



## SBU35060GE0DC14

Juniper Networks® Compatible 1000Base-BX SFP Transceiver (SMF, 1310nmTx/1550nmRx, 80km, LC, DOM)

### Product Description

This Juniper Networks® SFP transceiver provides 1000Base-BX throughput up to 80km over single-mode fiber (SMF) using a wavelength of 1310nmTx/1550nmRx via an LC connector. It is guaranteed to be 100% compatible with the equivalent Juniper Networks® 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:

- INF-8074 and SFF-8472 Compliance
- Simplex 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:

- 1000Base-BX Ethernet
- Access (FTTx) and Enterprise
- 1x Fibre Channel

---

*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      | V <sub>cc</sub>  | -0.5 |      | 4.0  | V    |       |
| Storage Temperature         | T <sub>stg</sub> | -40  |      | 85   | °C   |       |
| Operating Case Temperature  | T <sub>c</sub>   | -10  | 25   | 70   | °C   |       |
| Operating Relative Humidity | RH               | 5    |      | 95   | %    |       |
| Power Supply Current        | I <sub>cc</sub>  |      |      | 300  | mA   |       |
| Data Rate                   |                  | 0.1  |      | 1.25 | Gbps |       |

## 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>            |       |      | 300             | mA    |       |
| Power Dissipation                                                   | P <sub>DISS</sub>          |       |      | 1000            | mW    |       |
| Transmitter Differential Input Voltage (TD+/-)                      |                            | 300   |      | 2200            | mVp-p | 1     |
| Receiver Differential Output Voltage (RD+/-)                        |                            | 600   |      | 1200            | mVp-p | 2     |
| Low-Speed Output: Transmitter Fault (Tx_Fault)/Loss of Signal (LOS) | VOH                        | 2.0   |      | V <sub>cc</sub> | V     | 3     |
|                                                                     | VOL                        | 0     |      | 0.8             | V     |       |
| Low-Speed Input: Transmitter Fault (Tx_Fault), MOD_DEF1, MOD_DEF2   | VIH                        | 2.0   |      | V <sub>cc</sub> | V     | 4     |
|                                                                     | VIL                        | 0     |      | 0.8             | V     |       |
| Timing Characteristics                                              |                            |       |      |                 |       |       |
| Tx_Disable Assert Time                                              | T <sub>off</sub>           |       |      | 10              | μs    |       |
| Tx_Disable Negate Time                                              | T <sub>on</sub>            |       |      | 1               | ms    |       |
| Time to Initialize (Includes Reset of Tx_Fault)                     | T <sub>init</sub>          |       |      | 300             | ms    |       |
| Tx_Fault From Fault to Assertion                                    | T <sub>fault</sub>         |       |      | 100             | μs    |       |
| Tx_Disable Time to Start Reset                                      | T <sub>reset</sub>         | 10    |      |                 | μs    |       |
| Receiver LOS Assert Timer (On to Off)                               | T <sub>D</sub> ,<br>Rx_LOS |       |      | 80              | μs    |       |
| Receiver LOS Assert Timer (Off to On)                               | T <sub>A</sub> ,<br>Rx_LOS |       |      | 80              | μs    |       |
| Serial I2C Clock Rate                                               | I2C_Clock                  |       |      | 100             | kHz   |       |

## Notes:

1. Internally AC coupled and terminated to 100Ω differential load.
2. Internally AC coupled but requires a 100Ω differential termination or internal to Serializer/Deserializer.
3. Pulled up externally with a 4.7kΩ to 10kΩ resistor on the host board to the V<sub>ccT/R</sub>.
4. MOD\_DEF1 and MOD\_DEF2 must be pulled up externally with a 4.7kΩ to 10kΩ resistor on the host board to the V<sub>ccT/R</sub>.

## Optical Characteristics

| Parameter                   | Symbol                                       | Min. | Typ. | Max. | Unit | Notes |
|-----------------------------|----------------------------------------------|------|------|------|------|-------|
| Transmitter                 |                                              |      |      |      |      |       |
| Launch Optical Power        | Po                                           | 0    |      | 5    | dBm  |       |
| Center Wavelength           | λC                                           | 1260 | 1310 | 1360 | nm   |       |
| Extinction Ratio            | ER                                           | 9    |      |      | dB   |       |
| Spectral Width (-20dB)      | Δλ                                           |      |      | 1    | nm   |       |
| Side-Mode Suppression Ratio | SMSR                                         | 30   |      |      | dB   |       |
| Optical Rise/Fall Time      | Tr/Tf                                        |      |      | 260  | ps   |       |
| POUT @Tx_Disable Asserted   | Poff                                         |      |      | -45  | dBm  |       |
| Eye Diagram                 | IEEE Std 802.3-2005 1000Base-BX-D Compatible |      |      |      |      |       |
| Receiver                    |                                              |      |      |      |      |       |
| Wavelength Range            |                                              | 1470 | 1550 | 1600 | nm   |       |
| Receiver Sensitivity        | S                                            |      |      | -26  | dBm  | 1     |
| Receiver Overload           | Pol                                          | -3   |      |      | dBm  | 1     |
| Optical Return Loss         | ORL                                          | 12   |      |      | dB   |       |
| LOS De-Assert               | LOSD                                         |      |      | -27  | dBm  |       |
| LOS Assert                  | LOSA                                         | -35  |      |      | dBm  |       |
| LOS Hysteresis              |                                              | 0.5  | 3    | 5    | dB   |       |

### Notes:

1. Measured with a PRBS  $2^7-1$  test pattern, @1.25Gbps, and  $BER < 10^{-12}$ .

## Pin Descriptions

| Pin | Symbol      | Name/Description                                          | Plug Seq. | Notes |
|-----|-------------|-----------------------------------------------------------|-----------|-------|
| 1   | VeeT        | Transmitter Ground.                                       | 1         |       |
| 2   | Tx_Fault    | Transmitter Fault Indication.                             | 3         | 1     |
| 3   | Tx_Disable  | Transmitter Disable. Module disables on “high” or “open.” | 3         | 2     |
| 4   | MOD-DEF2    | Module Definition 2. 2-Wire Serial ID Interface.          | 3         | 3     |
| 5   | MOD-DEF1    | Module Definition 1. 2-Wire Serial ID Interface.          | 3         | 3     |
| 6   | MOD-DEF0    | Module Definition 0. Grounded within the module.          | 3         | 3     |
| 7   | Rate Select | Not Connected. Function not available.                    | 3         |       |
| 8   | LOS         | Loss of Signal.                                           | 3         | 4     |
| 9   | VeeR        | Receiver Ground.                                          | 1         |       |
| 10  | VeeR        | Receiver Ground.                                          | 1         |       |
| 11  | VeeR        | Receiver Ground.                                          | 1         |       |
| 12  | RD-         | Inverse Received Data Out.                                | 3         | 5     |
| 13  | RD+         | Received Data Out.                                        | 3         | 5     |
| 14  | VeeR        | Receiver Ground.                                          | 1         |       |
| 15  | VccR        | 3.3±5% Receiver Power.                                    | 2         | 6     |
| 16  | VccT        | 3.3±5% Transmitter Power.                                 | 2         | 6     |
| 17  | VeeT        | Transmitter Ground.                                       | 1         |       |
| 18  | TD+         | Transmitter Data In.                                      | 3         | 7     |
| 19  | TD-         | Inverse Transmitter Data In.                              | 3         | 7     |
| 20  | VeeT        | Transmitter Ground.                                       | 1         |       |

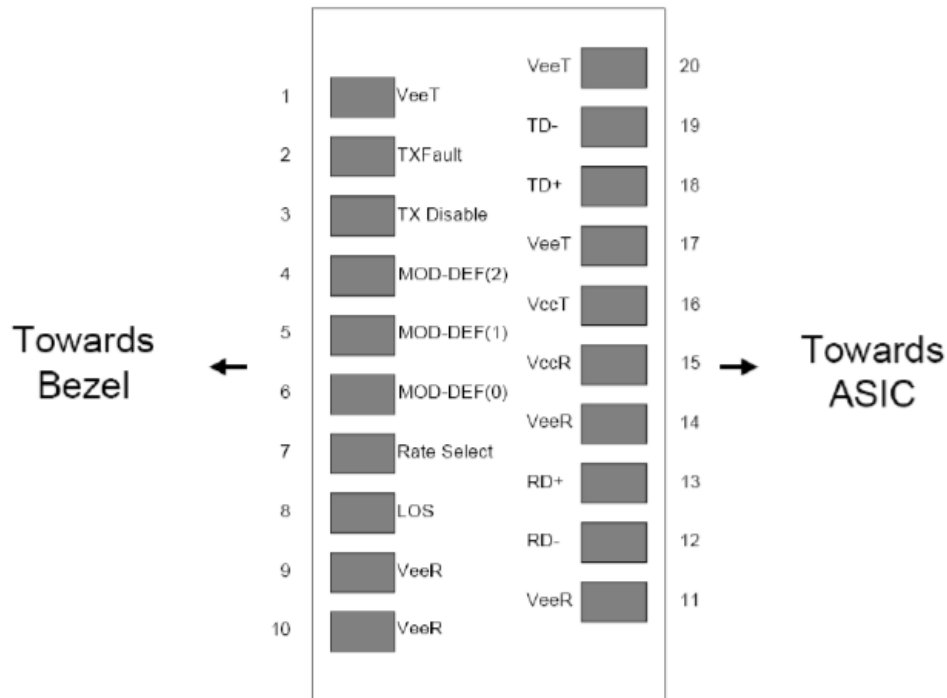
### Notes:

1. Tx\_Fault is an open collector/drain output which should be pulled up with a 4.7kΩ to 10kΩ resistor on the host board. Pull-up voltage between 2.0V and VccT/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.
2. Tx\_Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7kΩ to 10kΩ resistor. Its states are:
  - Low (0V – 0.8V): Transmitter On.
  - Between (0.8V and 2.0V): Undefined.
  - High (2.0V – VccT): Transmitter Disabled.
  - Open: Transmitter Disabled.
3. MOD-DEF0, 1, & 2. These are the module definition pins. They should be pulled up with a 4.7kΩ to 10kΩ resistor on the host board. The pull-up voltage shall be VccT or VccR.
  - MOD-DEF0 is grounded by the module to indicate that the module is present.
  - MOD-DEF1 is the clock line of 2-wire serial interface for optional serial ID.
  - MOD-DEF2 is the data line of 2-wire serial interface for optional serial ID.
4. LOS (Loss of Signal) is an open collector/drain output which should be pulled up with a 4.7kΩ to 10kΩ

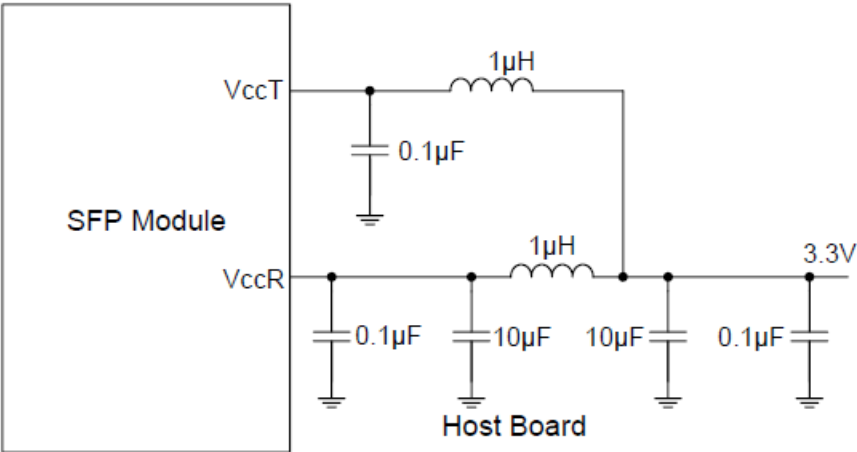
resistor on the host board to supply  $<V_{ccT}+0.3V$  or  $V_{ccR}+0.3V$ . When "high," this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). "Low" indicates normal operation. In the "low" state, the output will be pulled to  $<0.8V$ .

5. RD-/+ : These are the differential receiver outputs. They are AC coupled  $100\Omega$  differential lines which should be terminated with  $100\Omega$  (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.
6. VccR and VccT are the receiver and transmitter power supplies. They are defined as  $3.3V\pm5\%$  at the SFP connector pin. The in rush current will typically be more than 30mA above steady state supply current after 500ns.
7. TD-/+ : These are the differential transmitter inputs. They are AC-coupled, differential lines with  $100\Omega$  differential terminations inside the module. They are AC coupled differential lines with  $100\Omega$  differential termination inside the module. The AC coupling is done inside the module and is thus requires on host board.

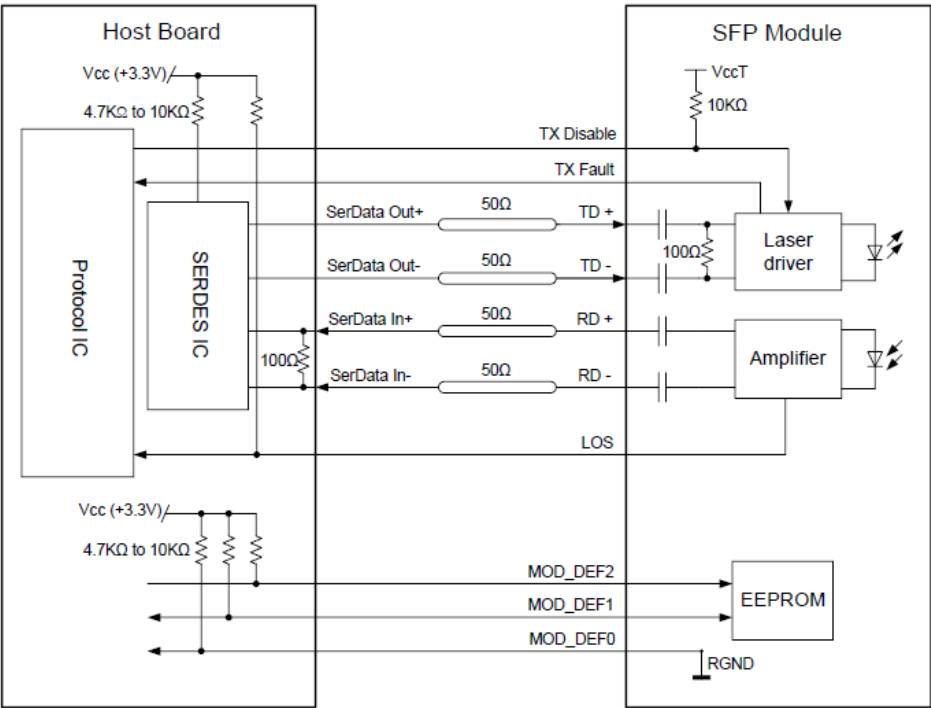
## Pin Connectors



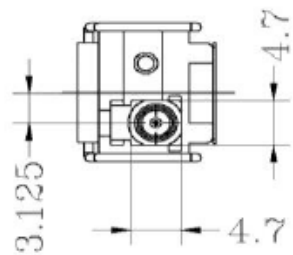
Recommended Host Board Power Supply Circuit



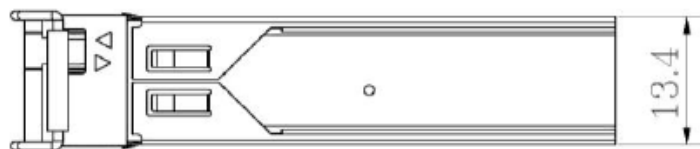
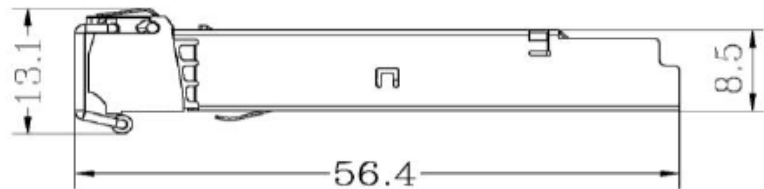
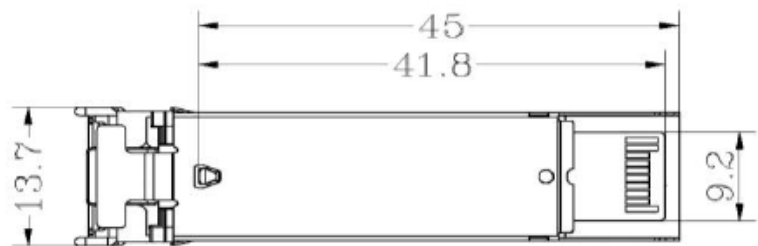
Recommended Application Interface Circuit



Mechanical Specifications



Unit:mm



# 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.

