



## 160-9403-900-SKY

Ciena® 160-9403-900 Compatible 100GBase-CWDM4 QSFP28 Transceiver (SMF, 1270nm to 1330nm, 2km, LC, DOM)

### Product Description

This Ciena® 160-9403-900 compatible QSFP28 transceiver provides 100GBase-CWDM4 throughput up to 2km over single-mode fiber (SMF) using wavelengths between 1270nm to 1330nm 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 Ciena®. 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-8665 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:

- Ethernet over CWDM
- Access, Metro 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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## 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 |
|----------------------------|--------|------|----------|------|------|
| Maximum Supply Voltage     | Vcc    | -0.5 |          | 4.0  | V    |
| Storage Temperature        | TS     | -40  |          | +85  | °C   |
| Operating Case Temperature | Tc     | 0    | 25       | 70   | °C   |
| Relative Humidity          | RH     | 5    |          | 95   | %    |
| Data Rate PER Channel      |        |      | 25.78125 |      | Gb/s |

## Electrical Characteristics

| Parameter                                  | Symbol    | Min.  | Typ. | Max.  | Unit              | Notes |
|--------------------------------------------|-----------|-------|------|-------|-------------------|-------|
| Power Supply Voltage                       | Vcc       | 3.135 | 3.3  | 3.465 | V                 |       |
| Power Dissipation                          | PD        |       |      | 3500  | mW                |       |
| Module Supply Current                      | Icc       |       |      | 1100  | mA                |       |
| Transmitter                                |           |       |      |       |                   |       |
| Single-ended Input Voltage Tolerance       | ZIN       | -0.3  |      | 4.0   | V                 |       |
| Input Differential Impedance               | VIN, P-P  |       | 100  |       | Ω                 |       |
| Differential Data Input Swing              |           | 190   |      | 700   | mV <sub>P-P</sub> |       |
| AC Common Mode Input Voltage Tolerance     |           | 15    |      |       | mV                |       |
| Differential Input Voltage Swing Threshold |           | 50    |      |       | mV <sub>pp</sub>  |       |
| Receiver                                   |           |       |      |       |                   |       |
| Single-ended Output Voltage                |           | -0.3  |      | 4.0   | V                 |       |
| Output Differential Impedance              | Zo        | 90    | 100  | 110   | Ω                 |       |
| Differential Data Output Swing             | VOUT, P-P | 300   |      | 850   | mV <sub>P-P</sub> |       |
| AC Common Mode Output Voltage              |           |       |      | 7.5   | mV                |       |

## Optical Characteristics

| Parameter                         | Symbol  | Min.                               | Typ. | Max.   | Unit | Notes |
|-----------------------------------|---------|------------------------------------|------|--------|------|-------|
| Transmitter                       |         |                                    |      |        |      |       |
| Launch Optical Power per lane     | Po      | -6.5                               |      | 2.5    | dBm  | 1     |
| Total Launch Optical Power        | Po      |                                    |      | +8.5   | dBm  | 1     |
| Center Wavelength Range           | L1      | 1264.5                             | 1271 | 1277.5 | nm   |       |
|                                   | L2      | 1284.5                             | 1291 | 1297.5 | nm   |       |
|                                   | L3      | 1304.5                             | 1311 | 1317.5 | nm   |       |
|                                   | L4      | 1324.5                             | 1331 | 1337.5 | nm   |       |
| Extinction Ratio                  | EX      | 4                                  |      |        | dB   | 2     |
| Spectral width (-20dB)            | Δλ      |                                    |      | 1      | nm   |       |
| Side-mode suppression ratio       | SMSR    | 30                                 |      |        | dB   |       |
| Optical Return Loss Tolerance     | ORLT    |                                    |      | 20     | dB   |       |
| Pout @TX-Disable Asserted         |         |                                    |      | -30    |      | 1     |
| Eye Mask {X1, X2, X3, Y1, Y2, Y3} |         | {0.31, 0.4, 0.45, 0.34, 0.38, 0.4} |      |        |      |       |
| Receiver                          |         |                                    |      |        |      |       |
| Center Wavelength                 | L1      | 1264.5                             | 1271 | 1277.5 | nm   |       |
|                                   | L2      | 1284.5                             | 1291 | 1297.5 | nm   |       |
|                                   | L3      | 1304.5                             | 1311 | 1317.5 | nm   |       |
|                                   | L4      | 1324.5                             | 1331 | 1337.5 | nm   |       |
| Sensitivity per Channel           | S       |                                    |      | -11.5  | dBm  | 3     |
| Overload (each channel)           | POL     | 2.5                                |      |        | dBm  | 3     |
| Damage Threshold (each channel)   | Pdamage | 3.5                                |      |        | dBm  |       |
| Optical Return Loss               | ORL     | 26                                 |      |        | dB   |       |
| LOS Assert                        | LOSA    | -24                                |      |        | dBm  |       |
| LOS De-Assert                     | LOSD    |                                    |      | -12.0  | dBm  |       |
| LOS Hysteresis                    |         | 0.5                                |      |        | dB   |       |

### Notes:

1. The optical power is launched into SMF.
2. Measured with a PRBS  $2^{31}-1$  test pattern @25.78125Gbps.
3. Measured with PRBS  $2^{31}-1$  test pattern, 25.78125Gb/s, BER  $5.0E-5$

## Pin Descriptions

| Pin | Symbol  | Name/Descriptions                                | Ref. |
|-----|---------|--------------------------------------------------|------|
| 1   | GND     | Transmitter Ground (Common with Receiver Ground) | 1    |
| 2   | Tx2-    | Transmitter Inverted Data Input                  |      |
| 3   | Tx2+    | Transmitter Non-Inverted Data output             |      |
| 4   | GND     | Transmitter Ground (Common with Receiver Ground) | 1    |
| 5   | Tx4-    | Transmitter Inverted Data Input                  |      |
| 6   | Tx4+    | Transmitter Non-Inverted Data output             |      |
| 7   | GND     | Transmitter Ground (Common with Receiver Ground) | 1    |
| 8   | ModSelL | Module Select                                    | 2    |
| 9   | ResetL  | Module Reset                                     | 2    |
| 10  | VccRx   | 3.3V Power Supply Receiver                       |      |
| 11  | SCL     | 2-Wire serial Interface Clock                    | 2    |
| 12  | SDA     | 2-Wire serial Interface Data                     | 2    |
| 13  | GND     | Transmitter Ground (Common with Receiver Ground) | 1    |
| 14  | Rx3+    | Receiver Non-Inverted Data Output                |      |
| 15  | Rx3-    | Receiver Inverted Data Output                    |      |
| 16  | GND     | Transmitter Ground (Common with Receiver Ground) | 1    |
| 17  | Rx1+    | Receiver Non-Inverted Data Output                |      |
| 18  | Rx1-    | Receiver Inverted Data Output                    |      |
| 19  | GND     | Transmitter Ground (Common with Receiver Ground) | 1    |
| 20  | GND     | Transmitter Ground (Common with Receiver Ground) | 1    |
| 21  | Rx2-    | Receiver Inverted Data Output                    |      |
| 22  | Rx2+    | Receiver Non-Inverted Data Output                |      |
| 23  | GND     | Transmitter Ground (Common with Receiver Ground) | 1    |
| 24  | Rx4-    | Receiver Inverted Data Output                    | 1    |
| 25  | Rx4+    | Receiver Non-Inverted Data Output                |      |
| 26  | GND     | Transmitter Ground (Common with Receiver Ground) | 1    |
| 27  | ModPrsI | Module Present                                   |      |
| 28  | IntL    | Interrupt                                        | 2    |
| 29  | VccTx   | 3.3V power supply transmitter                    |      |
| 30  | Vcc1    | 3.3V power supply                                |      |
| 31  | LPMODE  | Low Power Mode                                   | 2    |
| 32  | GND     | Transmitter Ground (Common with Receiver Ground) | 1    |
| 33  | Tx3+    | Transmitter Non-Inverted Data Input              |      |
| 34  | Tx3-    | Transmitter Inverted Data Output                 |      |
| 35  | GND     | Transmitter Ground (Common with Receiver Ground) | 1    |
| 36  | Tx1+    | Transmitter Non-Inverted Data Input              |      |
| 37  | Tx1-    | Transmitter Inverted Data Output                 |      |
| 38  | GND     | Transmitter Ground (Common with Receiver 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 4.7KΩ to 10KΩ pull-up resistor to VccHost.

### Electrical Pin-out Details



### Recommended Host Board Power Supply Filter Network



Recommended Application Interface Block Diagram



Mechanical Specifications

Measurement 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.

