



## SFP-10GB-CW-61-10-I-J-SKY

Juniper Networks® Compatible 10GBase-CWDM SFP+ Transceiver (SMF, 1610nm, 10km, LC, DOM, -40 to 85C)

### Product Description

This Juniper Networks® compatible SFP+ transceiver provides 10GBase-CWDM throughput up to 10km over single-mode fiber (SMF) using a wavelength of 1610nm via an LC connector. It is capable of withstanding rugged environments and can operate at temperatures between -40 and 85C. The listed reach has been determined using a link budget calculation and tested in a standard environment. Actual link distances achieved will be dependent upon the deployed environment. Our transceiver is built to meet or exceed OEM specifications and is guaranteed to be 100% compatible with Juniper Networks®. 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. 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
- Duplex LC Connector
- Industrial Temperature -40 to 85 Celsius
- Single-mode Fiber
- Hot Pluggable
- Excellent ESD Protection
- Metal with Lower EMI
- RoHS Compliant and Lead Free



### Applications:

- 10x Gigabit Ethernet over CWDM
- Access, Metro and Enterprise
- 8x/10x Fibre Channel
- Mobile Fronthaul CPRI/OBSAI

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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

### CWDM Available Wavelengths

| Wavelengths | Min.   | Typ. | Max.   |
|-------------|--------|------|--------|
| 47          | 1464.5 | 1471 | 1477.5 |
| 49          | 1484.5 | 1491 | 1497.5 |
| 51          | 1504.5 | 1511 | 1517.5 |
| 53          | 1524.5 | 1531 | 1537.5 |
| 55          | 1544.5 | 1551 | 1557.5 |
| 57          | 1564.5 | 1571 | 1577.5 |
| 59          | 1584.5 | 1591 | 1597.5 |
| 61          | 1604.5 | 1611 | 1617.5 |

### Absolute Maximum Ratings

| Parameter                  | Symbol | Min. | Typ. | Max.              | Unit | Notes |
|----------------------------|--------|------|------|-------------------|------|-------|
| Maximum Supply Voltage     | Vcc    | -0.5 |      | 4.0               | V    | 1     |
| Storage Temperature        | TS     | -40  |      | 85                | °C   | 2     |
| Operating Case Temperature | Tc     | -40  |      | 85                | °C   |       |
| Data Rate                  | DR     | 1.2  |      | 11.3              | Gb/s | 3     |
| Bit Error Rate             | BER    |      |      | 10 <sup>-12</sup> |      |       |

### Notes:

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

### Electrical Characteristics (V<sub>CC</sub>=3.14V to 3.46V, T<sub>C</sub>)

| Parameter                                 | Symbol                         | Min.            | Typ. | Max.                 | Unit | Notes |
|-------------------------------------------|--------------------------------|-----------------|------|----------------------|------|-------|
| Power Supply Voltage                      | V <sub>CC</sub>                | 3.14            | 3.3  | 3.46                 | V    |       |
| Power Supply Current                      | I <sub>CC</sub>                |                 | 400  | 450                  | mA   |       |
| <b>Transmitter</b>                        |                                |                 |      |                      |      |       |
| Input differential impedance              | R <sub>IN</sub>                |                 | 100  |                      | Ω    |       |
| Differential data input swing             | V <sub>IN</sub> PP             | 120             |      | 850                  | mV   |       |
| Transmit Disable Voltage                  | V <sub>D</sub>                 | 2               |      | V <sub>CC</sub>      | V    |       |
| Transmit Enable Voltage                   | V <sub>EN</sub>                | V <sub>EE</sub> |      | V <sub>EE</sub> +0.8 | V    |       |
| <b>Receiver</b>                           |                                |                 |      |                      |      |       |
| Differential data output swing            | V <sub>OUT</sub> PP            | 300             |      | 850                  | mV   |       |
| Data output rise time/fall time (20%-80%) | t <sub>r</sub> /t <sub>f</sub> | 28              |      |                      | ps   |       |
| LOS Fault                                 | V <sub>LOS</sub> A             | 2               |      | V <sub>CC</sub> HOST | V    |       |
| LOS Normal                                | V <sub>LOS</sub> D             | V <sub>EE</sub> |      | V <sub>EE</sub> +0.5 | V    |       |

### Optical Characteristics

| Parameter                       | Symbol                                | Min. | Typ. | Max. | Unit  | Notes |
|---------------------------------|---------------------------------------|------|------|------|-------|-------|
| Transmitter                     |                                       |      |      |      |       |       |
| Output Optical Power            | P <sub>TX</sub>                       | -1   |      | 4    | dBm   | 1     |
| Optical Center Wavelength       | λ <sub>c</sub>                        | λ-6  | λ    | λ+6  | nm    |       |
| Optical Modulation Amplitude    | OMA                                   | -5.2 |      |      |       | 2     |
| Extinction Ratio                | ER                                    | 8.2  |      |      | 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                                   |      |      | 2    | dB    |       |
| Launch Power of OFF Transmitter | P <sub>OUT_OFF</sub>                  |      |      | -30  | dBm   | 1     |
| Transmitter Jitter              | According to IEEE 802.3ae requirement |      |      |      |       |       |
| Receiver                        |                                       |      |      |      |       |       |
| Optical Center Wavelength       | λ <sub>c</sub>                        | 1260 |      | 1620 | nm    |       |
| Average Receive Power           | P <sub>RX</sub>                       | -16  |      | -1   | dBm   |       |
| Receiver Sensitivity @10.3Gb/s  | R <sub>X_SEN</sub>                    |      |      | -16  | dBm   | 3     |
| Receiver Reflectance            | TR <sub>RX</sub>                      |      |      | -27  | dB    |       |
| LOS Assert                      | LOS <sub>A</sub>                      | -25  |      |      | dBm   |       |

|                |                  |     |  |     |     |  |
|----------------|------------------|-----|--|-----|-----|--|
| LOS De-Assert  | LOS <sub>D</sub> |     |  | -18 | dBm |  |
| LOS Hysteresis | LOS <sub>H</sub> | 0.5 |  |     | dB  |  |

**Notes:**

1. Average
2. Per IEEE 802.3ae
3. Measured with worst ER: BER<10<sup>-12</sup>; 2<sup>31</sup>-1 PRBS

**Pin Descriptions**

| Pin | Symbol     | Name/Descriptions                                                              | Ref. |
|-----|------------|--------------------------------------------------------------------------------|------|
| 1   | VeeT       | Transmitter Ground (Common with Receiver Ground).                              | 1    |
| 2   | TX Fault   | Transmitter Fault. LVTTTL-O                                                    | 2    |
| 3   | TX Disable | Transmitter Disable. Laser output disabled on high or open. LVTTTL-I.          | 3    |
| 4   | SDA        | 2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i). LVTTTL-I/O. |      |
| 5   | SCL        | 2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i). LVTTTL-I.   |      |
| 6   | MOD_ABS    | Module Absent, Connect to VeeT or VeeR in Module.                              | 4    |
| 7   | RS0        | Rate Select 0. Not used                                                        | 5    |
| 8   | LOS        | Loss of Signal indication. Logic 0 indicates normal operation. LVTTTL-O.       | 2    |
| 9   | RS1        | Rate Select 1. Not used                                                        | 5    |
| 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. CML-O.                                 |      |
| 13  | RD+        | Receiver Non-inverted DATA out. AC Coupled. CML-O.                             |      |
| 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. CML-I.                           |      |
| 19  | TD-        | Transmitter Inverted DATA in. AC Coupled. CML-O.                               |      |
| 20  | VeeT       | Transmitter Ground (Common with Receiver Ground).                              | 1    |

**Notes:**

1. The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.
2. This contact is an open collector/drain output and should be pulled up to the Vcc\_Host with resistor in the range 4.7KΩ to 10KΩ. Pull ups can be connected to one or several power supplies, however the host board design shall ensure that no module contract has voltage exceeding module VccT/R +0.5.V.
3. Tx\_Disable is an input contact with a 4.7KΩ to 10KΩ pull-up resistor to VccT inside module.

4. Mod\_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull the contract up to Vcc\_Host with a resistor in the range from 4.7K $\Omega$  to 10K $\Omega$ . Mod\_ABS is asserted “High” when the SFP+ module is physically absent from a host slot.
5. Internally pulled down per SFF-8431



Pin-out of connector Block on Host board

### Recommended Circuit Schematic



**Mechanical Specifications**

Small Form Factor Pluggable (SFP) transceivers are compatible with the dimensions defined by the SFP Multi-Sourcing Agreement (MSA).



**EEPROM Information**

EEPROM memory map specific data field description is as below:



# 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.

