



## SBU35040DR3D000

MSA Compliant 1000Base-BX SFP Transceiver (SMF, 1310nmTx/1550nmRx, 40km, SC, DOM)

### Product Description

This MSA compliant SFP transceiver provides 1000Base-BX throughput up to 40km over single-mode fiber (SMF) using a wavelength of 1310nmTx/1550nmRx via an SC connector. This bidirectional unit must be used with another transceiver or network appliance of complementing wavelengths. It can operate at temperatures between 0 and 70C. All of our transceivers are built to comply with Multi-Source Agreement (MSA) standards and are uniquely serialized and tested for data-traffic and application to ensure 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:

- Single-Mode Bi-Directional Transmission
- Hot-Pluggable
- SC Receptacle
- Single 3.3V Power Supply
- Excellent EMI and ESD Protection
- Up to 1.25Gbps Data Links
- Operating Temperature: 0 to 70 Celsius
- Laser Eye Safety Compliant
- Excellent ESD Protection
- RoHS Compliant and Lead-Free
- RoHS Compliant and Lead Free



### Applications:

- 1000Base Ethernet
- Access (FTTx) and Enterprise
- 1x 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 |
|-----------------------|--------|------|------|------|------|-------|
| Data Rate             | DR     |      | 1250 |      | Mbps |       |
| Storage Temperature   | Tstg   | -40  |      | 85   | °C   |       |
| Operating Temperature | Tc     | 0    |      | 70   | °C   |       |
| Input Voltage         | Vcc    | 0    |      | 5    | V    |       |

## Electrical Characteristics

| Parameter                              | Symbol    | Min. | Typ. | Max. | Unit  | Notes |
|----------------------------------------|-----------|------|------|------|-------|-------|
| Power Supply Voltage                   | Vcc       | 3.0  | 3.3  | 3.6  | V     |       |
| Power Supply Current                   | Icc       |      | 180  | 250  | mA    |       |
| Transmitter                            |           |      |      |      |       |       |
| Transmitter Differential Input Voltage | +/-TX_DAT | 200  |      | 2400 | mVp-p |       |
| Tx_Disable Input Voltage               | Low       | VIL  | 0    | 0.8  | V     |       |
|                                        | High      | VIH  | 2.0  | Vcc  | V     |       |
| Tx_Fault Output Voltage                | Low       | VOL  | 0    | 0.8  | V     |       |
|                                        | High      | VOH  | 2.0  | Vcc  | V     |       |
| Receiver                               |           |      |      |      |       |       |
| Receiver Differential Output Voltage   | +/-RX_DAT | 600  |      | 1400 | mVp-p |       |
| Rx_LOS Output Voltage                  | Low       | VOL  | 0    | 0.8  | V     |       |
|                                        | High      | VOH  | 2.0  | Vcc  | V     |       |

## Optical Characteristics

| Parameter                      |      | Symbol                     | Min.                  | Typ. | Max.                  | Unit | Notes |
|--------------------------------|------|----------------------------|-----------------------|------|-----------------------|------|-------|
| Transmitter                    |      |                            |                       |      |                       |      |       |
| Centre Wavelength              |      | $\lambda_C$                | 1290                  | 1310 | 1330                  | nm   |       |
| Output Spectral Width          |      | $\Delta\lambda$ (RMS)      |                       |      | 4                     | nm   |       |
| Average Output Power           |      | P <sub>O</sub>             | -5                    |      | 0                     | dBm  |       |
| Extinction Ratio               |      | ER                         | 10                    |      |                       | dB   |       |
| Data Input Voltage             | High | V <sub>IHS</sub>           | V <sub>CC</sub> -1.16 |      | V <sub>CC</sub> -0.89 | V    |       |
|                                | Low  | V <sub>ILS</sub>           | V <sub>CC</sub> -1.82 |      | V <sub>CC</sub> -1.48 | V    |       |
| Supply Current                 |      | I <sub>CC</sub>            |                       | 90   | 110                   | mA   |       |
| Output Optical Eye             |      | Compliant with ITU-T G.957 |                       |      |                       |      |       |
| Receiver                       |      |                            |                       |      |                       |      |       |
| Receive Sensitivity            |      | P <sub>min</sub>           |                       |      | -25                   | dBm  |       |
| Maximum Input Power            |      | P <sub>max</sub>           | -3                    |      |                       | dBm  |       |
| Signal Detection - Asserted    |      | P <sub>H-L</sub>           | -35                   |      |                       | dBm  |       |
| Signal Detection - De-Asserted |      | P <sub>L-H</sub>           |                       |      | -26                   | dBm  |       |
| Output Voltage                 | High | VOH                        | V <sub>CC</sub> -1.03 |      | V <sub>CC</sub> -0.89 | V    |       |
|                                | Low  | VOL                        | V <sub>CC</sub> -1.82 |      | V <sub>CC</sub> -1.63 | V    |       |
| Operating Wavelength           |      | $\lambda_C$                | 1480                  | 1550 | 1580                  | nm   |       |
| Supply Current                 |      | I <sub>CC</sub>            |                       | 80   | 110                   | mA   |       |

## Pin Descriptions

| Pin | Symbol      | Name/Description                                                                                                                    | Plug Sequence | Notes |
|-----|-------------|-------------------------------------------------------------------------------------------------------------------------------------|---------------|-------|
| 1   | VeeT        | Transmitter Ground.                                                                                                                 | 1             |       |
| 2   | Tx_Fault    | Transmitter Fault Indication.                                                                                                       | 3             | 1     |
| 3   | Tx_Dis      | Transmitter Disable. Module disables on “high” or “open.”                                                                           | 3             | 2     |
| 4   | MOD_DEF (2) | SDA Serial Data Signal. 2-Wire Serial ID Interface.                                                                                 | 3             | 3     |
| 5   | MOD_DEF (1) | SCL Serial Clock Signal. 2-Wire Serial ID Interface.                                                                                | 3             | 3     |
| 6   | MOD_DEF (0) | TTL Low. Grounded within the module.                                                                                                | 3             | 3     |
| 7   | Rate Select | Select between full or reduced receiver bandwidth. No connection required. “Low” = open-reduced bandwidth. “High” = full bandwidth. | 3             |       |
| 8   | LOS         | Loss of Signal Indication. “Logic 0” indicates normal operation.                                                                    | 3             | 5     |
| 9   | VeeR        | Receiver Ground.                                                                                                                    | 1             | 6     |
| 10  | VeeR        | Receiver Ground.                                                                                                                    | 1             | 6     |
| 11  | VeeR        | Receiver Ground.                                                                                                                    | 1             | 6     |
| 12  | RX-         | Receiver Data Bar. Differential PECL. AC coupled.                                                                                   | 3             | 7     |
| 13  | RX+         | Receiver Data. Differential PECL. AC coupled.                                                                                       | 3             | 7     |
| 14  | VeeR        | Receiver Ground.                                                                                                                    | 1             | 6     |
| 15  | VccR        | Receiver Power. 3.3V+5%.                                                                                                            | 2             | 8     |
| 16  | VccT        | Transmitter Power. 3.3V+5%.                                                                                                         | 2             | 8     |
| 17  | VeeT        | Transmitter Ground.                                                                                                                 | 1             | 6     |
| 18  | TX+         | Receiver Data. Differential PECL. AC coupled.                                                                                       | 3             | 9     |
| 19  | TX-         | Receiver Data Bar. Differential PECL. AC coupled.                                                                                   | 3             | 9     |
| 20  | VeeT        | Transmitter Ground.                                                                                                                 | 1             | 6     |

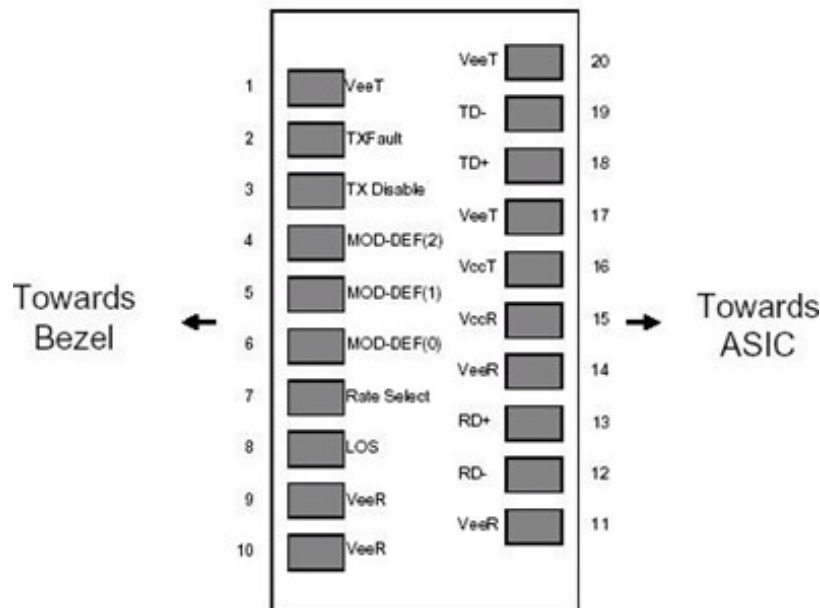
### Notes:

1. Tx\_Fault is an open collector/drain output that 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 to 0.8V): Transmitter On
  - (>0.8V, <2.0V): Undefined
  - High (2.0V to 3.465V): 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 the 2-wire serial interface for serial ID.
  - MOD\_DEF2 is the data line of the 2-wire serial interface for serial ID.
4. This is an optional input used to control the receiver bandwidth for compatibility with multiple data rates (most likely Fibre Channel 1x and 2x rates). If implemented, the input will be internally pulled down with >30k resistor. The input states are:
  - Low (0V to 0.8V): Reduced Bandwidth
  - (>0.8V, <2.0V): Undefined
  - High (2.0V to 3.465V): Full Bandwidth

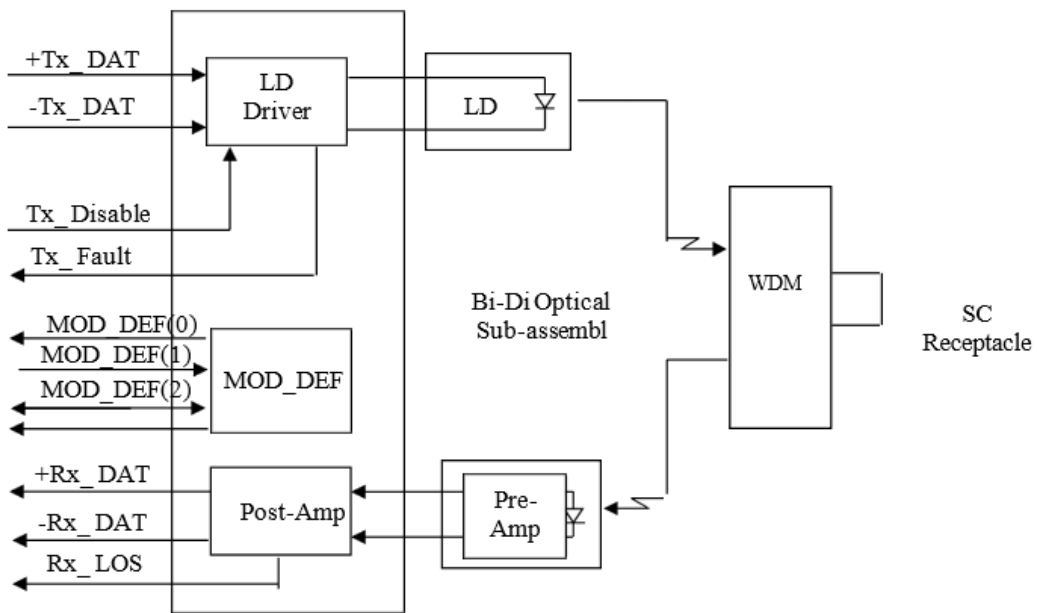
Open: Reduced Bandwidth.

5. LOS (Loss of Signal) is an open collector/drain output that should be pulled up with a 4.7k $\Omega$  to 10k $\Omega$  resistor. Pull-up voltage between 2.0V and VccT/R+0.3V. When “high,” this output indicates that 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.
6. VeeR and VeeT may be internally connected within the SFP module.
7. RD-/+. These are the differential receiver outputs. They are AC-coupled, 100 differential lines that should be terminated with 100 (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 370mV and 2000mV differential (185mV to 1000mV single-ended) when properly terminated.
8. VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V $\pm$ 5% at the SFP connector pin. Maximum supply current is 300mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1 $\Omega$  should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot-plugging of the SFP transceiver module will result in an in-rush current of no more than 30mA greater than the steady state value. VccR and VccT may be internally connected within the SFP transceiver module.
9. TD-/+. These are the differential transmitter inputs. They are AC-coupled, differential lines with 100 differential terminations inside the module. The AC coupling is done inside the module and is thus not required on the host board. The inputs will accept differential swings of 500mV to 2400mV (250mV to 1200mV single-ended), though it is recommended that values between 500mV and 1200mV differential (250mV to 600mV single-ended) be used for best EMI performance.

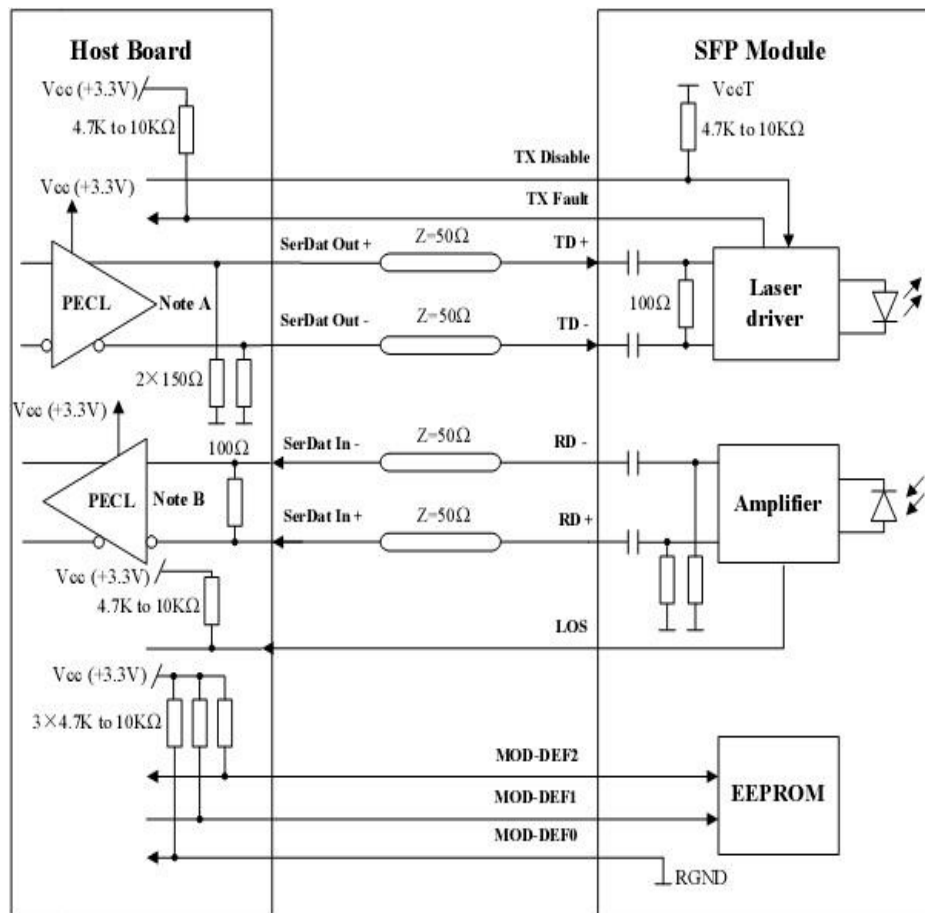
## Pin-Out Details



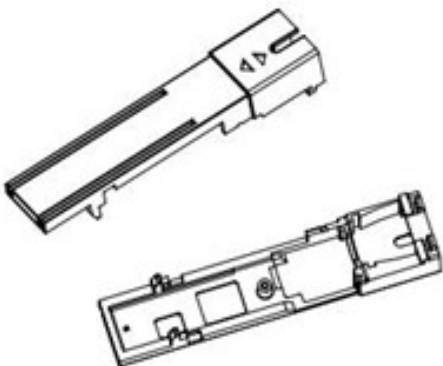
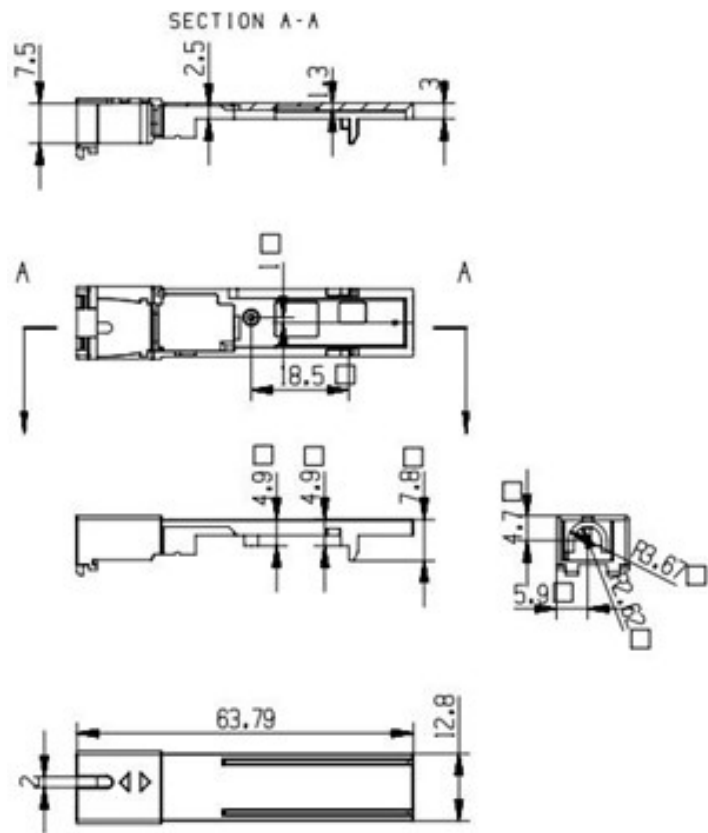
## Block Diagram of Transceiver



## Recommended Circuit



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.

