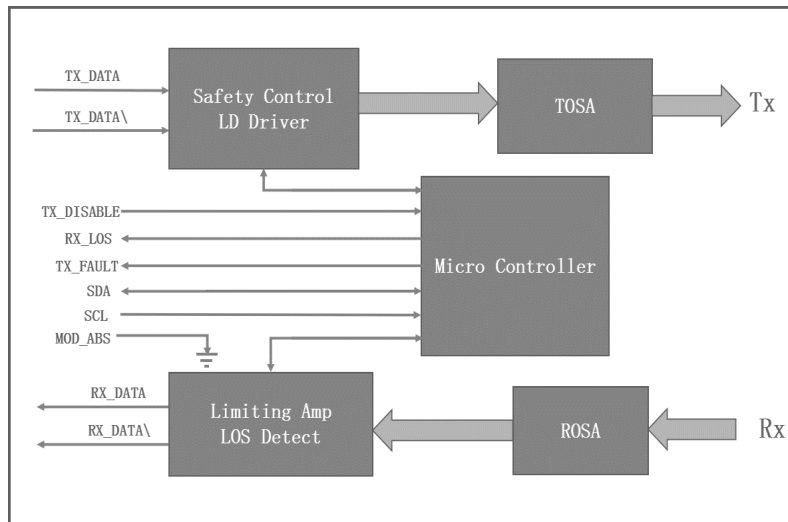


Bottom of Board



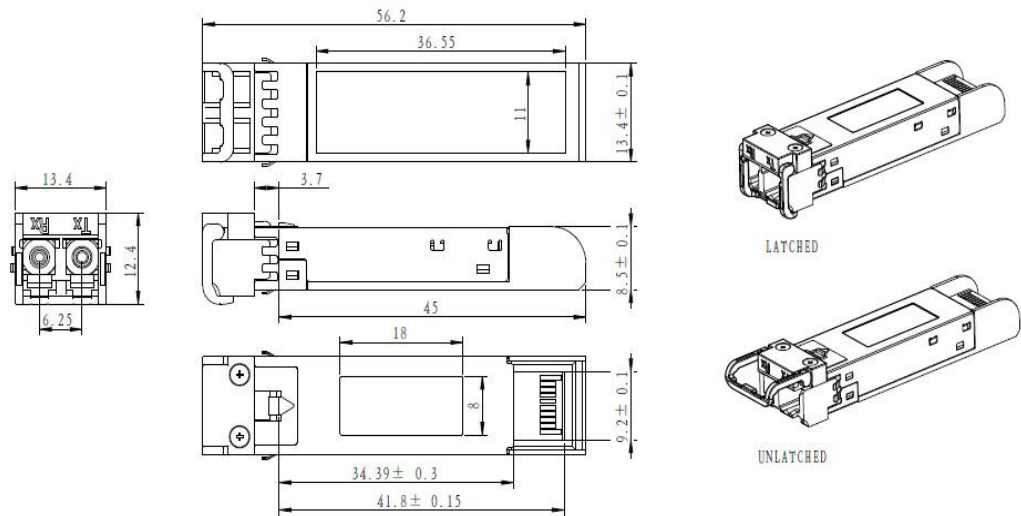
Pin-out of connector Block on Host board

## Block Diagram



Mechanical Specifications

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



ALL DIMENSIONS ARE ±0.2mm UNLESS OTHERWISE SPECIFIED  
UNIT: mm

EEPROM Information

EEPROM memory map specific data field description is as below:

| 2 wire address 1010000X (A0h)           | 2 wire address 1010001X (A2h)             |
|-----------------------------------------|-------------------------------------------|
| 0                                       | 0                                         |
| Serial ID Defined by SFP MSA (96 bytes) | Alarm and Warning Thresholds (56 bytes)   |
| 95                                      | 55                                        |
| Vendor Specific (32 bytes)              | Cal Constants (40 bytes)                  |
| 127                                     | 95                                        |
| Reserved, SFF8079 (128 bytes)           | Real Time Diagnostic Interface (24 bytes) |
|                                         | 119                                       |
|                                         | 127                                       |
|                                         | Vendor Specific (8 bytes)                 |
|                                         | User Writable EEPROM (120 bytes)          |
|                                         | 247                                       |
| 255                                     | 255                                       |
|                                         | Vendor Specific (8 bytes)                 |

# 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.

