



## FN-TRAN-SFP28-LR-SKY

Fortinet® FN-TRAN-SFP28-LR Compatible 25GBase-LR SFP28 Transceiver (SMF, 1310nm, 10km, LC, DOM)

### Product Description

This Fortinet® FN-TRAN-SFP28-LR 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 can operate at temperatures between 0 and 70C. Our transceiver is built to meet or exceed OEM specifications and is guaranteed to be 100% compatible with Fortinet®. It has been programmed, uniquely serialized, and tested for data-traffic and application to ensure that it will initialize and perform identically. All of our transceivers comply with Multi-Source Agreement (MSA) standards to provide seamless network integration. Additional product features include Digital Optical Monitoring (DOM) support which allows 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-8402 and SFF-8472 Compliance
- Duplex LC Connector
- Commercial Temperature 0 to 70 Celsius
- Single-mode Fiber
- Hot Pluggable
- Excellent ESD Protection
- Metal with Lower EMI
- RoHS Compliant and Lead Free



### 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 |
|-------------------------------------------------|-----------------|------|-------|--------------------|------|-------|
| 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>  | 0    | 25    | 70                 | °C   |       |
| Relative Humidity                               | RH              | 5    |       | 95                 | %    |       |
| Data Rate                                       | BR              |      | 25.78 |                    | Gb/s |       |
| Bit Error Rate                                  | BER             |      |       | 5x10 <sup>-5</sup> |      | 1     |
| Supported Link Length on 9/125um SMF, 25.78GB/s | L               |      | 10    |                    | km   | 2     |

### Notes:

1. Tested with a PRBS 231-1 test pattern for 25.78Gb/s operation.
2. Distances are based on FC-P1-6 Rev 3.1 and IEEE 802.3 standards.

## Electrical Characteristics

| Parameter                         |                      | Symbol                          | Min   | Typ   | Max                 | Unit  | Notes |
|-----------------------------------|----------------------|---------------------------------|-------|-------|---------------------|-------|-------|
| Supply Voltage                    |                      | V <sub>CC</sub>                 | 3.135 | 3.3   | 3.465               | V     |       |
| Data Rate                         |                      |                                 |       | 25.78 |                     | GB/s  |       |
| Module Supply Current             |                      | I <sub>CC</sub>                 |       |       | 450                 | mA    |       |
| Power Dissipation                 |                      | PD                              |       |       | 1500                | mW    |       |
| Transmitter                       |                      |                                 |       |       |                     |       |       |
| Input Differential Impedance      |                      | Z <sub>IN</sub>                 |       | 100   |                     | Ω     |       |
| Differential Data Input Swing     |                      | V <sub>IN</sub> , P-P           | 180   |       | 700                 | mVp-p |       |
| TX_FAULT                          | Transmitter Fault    | V <sub>OH</sub>                 | 2.0   |       | V <sub>CCHOST</sub> | V     |       |
|                                   | Normal Operation     | V <sub>OL</sub>                 | 0     |       | 0.8                 | V     |       |
| TX_DISABLE                        | Transmitter Disable  | V <sub>IH</sub>                 | 2.0   |       | V <sub>CCHOST</sub> | V     |       |
|                                   | Transmitter Enable   | V <sub>IL</sub>                 | 0     |       | 0.8                 | V     |       |
| Receiver                          |                      |                                 |       |       |                     |       |       |
| Output Differential Impedance     |                      | Z <sub>O</sub>                  |       | 100   |                     | Ω     |       |
| Differential Data Output Swing    |                      | V <sub>OUT</sub> , P-P          | 300   |       | 850                 | mVp-p | 1     |
| Data Output Rinse Time, Fall Time |                      | t <sub>r</sub> , t <sub>f</sub> | 15    |       |                     | Ps    | 2     |
| Rx_LOS                            | Loss of Signal (LOS) | V <sub>OH</sub>                 | 2.0   |       | V <sub>CCHOST</sub> | V     | 3     |
|                                   | Normal Operation     | V <sub>OL</sub>                 | 0     |       | 0.8                 | V     | 3     |

**Notes:**

1. Internally AC coupled, but requires an external 100Ω differential load termination.
2. 20-80%
3. LOS is an open collector output. Should be pulled up with 4.7Ω on the host board.

**Optical Characteristics**

| Parameter                          | Symbol          | Min  | Typ  | Max   | Unit | Notes |
|------------------------------------|-----------------|------|------|-------|------|-------|
| <b>Transmitter</b>                 |                 |      |      |       |      |       |
| Launch Optical Power               | Po              | -5   |      | 2     | dBm  | 1     |
| Extinction Ratio                   | ER              | 4    |      |       | dB   |       |
| Center Wavelength Range            | $\lambda_c$     | 1295 | 1310 | 1325  | nm   |       |
| Optical Modulation Amplitude       | OMA             | 631  |      |       | uW   |       |
| Transmitter Dispersion Penalty     | TDP             |      |      | 2.7   | dB   |       |
| Spectral Width                     | $\Delta\lambda$ |      |      | 1     | nm   | 2     |
| Optical Rise/Fall Time @25.78 Gb/s | tr/tf           |      |      | 15    | ps   | 3     |
| Optical Return Loss Tolerance      | ORLT            |      |      | 12    | dB   |       |
| Pout @TX-Disable Asserted          | POFF            |      |      | -30   | dBm  | 1     |
| <b>Receiver</b>                    |                 |      |      |       |      |       |
| Center Wavelength                  | $\lambda_c$     | 1260 | 1310 | 1370  | nm   |       |
| Receiver OMA Sensitivity           | RxSENS          |      |      | -11.4 | dBm  | 4     |
| Receiver Overload (P avg)          | POL             | 2    |      |       | dBm  |       |
| Optical Return Loss                | ORL             | 26   |      |       | dB   |       |
| LOS De-Assert                      | LOSD            |      |      | -13   | dBm  |       |
| LOS Assert                         | LOSA            | -30  |      |       | dBm  |       |
| LOS Hysteresis                     |                 | 0.5  |      |       | dB   |       |

**Notes:**

1. Class 1 Laser Safety per FDA/CDRH and EN (IEC) 60825 regulations.
2. 20dB spectral width.
3. Unfiltered, 20-80%.
4. Measured with PRBS 2<sup>31</sup>-1 at 5×10<sup>-5</sup> BER

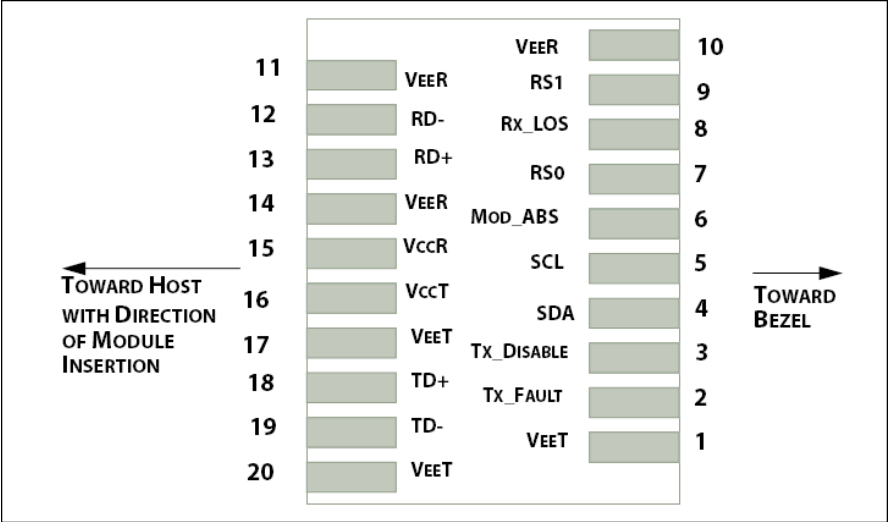
## Pin Descriptions

| Pin | Symbol     | Name/Descriptions                                                      | Notes |
|-----|------------|------------------------------------------------------------------------|-------|
| 1   | VeeT       | Transmitter Ground                                                     | 1     |
| 2   | TX_Fault   | Transmitter Fault (LVTTTL-O) - High indicates a fault condition        | 2     |
| 3   | TX_Disable | Transmitter Disable (LVTTTL-I) – High or open disables the transmitter | 3     |
| 4   | SDA        | Two wire serial interface Data Line (LVCMOS-I/O) (MOD-DEF2)            | 4     |
| 5   | SCL        | Two wire serial interface Clock Line (LVCMOS-I/O) (MOD-DEF1)           | 4     |
| 6   | MOD_ABS    | Module Absent (Output), connected to VeeT or VeeR in the module        | 5     |
| 7   | RS0        |                                                                        | 6     |
| 8   | RX_LOS     | Receiver Loss of Signal (LVTTTL-O)                                     | 2     |
| 9   | RS1        |                                                                        | 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       | Receiver Power - +3.3V                                                 |       |
| 16  | VccT       | Transmitter Power - +3.3 V                                             |       |
| 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     |

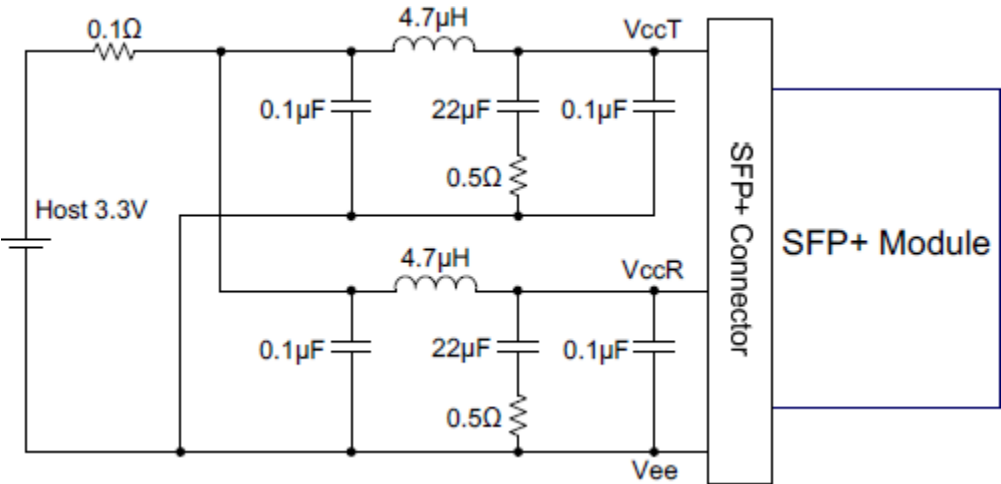
## Notes:

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 4.7K $\Omega$  to 10K $\Omega$  pull-up resistor to VccHost.
3. This input is internally biased high with a 4.7K $\Omega$  to 10K $\Omega$  pull-up resistor to VccT.
4. Two-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 4.7K $\Omega$  to 10K $\Omega$  pull-up resistor to VccHost.
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, Address A2h. 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.

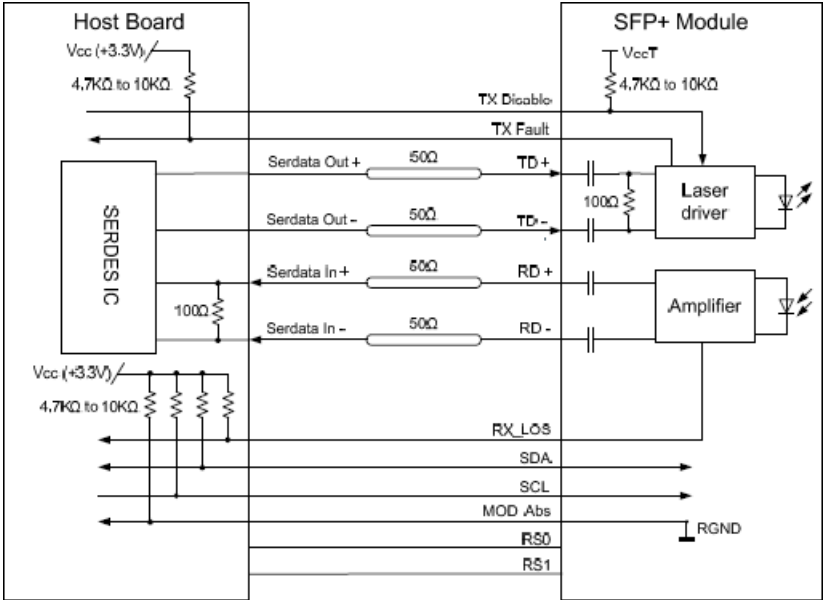
Electrical Pin-Out Details



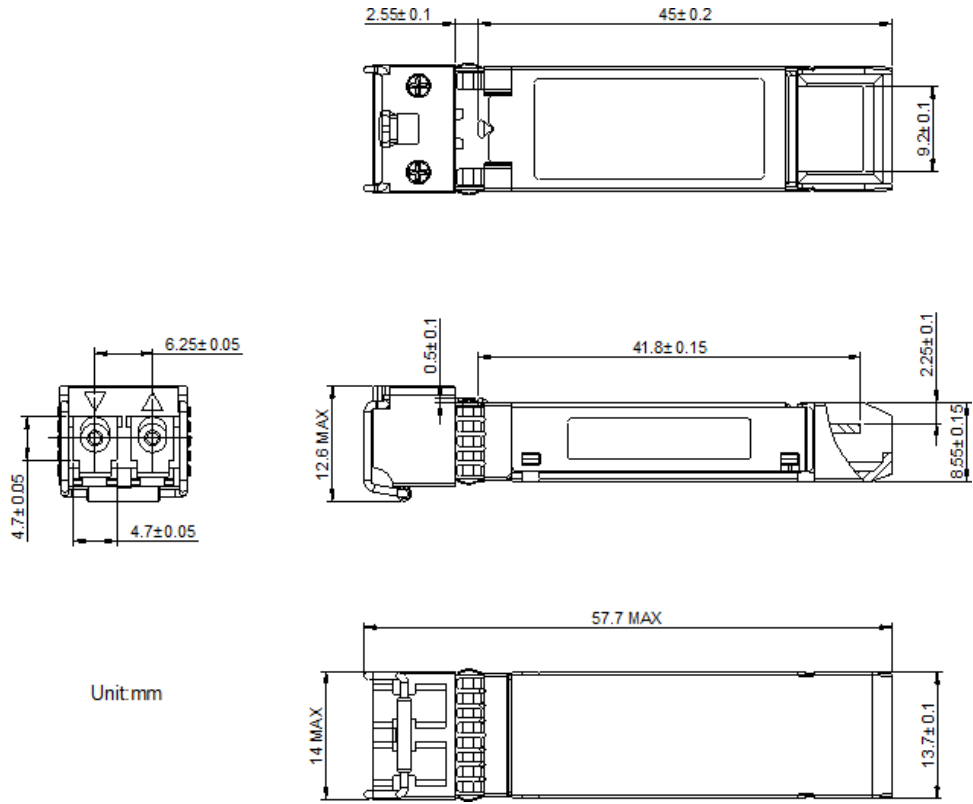
Recommended Host Board Power Supply Filter Network



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.

