



## S28130102R2FBG0

Cisco® SFP-10/25G-LR-I Compatible 10/25GBase-LR-S SFP28 Transceiver (SMF, 1310nm, 10km, LC, DOM, -40 to 85C)

### Product Description

This Cisco® SFP-10/25G-LR-I compatible SFP28 transceiver provides 25GBase-LR throughput up to 10km over single-mode fiber (SMF) using a wavelength of 1310nm via an LC connector. 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:

- PIN photodiode receiver with limiting amplifier
- Up to 10 km transmission length (LR)
- Compliant to SFP28 SFF standards
- 1310nm un-cooled, direct modulation laser
- Positive power supply lines: 3.3 V
- Data rate of up to 25.781Gbps
- Hot-Pluggable
- LC-Duplex Optical Receptacle
- RoHS Compliant and Lead-Free
- Operating Temperature: -40 to 85 Celsius



### Applications:

- 25GBase Ethernet
- Access and Enterprise

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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 |                | 4.0                | V    |       |
| Storage Temperature                             | T <sub>S</sub>  | -40  |                | 85                 | °C   |       |
| Operating Case Temperature                      | T <sub>c</sub>  | -40  | 25             | 85                 | °C   |       |
| Relative Humidity                               | RH              | 5    |                | 95                 | %    |       |
| Data Rate                                       |                 |      | 24.33<br>25.78 |                    | Gbps |       |
| Bit Error Rate                                  | BER             |      |                | 5×10 <sup>-5</sup> |      | 1     |
| Supported Link Length on 9/125um SMF, 25.78GB/s | L               |      | 10             |                    | km   | 2     |

## Notes:

1. Tested with PRBS 2<sup>31</sup>-1 test pattern for 25.78GBps operation.
2. Distances are based on FC-P1-6 Rev 3.1 and IEEE 802.3 standards with FEC.

## Electrical Characteristics

| Parameter                       |                      | Symbol              | Min.  | Typ.  | Max.     | Unit  | Notes |
|---------------------------------|----------------------|---------------------|-------|-------|----------|-------|-------|
| Supply Voltage                  |                      | V <sub>cc</sub>     | 3.135 | 3.3   | 3.465    | V     |       |
| Module Supply Current           |                      | I <sub>cc</sub>     |       |       | 450      | mA    |       |
| Power Dissipation               |                      | P <sub>D</sub>      |       |       | 1500     | mW    |       |
| Data Rate                       |                      | BR                  |       | 25.78 |          |       |       |
| Transmitter                     |                      |                     |       |       |          |       |       |
| Input Differential Impedance    |                      | Z <sub>IN</sub>     |       | 100   |          | Ω     |       |
| Differential Data Input Swing   |                      | V <sub>in,pp</sub>  | 180   |       | 700      | mVp-p |       |
| TX Fault                        | Transmitter Fault    | VOH                 | 2.0   |       | Host_Vcc | V     |       |
|                                 | Normal Operation     | VOL                 | 0     |       | 0.8      | V     |       |
| TX Disable                      | Transmitter Disable  | VIH                 | 2.0   |       | Host_Vcc | V     | T     |
|                                 | Transmitter Enable   | VIL                 | 0     |       | 0.8      | V     |       |
| Receiver                        |                      |                     |       |       |          |       |       |
| Output Differential Impedance   |                      | Z <sub>OUT</sub>    |       | 100   |          | Ω     |       |
| Differential Data Output Swing  |                      | V <sub>OUT,pp</sub> | 300   |       | 850      | mVp-p | 1     |
| Data Output Rise Time/Fall Time |                      | Tr/Tf               | 15    |       |          | ps    | 2     |
| RX_LOS                          | Loss of Signal (LOS) | VOH                 | 2.0   |       | Host_Vcc | V     | 3     |
|                                 | Normal Operation     | VOL                 | 0     |       | 0.8      | V     | 3     |

**Notes:**

- Internally AC coupled but requires an external 100Ω differential load termination.
- 20-80%
- LOS is an open collector output. Should be pulled up with 4.7KΩ on the host board.

**Optical Characteristics**

| Parameter                             | Symbol                         | Min. | Typ. | Max. | Unit | Notes |
|---------------------------------------|--------------------------------|------|------|------|------|-------|
| <b>Transmitter</b>                    |                                |      |      |      |      |       |
| Launch Optical Power                  | P <sub>o</sub>                 | -5   |      | +2   | dBm  | 1     |
| Extinction Ratio                      | ER                             | 3.5  |      |      | dB   |       |
| Center Wavelength Range               | λ <sub>c</sub>                 | 1295 | 1310 | 1325 | nm   |       |
| Transmitter Dispersion Penalty        | TDP                            |      |      | 2.7  | dB   |       |
| Spectral Width                        | Δλ                             |      |      | 1    | nm   | 2     |
| Optical Rise/Fall Time @25.78GBps     | T <sub>r</sub> /T <sub>f</sub> | 15   |      |      | ps   | 3     |
| Optical Return Loss Tolerance         | ORLT                           |      |      | 12   | dB   |       |
| P <sub>out</sub> @TX_Disable Asserted | P <sub>off</sub>               |      |      | -30  | dBm  |       |
| <b>Receiver</b>                       |                                |      |      |      |      |       |
| Center Wavelength                     | λ <sub>c</sub>                 | 1260 | 1310 | 1370 | nm   |       |
| Receiver OMA Sensitivity              | ROMA                           |      |      | -12  | dBm  | 4     |
| Receiver Overload (P <sub>avg</sub> ) | P <sub>MAX</sub>               | 2    |      |      | dBm  |       |
| Optical Return Loss                   | ORLT                           | 26   |      |      | dB   |       |
| LOS De-Assert                         | LOSD                           |      |      | -16  | dBm  |       |
| LOS Assert                            | LOSA                           | -30  |      |      | dBm  |       |
| LOS Hysteresis                        |                                | 0.5  |      |      | dB   |       |

**Notes:**

- Class 1 Laser Safety per FDA/CDRH and EN (IEC) 60825 regulation.
- 20dB spectral width.
- Unfiltered, 20-80%.
- Measured with PRBS 2<sup>31</sup>-1 at 5x10<sup>-5</sup> BER.

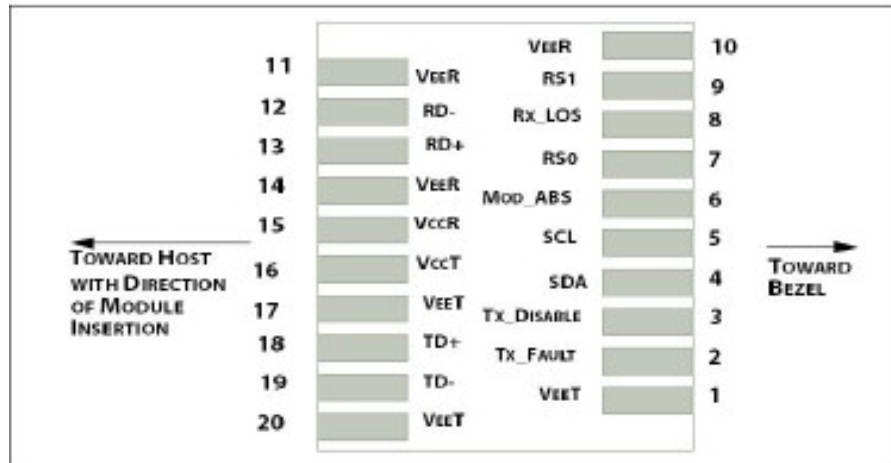
## Pin Descriptions

| Pin | Symbol     | Name/Descriptions                                                         | Ref. |
|-----|------------|---------------------------------------------------------------------------|------|
| 1   | VeeT       | Transmitter Ground.                                                       | 1    |
| 2   | TX_Fault   | Transmitter Fault. LVTTTL-O. "High" indicated a fault condition.          | 2    |
| 3   | TX_Disable | Transmitter Disable. LVTTTL-I. "High" or "open" disables the transmitter. | 3    |
| 4   | SDA        | 2-Wire Serial Interface Data. LVCMOS-I/O. MOD-DEF2.                       | 4    |
| 5   | SCL        | 2-Wire serial interface Clock. LVCMOS-I/O. MOD-DEF1.                      | 4    |
| 6   | MOD_ABS    | Module Absent (Output). Connected to VeeT or VeeR in the module.          | 5    |
| 7   | RS0        | NA.                                                                       | 6    |
| 8   | RX_LOS     | Receiver Loss of Signal. LVTTTL-O.                                        | 2    |
| 9   | RS1        | NA.                                                                       | 6    |
| 10  | VeeR       | Receiver Ground.                                                          | 1    |
| 11  | VeeR       | Receiver Ground.                                                          | 1    |
| 12  | RD-        | Inverse Received Data out. CML-O.                                         |      |
| 13  | RD+        | Received Data out. CML-O.                                                 |      |
| 14  | VeeR       | Receiver Ground.                                                          |      |
| 15  | VccR       | +3.3V Receiver Power.                                                     |      |
| 16  | VccT       | +3.3V Transmitter Power.                                                  |      |
| 17  | VeeT       | Transmitter Ground.                                                       | 1    |
| 18  | TD+        | Transmitter Data In. CML-I.                                               |      |
| 19  | TD-        | Inverse Transmitter Data In. CML-I.                                       |      |
| 20  | VeeT       | Transmitter Ground.                                                       | 1    |

## Notes:

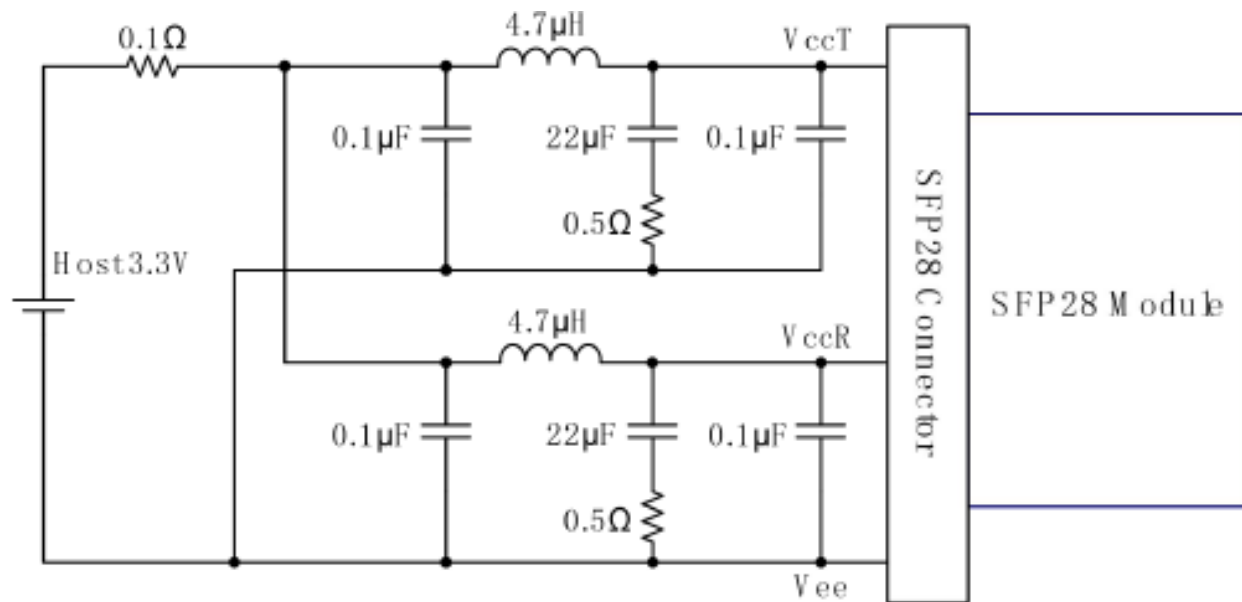
1. The module signal grounds are isolated from the module case.
2. This is an open collector/drain output that on the host board requires a 4.7KΩ to 10KΩ pull-up resistor to Host\_Vcc.
3. This input is internally biased high with a 4.7KΩ to 10KΩ pull-up resistor to VccT.
4. 2-Wire Serial Interface Clock and Data lines require an external pull-up resistor dependent on the capacitance load.
5. This is a ground return that on the host board requires a 4.7KΩ to 10KΩ pull-up resistor to Host\_Vcc.
6. Rate select can also be set through the 2-wire bus in accordance with SFF-8472 v. 12.1. Rx Rate Select is set at Bit 3, Byte 110, and Address A2h, and Tx Rate Select is set at Bit 3, Byte 118, Address A2h.

**Note:** Writing a "1" selects maximum bandwidth operation. Rate select is the logic OR of the input state of Rate Select Pin and 2-wire bus.



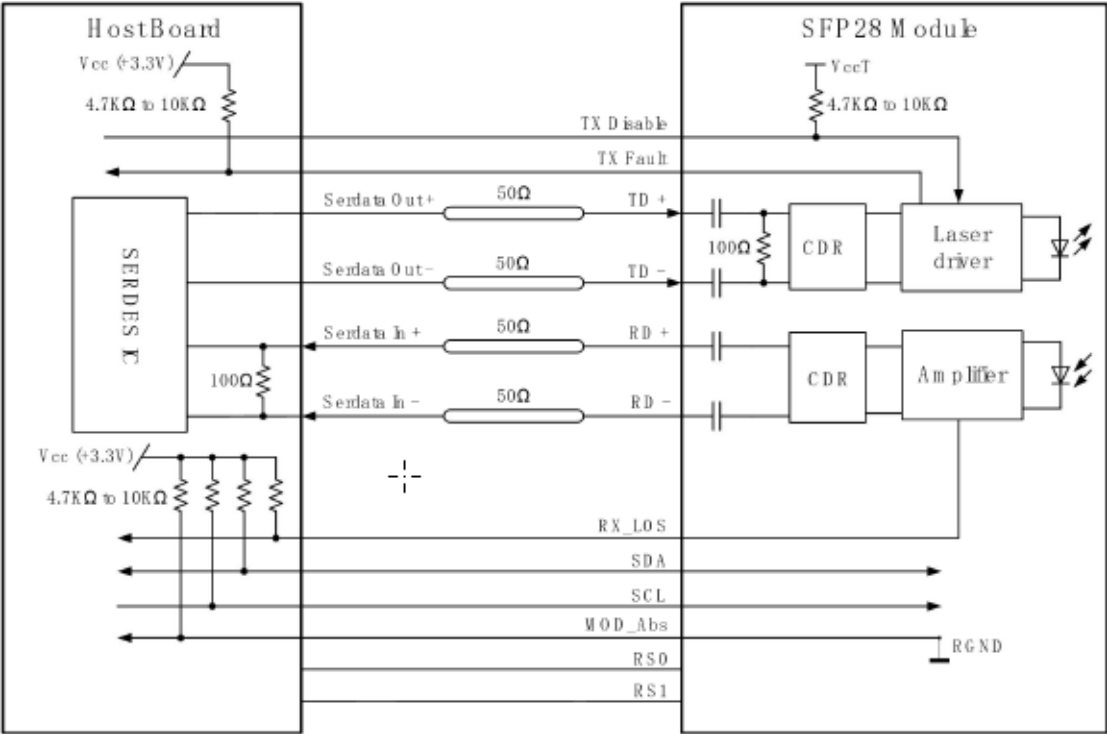
Host PCB SFP28 pad assignment

### Recommended Host Board

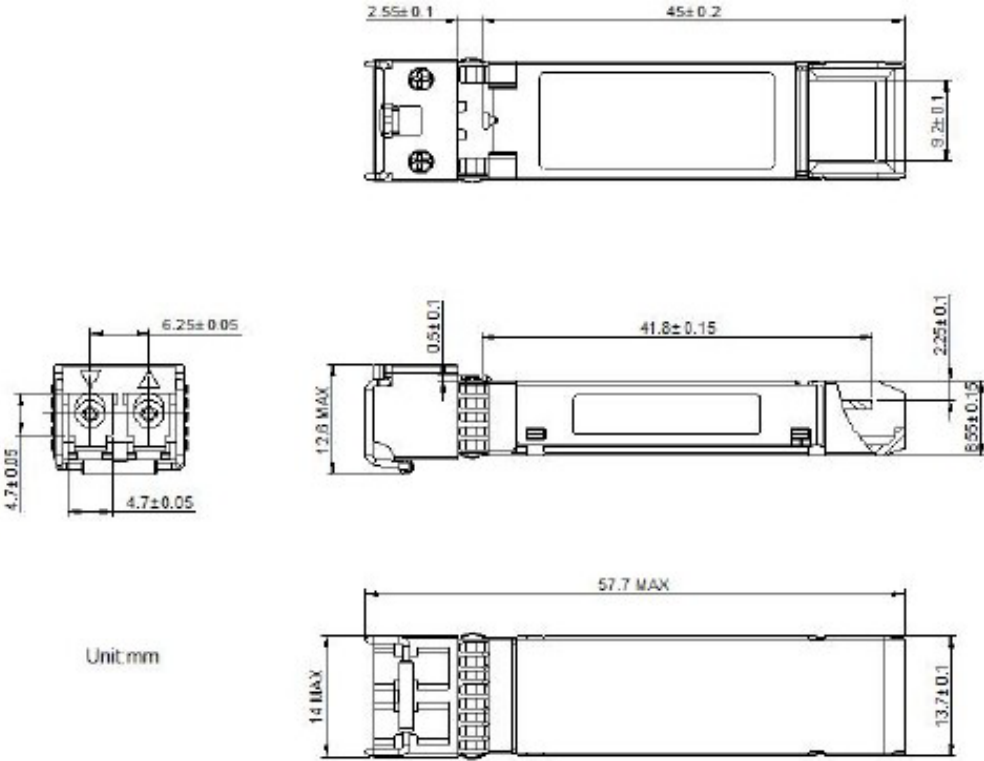


Recommended Host Board Power Supply Filter Network

Recommended Application Interface Block Diagram



Mechanical Specifications



# 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.

