



## 407-BBOP-BXD-SKY

Dell® 407-BBOP-BXD Compatible 10GBase-BX SFP+ Transceiver (SMF, 1330nmTx/1270nmRx, 10km, LC, DOM)

### Product Description

This Dell® 407-BBOP-BXD compatible SFP+ transceiver provides 10GBase-BX throughput up to 10km over single-mode fiber (SMF) using a wavelength of 1330nmTx/1270nmRx via an LC 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. Our transceiver is built to meet or exceed OEM specifications and is guaranteed to be 100% compatible with Dell®. 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-8432 and SFF-8472 Compliance
- Uncooled DFB transmitter and PIN receiver
- 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:

- 10GBase-BX 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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## Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.4.
- ESD to the LC Receptacle: compatible with IEC 61000-4-3.
- EMI/EMC: compatible with FCC Part 15 Subpart B Rules, EN55022:2010.
- Laser Eye Safety: compatible with FDA 21CFR, EN60950-1& EN (IEC) 60825-1, 2.
- RoHS: compliant with EU RoHS 2.0 directive 2015/863/EU.

## Absolute Maximum Ratings

| Parameter                  | Symbol           | Min. | Typ. | Max.              | Unit | Notes |
|----------------------------|------------------|------|------|-------------------|------|-------|
| Maximum Supply Voltage     | V <sub>cc</sub>  | -0.5 |      | 4.0               | V    | 1     |
| Storage Temperature        | T <sub>stg</sub> | -40  |      | 85                | °C   | 2     |
| Operating Case Temperature | T <sub>c</sub>   | 0    |      | 70                | °C   | 3     |
| Data Rate                  | DR               | 9.83 |      | 11.3              | Gbps | 4     |
| Bit Error Rate             | BER              |      |      | 10 <sup>-12</sup> |      |       |
| Supply Current             | I <sub>cc</sub>  |      | 200  | 350               | mA   | 1     |

## Notes:

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

## Electrical Characteristics

| Parameter                                | Symbol                         | Min.            | Typ. | Max.                 | Unit | Notes |
|------------------------------------------|--------------------------------|-----------------|------|----------------------|------|-------|
| Power Supply Voltage                     | V <sub>cc</sub>                | 3.14            | 3.3  | 3.46                 | V    |       |
| Power Dissipation                        | P <sub>DISS</sub>              |                 | 0.65 | 1.2                  | W    |       |
| Transmitter                              |                                |                 |      |                      |      |       |
| Input Differential Impedance             | R <sub>IN</sub>                |                 | 100  |                      | Ω    |       |
| Differential Data Input Swing            | V <sub>IN,pp</sub>             | 180             |      | 700                  | mV   |       |
| Transmit Disable Voltage                 | V <sub>D</sub>                 | 2.0             |      | 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 Time/Fall Time (20-80%) | T <sub>r</sub> /T <sub>f</sub> | 28              |      |                      | ps   |       |
| LOS Assert                               | LOSA                           | 2               |      | Host_V <sub>cc</sub> | V    |       |
| LOS De-Assert                            | LOSD                           | V <sub>ee</sub> |      | V <sub>ee</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       | λC                                    | 1320 | 1330 | 1340  | nm    |       |
| Extinction Ratio                | ER                                    | 3.5  |      |       | dB    |       |
| Spectral Width (-20dB)          | Δλ                                    |      |      | 0.6   | nm    |       |
| 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     |
| Transmitter Jitter              | According to IEEE 802.3ae Requirement |      |      |       |       |       |
| Receiver                        |                                       |      |      |       |       |       |
| Receiver Overload               |                                       | 0.5  |      |       | dBm   |       |
| Optical Center Wavelength       | λC                                    | 1260 | 1270 | 1280  | nm    |       |
| Receiver Sensitivity            | S                                     |      |      | -14.4 | dBm   | 2     |
| Receiver Reflectance            | TRrx                                  |      |      | -12   | dB    |       |
| LOS Assert                      | LOSA                                  | -30  |      |       | dBm   |       |
| LOS De-Assert                   | LOSD                                  |      |      | -17   | dBm   |       |
| LOS Hysteresis                  | LOSH                                  | 0.5  |      |       | dB    |       |

### Notes:

1. Average.
2. Average. Measured with worst ER: BER <  $10^{-12}$  and  $2^{31}-1$  PRBS.

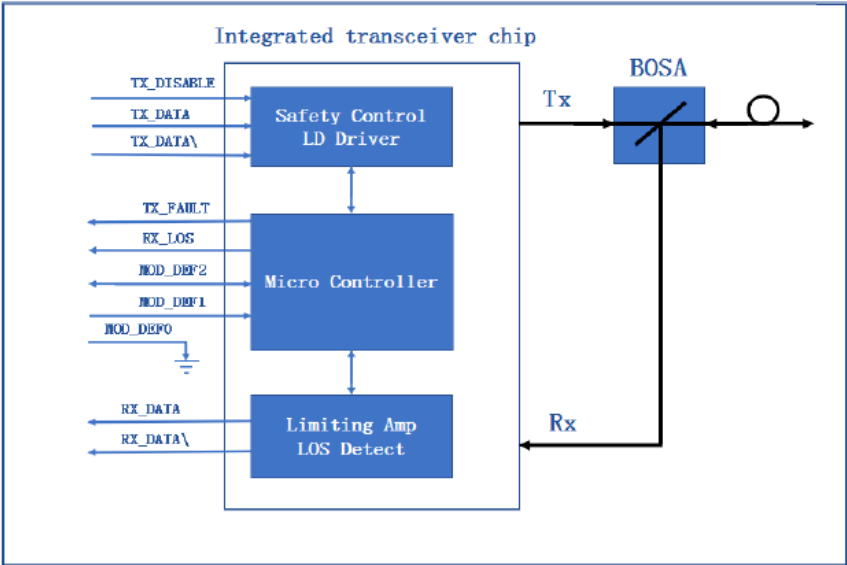
## Pin Descriptions

| Pin | Symbol     | Name/Descriptions                                                | Notes |
|-----|------------|------------------------------------------------------------------|-------|
| 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.                                    | 4     |
| 5   | SCL        | 2-Wire Serial Interface Clock.                                   | 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:

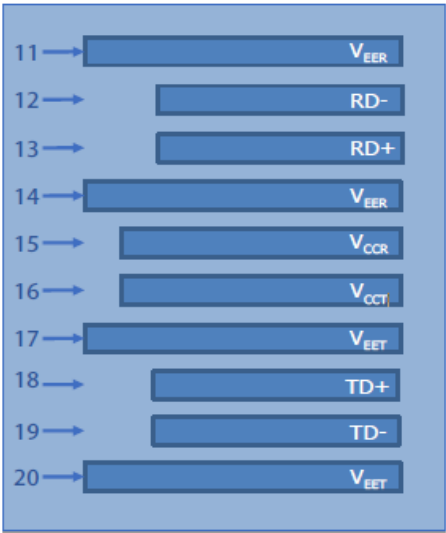
1. Circuit ground is isolated from the chassis ground.
2. Tx\_Fault is the open collector output and should be pulled up with 4.7k $\Omega$ -10k $\Omega$  on the host board to a voltage between 2V and Vcc+0.3V.
3. Disabled: TDIS>2V or open. Enabled TDIS<0.8V.
4. Should be pulled up with the 4.7k $\Omega$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

Transceiver Block Diagram

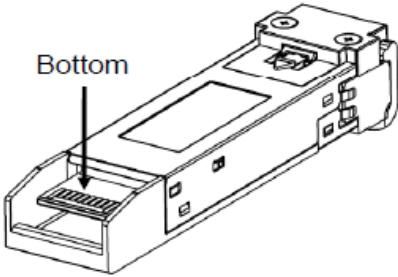
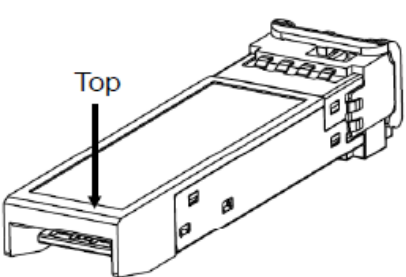
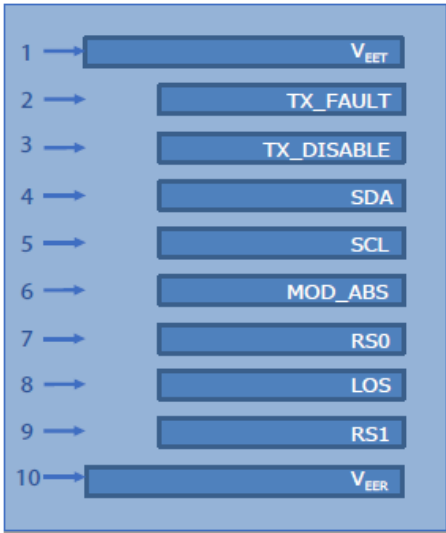


Electical Pad Layout

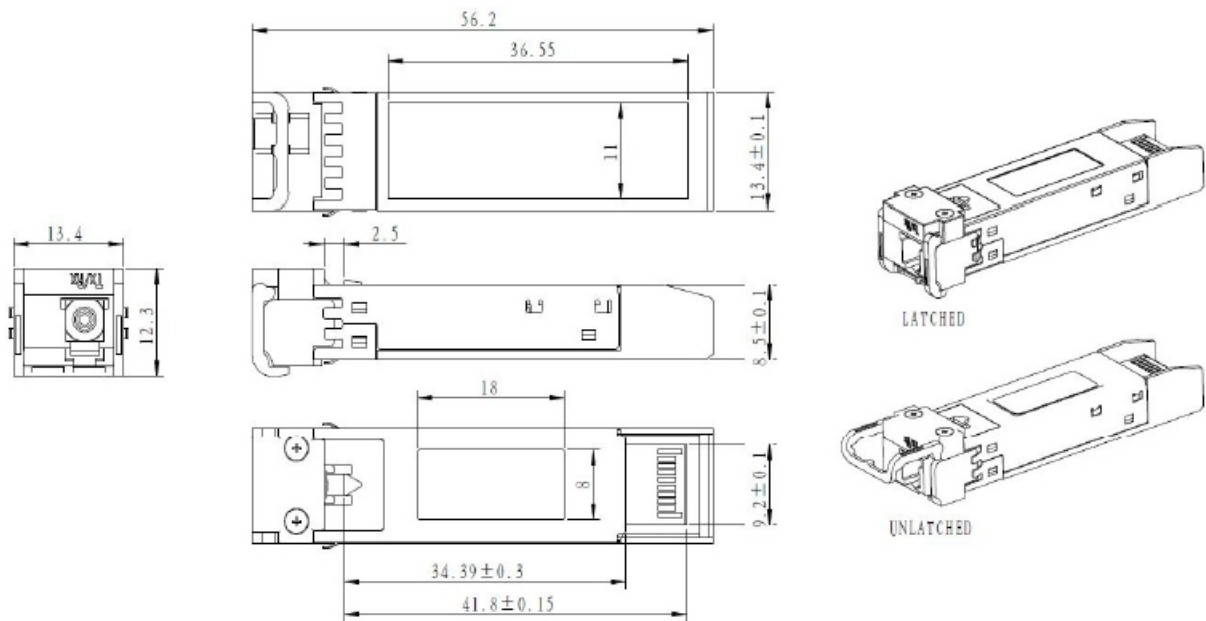
Top view



Bottom view



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.

