



## QSFP-40G-SR4-SKY

Cisco® QSFP-40G-SR4 Compatible 40GBase-SR4 QSFP+ Transceiver (MMF, 850nm, 150m, MPO, DOM)

### Product Description

This Cisco® QSFP-40G-SR4 compatible QSFP+ transceiver provides 40GBase-SR4 throughput up to 150m over multi-mode fiber (MMF) using a wavelength of 850nm via an MPO connector. Our transceiver is built to meet or exceed OEM specifications and is guaranteed to be 100% compatible with Cisco®. 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:

- 4-Channel Full-Duplex Transceiver Module
- Maximum Link Length of 150m on OM4 MMF
- Hot-Pluggable
- Maximum Power Dissipation: 1W
- Reliable VCSEL Array Technology
- Multi-Rate Capability: 1.06Gbps to 10.5Gbps Per Channel
- Operating Temperature: 0 to 70 Celsius
- Single 1x12 MPO Receptacle
- Excellent ESD Protection
- RoHS Compliant and Lead-Free
- RoHS Compliant and Lead Free



### Applications:

- 40GBase Ethernet
- Access and Enterprise
- 4x10G Breakout Option

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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 |
|------------------------------------|--------|------|------|-------------------|------|-------|
| Maximum Supply Voltage             | Vcc    | -0.5 |      | 3.6               | V    |       |
| Storage Temperature                | Tstg   | -40  |      | 85                | °C   |       |
| Operating Case Temperature         | Tc     | 0    |      | 70                | °C   |       |
| Relative Humidity (Non-Condensing) | RH     | 0    |      | 85                | %    |       |
| Damage Threshold (Per Lane)        | DT     | 3.4  |      |                   | dBm  |       |
| Maximum Aggregate Data Rate        |        |      | 42.0 |                   | Gbps |       |
| Bit Rate Per Lane                  | BR     | 1062 |      | 10500             | Mbps | 1     |
| Bit Error Ratio                    | BER    |      |      | 10 <sup>-12</sup> |      | 2     |
| Link Distance on OM3 MMF           | D      |      |      | 100               | m    | 3     |
| Link Distance on OM4 MMF           | D      |      |      | 150               | m    | 3     |

### Notes:

1. Compliant with 40G Ethernet. Compatible with 1/10 Gigabit Ethernet and 1/2/4/8/10G Fibre Channel.
2. Tested with a PRBS 2<sup>31</sup>-1 test pattern.
3. Per 40GBASE-SR4, IEEE 802.3ba.

## Electrical Characteristics

| Parameter                                    | Symbol  | Min.                                 | Typ. | Max. | Unit   | Notes |
|----------------------------------------------|---------|--------------------------------------|------|------|--------|-------|
| Power Supply Voltage                         | Vcc     | 3.15                                 | 3.3  | 3.45 | V      |       |
| Supply Current                               | Icc     |                                      |      | 300  | mA     |       |
| Transmit Turn-On Time                        |         |                                      |      | 2000 | ms     | 1     |
| Power Consumption                            |         |                                      | 1    |      | W      |       |
| Transmitter                                  |         |                                      |      |      |        |       |
| Single-Ended Input Voltage Tolerance         | VINT    | -0.3                                 |      | 4.0  | V      |       |
| Differential Data Input Swing                | VIN,pp  | 180                                  |      | 1200 | mVp-p  | 2     |
| Differential Input Threshold                 |         |                                      | 50   |      | mV     |       |
| AC Common-Mode Input Voltage Tolerance (RMS) |         | 15                                   |      |      | mV     |       |
| J2 Jitter Tolerance                          | Jt2     | 0.17                                 |      |      | UI     |       |
| J9 Jitter Tolerance                          | Jt9     | 0.29                                 |      |      | UI     |       |
| Data-Dependent Pulse Width Shrinkage         | DDPWS   | 0.07                                 |      |      | UI     |       |
| Differential Input Return Loss               |         | Per IEEE P802.3ba, Section 86A.4.1.1 |      |      | dB     | 3     |
| Eye Mask Coordinates: (X1, X2, Y1, Y2)       |         | (0.11, 0.31, 95, 350)                |      |      | UI, mV | 4     |
| Receiver                                     |         |                                      |      |      |        |       |
| Single-Ended Output Voltage                  |         | -0.3                                 |      | 4.0  | V      |       |
| Differential Data Output Swing               | VOUT,pp | 0                                    |      | 800  | mVp-p  | 3, 4  |
| AC Common-Mode Output Voltage (RMS)          |         |                                      |      | 7.5  | mV     |       |
| Termination Mismatch at 1MHZ                 |         |                                      |      | 5    | %      |       |
| Output Transition Time (20-80%)              |         | 28                                   |      |      | ps     |       |
| J2 Jitter Output                             | Jo2     |                                      |      | 0.42 | UI     |       |
| J9 Jitter Output                             | Jo9     |                                      |      | 0.65 | UI     |       |
| Power Supply Ripple Tolerance                | PSR     | 50                                   |      |      | mVp-p  |       |
| Differential Output Return Loss              |         | Per IEEE P802.3ba, Section 86A.4.2.1 |      |      | dB     | 5     |
| Common-Mode Output Return Loss               |         | Per IEEE P802.3ba, Section 86A.4.2.2 |      |      | dB     | 5     |
| Eye Mask Coordinates #1: (X1, X2, Y1, Y2)    |         | (0.29, 0.5, 150, 425)                |      |      | UI, mV | 6     |

### Notes:

1. From power-on and end of any fault conditions.
2. After internal AC coupling. Self-biasing 100Ω differential input.
3. AC coupled with 100Ω differential output impedance.
4. Settable in 4 discrete steps via the I2C interface.
5. 10MHz to 11.1GHz range.
6. Hit ratio =  $5 \times 10^{-5}$ .

## Optical Characteristics

| Parameter                                                 |                  | Symbol           | Min.                                | Typ. | Max. | Unit       | Notes |
|-----------------------------------------------------------|------------------|------------------|-------------------------------------|------|------|------------|-------|
| Transmitter                                               |                  |                  |                                     |      |      |            |       |
| Signaling Speed Per Lane                                  |                  |                  |                                     |      | 10.5 | GBd        | 1     |
| Center Wavelength                                         |                  |                  | 840                                 |      | 860  | nm         |       |
| RMS Spectral Width                                        |                  | SW               |                                     |      | 0.65 | nm         |       |
| Average Launch Power Per Lane                             |                  | TXP <sub>x</sub> | -7.6                                |      | -1.0 | dBm        |       |
| Transmit OMA Per Lane                                     |                  | TxOMA            | -5.6                                |      | 3.0  | dBm        | 2     |
| Difference in Power Between Any Two Lanes (OMA)           |                  | DP <sub>x</sub>  |                                     |      | 4.0  | dB         |       |
| Peak Power Per Lane                                       |                  | PP <sub>x</sub>  |                                     |      | 4.0  | dBm        |       |
| Launch Power (OMA) Minus TDP Per Lane                     |                  | P-TDP            | -6.5                                |      |      | dBm        |       |
| TDP Per Lane                                              |                  | TDP              |                                     |      | 3.5  | dBm        |       |
| Optical Extinction Ratio                                  |                  | ER               | 3.0                                 |      |      | dB         |       |
| Optical Return Loss Tolerance                             |                  | ORL              |                                     |      | 12   | dB         |       |
| Average Launch Power of Off Transmitter Per Lane          |                  |                  |                                     |      | -30  | dBm        |       |
| Relative Intensity Noise                                  |                  | RIN              |                                     |      | -128 | dB/Hz      |       |
| Encircled Flux                                            |                  | FLX              | >86% at 19μm<br><30% at 4.5μm       |      |      | dBm        |       |
| Transmitter Eye Mask Definition: (X1, X2, X3, Y1, Y2, Y3) |                  |                  | (0.23, 0.34, 0.43, 0.27, 0.35, 0.4) |      |      |            |       |
| Receiver Module Output (TP4)                              |                  |                  |                                     |      |      |            |       |
| Signaling Speed Per Lane                                  |                  |                  |                                     |      | 10.5 | GBd        | 3     |
| Center Wavelength                                         |                  |                  | 840                                 |      | 860  | nm         |       |
| Damage Threshold                                          |                  | DT               | 3.4                                 |      |      | dBm        |       |
| Average Receive Power Per Lane                            |                  | RXP <sub>x</sub> | -9.9                                |      | 2.4  | dBm        |       |
| Receive Power (OMA) Per Lane                              |                  | RxOMA            |                                     |      | 3.0  | dBm        |       |
| Stressed Receiver Sensitivity (OMA) Per Lane              |                  | SRS              |                                     |      | -5.4 | dBm        |       |
| Peak Power Per Lane                                       |                  | PP <sub>x</sub>  |                                     |      | 4    | dBm        |       |
| Receiver Reflectance                                      |                  | R <sub>fl</sub>  |                                     |      | -12  | dB         |       |
| Vertical Eye Closure Penalty Per Lane                     |                  |                  |                                     |      | 1.9  | dB         |       |
| Stressed Eye J2 Jitter Per Lane                           |                  |                  |                                     |      | 0.3  | UI         |       |
| Stressed Eye J9 Jitter Per Lane                           |                  |                  |                                     |      | 0.47 | UI         |       |
| OMA of Each Aggressor Lane                                |                  |                  |                                     |      | -0.4 | dBm        |       |
| Rx Jitter Tolerance                                       | Jitter Frequency |                  | (75, 5)                             |      |      | kHz,<br>UI |       |
|                                                           | P-P Amplitude    |                  | (375, 1)                            |      |      |            |       |
| LOS De-Assert                                             |                  | LOSD             |                                     |      | -12  | dBm        |       |
| LOS Assert                                                |                  | LOSA             | -30                                 |      |      | dBm        |       |
| LOS Hysteresis                                            |                  |                  | 0.5                                 |      |      | dBm        |       |

**Notes:**

1. The transmitter consists of 4 lasers operating at a maximum rate of 10.5Gbps each.
2. Even if the TDP is < 0.9dB, the OMA minimum must exceed this value.
3. Receiver consists of 4 photodetectors operating at a maximum rate of 10.5Gbps each.

**Pin Descriptions**

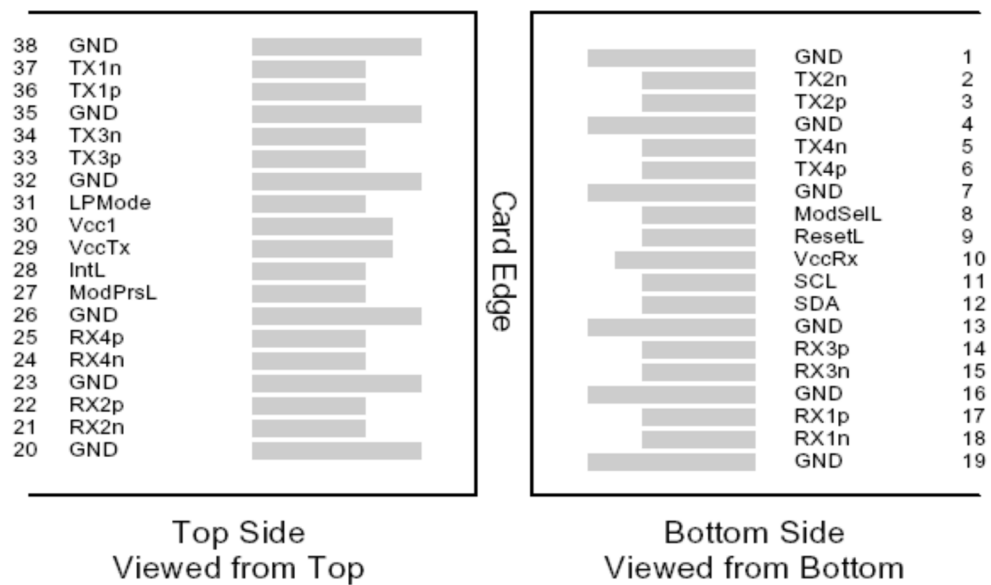
| Pin | Symbol  | Name/Descriptions                    | Notes |
|-----|---------|--------------------------------------|-------|
| 1   | GND     | Module Ground.                       | 1     |
| 2   | Tx2-    | Transmitter Inverted Data Input.     |       |
| 3   | Tx2+    | Transmitter Non-Inverted Data Input. |       |
| 4   | GND     | Module Ground.                       | 1     |
| 5   | Tx4-    | Transmitter Inverted Data Input.     |       |
| 6   | Tx4+    | Transmitter Non-Inverted Data Input. |       |
| 7   | GND     | Module Ground.                       | 1     |
| 8   | ModSelL | Module Select.                       |       |
| 9   | ResetL  | Module Reset.                        |       |
| 10  | VccRx   | +3.3V Receiver Power Supply.         |       |
| 11  | SCL     | 2-Wire Serial Interface Clock.       |       |
| 12  | SDA     | 2-Wire Serial Interface Data.        |       |
| 13  | GND     | Module Ground.                       | 1     |
| 14  | Rx3+    | Receiver Non-Inverted Data Output.   |       |
| 15  | Rx3-    | Receiver Inverted Data Output.       |       |
| 16  | GND     | Module Ground.                       | 1     |
| 17  | Rx1+    | Receiver Non-Inverted Data Output.   |       |
| 18  | Rx1-    | Receiver Inverted Data Output.       |       |
| 19  | GND     | Module Ground.                       | 1     |
| 20  | GND     | Module Ground.                       | 1     |
| 21  | Rx2-    | Receiver Inverted Data Output.       |       |
| 22  | Rx2+    | Receiver Non-Inverted Data Output.   |       |
| 23  | GND     | Module Ground.                       | 1     |
| 24  | Rx4-    | Receiver Inverted Data Output.       |       |
| 25  | Rx4+    | Receiver Non-Inverted Data Output.   |       |
| 26  | GND     | Module Ground.                       | 1     |
| 27  | ModPrsL | Module Present.                      |       |
| 28  | IntL    | Interrupt.                           |       |
| 29  | VccTx   | +3.3V Transmitter Power Supply.      |       |

|    |        |                                      |   |
|----|--------|--------------------------------------|---|
| 30 | Vcc1   | +3.3V Power Supply.                  |   |
| 31 | LPMode | Low-Power Mode.                      |   |
| 32 | GND    | Module Ground.                       | 1 |
| 33 | Tx3+   | Transmitter Non-Inverted Data Input. |   |
| 34 | Tx3-   | Transmitter Inverted Data Input.     |   |
| 35 | GND    | Module Ground.                       | 1 |
| 36 | Tx1+   | Transmitter Non-Inverted Data Input. |   |
| 37 | Tx1-   | Transmitter Inverted Data Input.     |   |
| 38 | GND    | Module Ground.                       | 1 |

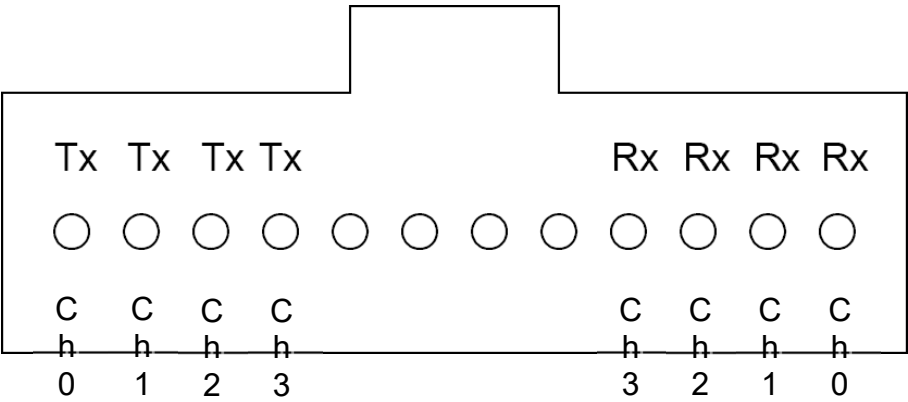
#### Notes:

1. The circuit ground is internally isolated from the chassis ground.

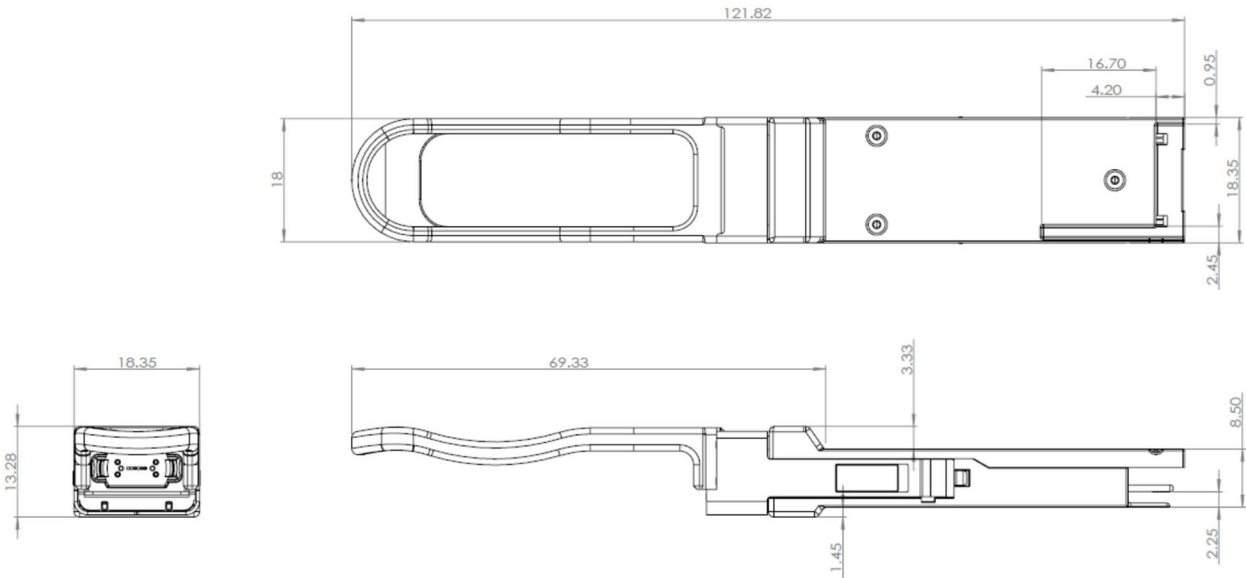
#### Electrical Pin-Out Details



Optical Lane Assignment (Front View of MPO Receptacle)



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.

