



## QSFP-100G-SR1.2-AR-SKY

Arista Networks® QSFP-100G-SR1.2 Compatible 100GBase-BX SR1.2 QSFP28 Transceiver (MMF, 844nm to 918nm, 100m, LC, DOM)

### Product Description

This Arista Networks® QSFP-100G-SR1.2 compatible QSFP28 transceiver provides 100GBase-BX SR1.2 throughput up to 100m over OM4 multi-mode fiber (MMF) using a wavelength of 844nm to 918nm 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 Arista 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. 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:

- QSFP28 MSA compliant
- Supports KP4 FEC @ 100G data rate
- Supports 100GE aggregate bit rates
- Up to 100m OM4 MMF transmission
- Operating case temperature: 10 to 70 C @ 100G
- Two independent full-duplex channels
- Maximum power consumption 4W
- Single 3.3V power supply
- RoHS compliant and lead-free
- LC optical connector



### Applications:

- 100GBase Ethernet
- Access 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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## Absolute Maximum Ratings

| Parameter                   |     | Symbol          | Min. | Max. | Unit                 | Notes |
|-----------------------------|-----|-----------------|------|------|----------------------|-------|
| Maximum Supply Voltage      |     | V <sub>CC</sub> | -0.5 | 3.6  | V                    |       |
| Storage Temperature         |     | T <sub>S</sub>  | -40  | 85   | °C                   |       |
| Operating Case Temperature  |     | T <sub>OP</sub> | 10   | 70   | °C                   |       |
| Operating Relative Humidity |     | RH              | 0    | 85   | %                    |       |
| Damage Threshold            |     | TH <sub>d</sub> | 5    |      | dBm                  |       |
| Data Rate Accuracy          |     |                 | -100 | 100  | ppm                  |       |
| Pre-FEC Bit Error Ratio     |     |                 |      |      | 2.4x10 <sup>-4</sup> |       |
| Post-FEC Bit Error Ratio    |     |                 |      |      | 1x10 <sup>-12</sup>  | 1     |
| Link Distance               | OM3 | D1              |      | 70   | m                    | 2     |
|                             | OM4 | D2              |      | 100  | m                    | 2     |
|                             | OM5 | D3              |      | 150  | m                    | 2     |

## Notes:

1. FEC provided by host system.
2. FEC required on host system to support maximum distance.

## Electrical Characteristics

| Parameter                                                                                        | Test Point | Min.                                | Typ. | Max.                           | Unit | Notes   |
|--------------------------------------------------------------------------------------------------|------------|-------------------------------------|------|--------------------------------|------|---------|
| Power Supply Voltage                                                                             | Vcc        | 3.135                               | 3.3  | 3.465                          | V    |         |
| Control Input Voltage High                                                                       |            | 2                                   |      | Vcc                            | V    |         |
| Control Input Voltage Low                                                                        |            | 0                                   |      | 0.8                            | V    |         |
| Power Consumption                                                                                |            |                                     |      | 4                              | W    |         |
| Supply Current                                                                                   | Icc        |                                     |      | 1.21                           | A    |         |
| <b>Transmitter</b>                                                                               |            |                                     |      |                                |      |         |
| Overload Differential Voltage pk-pk                                                              | TP1a       | 900                                 |      |                                | mV   |         |
| Common Mode Voltage (Vcm)                                                                        | TP1        | -350                                |      | 2850                           | mV   | 1       |
| Differential Termination Resistance Mismatch                                                     | TP1        |                                     |      | 10                             | %    | At 1MHz |
| Differential Return Loss (SDD11)                                                                 | TP1        |                                     |      | See CEI-28G-VSR Equation 13-19 | dB   |         |
| Common Mode to Differential conversion and Differential to Common Mode conversion (SDC11, SCD11) | TP1        |                                     |      | See CEI-28G-VSR Equation 13-20 | dB   |         |
| Stresses Input Test                                                                              | TP1a       | See CEI-28G-VSR Section 13.3.11.2.1 |      |                                |      |         |
| <b>Receiver</b>                                                                                  |            |                                     |      |                                |      |         |
| Differential Voltage, pk-pk                                                                      | TP4        |                                     |      | 900                            | mV   |         |
| Common Mode Voltage (Vcm)                                                                        | TP4        | -350                                |      | 2850                           | mV   | 1       |
| Common Mode Noise, RMS                                                                           | TP4        |                                     |      | 17.5                           | mV   |         |
| Differential Termination Resistance Mismatch                                                     | TP4        |                                     |      | 10                             | %    | At 1MHZ |
| Differential Return Loss (SDD22)                                                                 | TP4        |                                     |      | See CEI-28G-VSR Equation 13-19 | dB   |         |
| Common Mode to Differential conversion and Differential to Common Mode conversion (SDC22, SCD22) | TP4        |                                     |      | See CEI-28G-VSR Equation 13-21 | dB   |         |
| Common Mode Return Loss (SCC22)                                                                  | TP4        |                                     |      | -2                             | dB   | 2       |
| Transition Time, 20 to 80%                                                                       | TP4        | 9.5                                 |      |                                | ps   |         |
| Vertical Eye Closure (VEC)                                                                       | TP4        |                                     |      | 5.5                            | dB   |         |
| Eye Width at 10 <sup>-15</sup> probability (EW15)                                                | TP4        | 0.57                                |      |                                | UI   |         |
| Eye Height at 10 <sup>-15</sup> probability (EH15)                                               | TP4        | 228                                 |      |                                | mV   |         |

### Notes:

1. Vcm is generated by the host. Specification includes effects of ground offset voltage.
2. From 250MHz to 30GHz

## Optical Characteristics

| Parameter                                             | Symbol                | KP4 FEC Mode                                            |      |                                         | Unit  | Notes |
|-------------------------------------------------------|-----------------------|---------------------------------------------------------|------|-----------------------------------------|-------|-------|
|                                                       |                       | Min.                                                    | Typ. | Max.                                    |       |       |
| Transmitter                                           |                       |                                                         |      |                                         |       |       |
| Center Wavelength Line0                               | $\lambda_C$           | 844                                                     |      | 863                                     | nm    |       |
| Center Wavelength Line1                               | $\lambda_C$           | 900                                                     |      | 918                                     | nm    |       |
| RMS Spectral Width                                    | $\Delta\lambda_{rms}$ |                                                         |      | $\lambda_1$ : 0.6<br>$\lambda_2$ : 0.65 | nm    |       |
| Average Launch Power, each Lane                       | $P_{AVG}$             | -6.2                                                    |      | 4                                       | dBm   | 1     |
| Optical Modulation Amplitude (OMA), each Lane         | $P_{OMA}$             | -4.2                                                    |      | 3                                       | dBm   |       |
| Launch power in OMA minus TDP, each lane              |                       | -5.6                                                    |      |                                         | dBm   |       |
| TDECQ, each lane                                      |                       |                                                         |      | 4.5                                     | dBm   |       |
| Extinction Ratio                                      | ER                    | 3.0                                                     |      |                                         | dB    |       |
| Transmitter transition time, each lane (max)          |                       |                                                         |      | 31                                      | ps    |       |
| RIN12 OMA                                             |                       |                                                         |      | -128                                    | dB/Hz |       |
| Optical Return Loss Tolerance                         | TOL                   |                                                         |      | 12                                      | dB    |       |
| Average Launch Power OFF Transmitter, each Lane       | $P_{off}$             |                                                         |      | -30                                     | dBm   |       |
| Encircled Flux                                        |                       | $\geq 86\%$ at 19 $\mu m$<br>$\leq 30\%$ at 4.5 $\mu m$ |      |                                         |       | 2     |
| Signaling rate, each lane                             |                       | 26.5625± 100ppm                                         |      |                                         | Gbps  |       |
| Receiver                                              |                       |                                                         |      |                                         |       |       |
| Center Wavelength Lane0                               | $\lambda_C$           | 844                                                     | 850  | 863                                     | nm    |       |
| Center Wavelength Lane1                               | $\lambda_C$           | 900                                                     | 910  | 918                                     | nm    |       |
| Damage Threshold, each Lane                           | $TH_d$                | 5                                                       |      |                                         | dBm   | 3     |
| Average Receive Power, each lane                      |                       | -8.2                                                    |      |                                         | dBm   | 4     |
| Average power at receiver input, each lane (overload) |                       |                                                         |      | 4                                       | dBm   |       |
| Receiver Reflectance                                  | $R_R$                 |                                                         |      | -12                                     | dB    |       |
| Stressed receiver sensitivity in OMA, Lane2           |                       |                                                         |      | -3.5                                    | dBm   | 5     |
| Receiver sensitivity (OMA outer), each lane           |                       |                                                         |      | Max(-6.6, SECQ-8)<br>as per IEEE cl 150 | dBm   |       |
| LOS Assert                                            | LOSA                  | -30                                                     |      | -14.2                                   | dBm   |       |
| LOS Deassert                                          | LOSD                  |                                                         |      | -11.2                                   | dBm   |       |
| LOS Hysteresis                                        | LOSH                  | 0.5                                                     |      |                                         | dB    |       |

### Notes:

1. Even if the mTDEC < 0.9 db, the OMA (min) must exceed this value.
2. If measured into type A1a.2 50um fiber in accordance with IEC 61280-1-4.
3. The receiver shall be able to tolerate, without damage, continuous exposure to a modulated optical input signal having this power level on one lane. The receiver does not have to operate correctly at this input power.

4. Average receive power, each lane (min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance.
5. Measured with conformance test signal at TP3 as per the following:

|                                               |     |     |
|-----------------------------------------------|-----|-----|
| <b>Stressed eye closure (SECq), each lane</b> | 4.5 | dB  |
| <b>OMA of each aggressor, each lane</b>       | 3   | dBm |

## Pin Descriptions

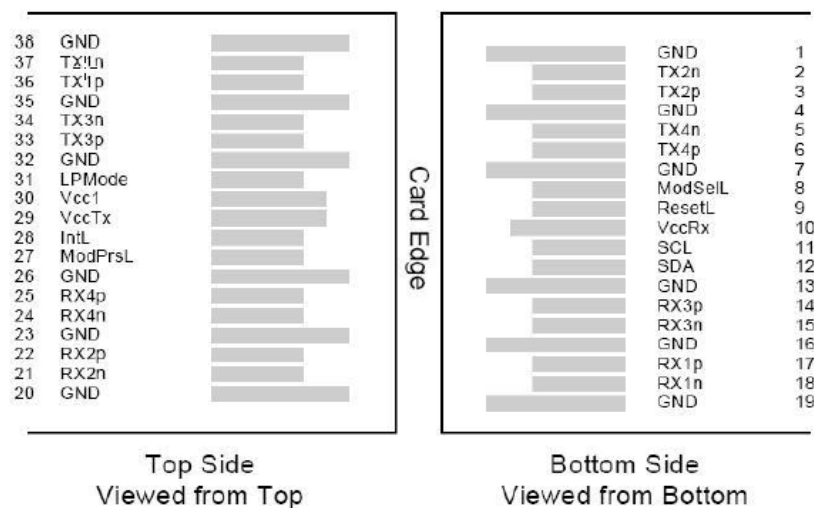
| Pin | Logic       | Symbol  | Name/Descriptions                    | Notes |
|-----|-------------|---------|--------------------------------------|-------|
| 1   |             | GND     | Ground                               | 1     |
| 2   | CML-I       | Tx2n    | Transmitter Inverted Data Input      |       |
| 3   | CML-I       | Tx2p    | Transmitter Non-Inverted Data output |       |
| 4   |             | GND     | Ground                               | 1     |
| 5   | CML-I       | Tx4n    | Transmitter Inverted Data Input      |       |
| 6   | CML-I       | Tx4p    | Transmitter Non-Inverted Data output |       |
| 7   |             | GND     | Ground                               | 1     |
| 8   | LVTLL-I     | ModSelL | Module Select                        |       |
| 9   | LVTLL-I     | ResetL  | Module Reset                         |       |
| 10  |             | VccRx   | +3.3V Power Supply Receiver          | 2     |
| 11  | LVC MOS-I/O | SCL     | 2-Wire Serial Interface Clock        |       |
| 12  | LVC MOS-I/O | SDA     | 2-Wire Serial Interface Data         |       |
| 13  |             | GND     | Ground                               |       |
| 14  | CML-O       | Rx3p    | Receiver Non-Inverted Data Output    |       |
| 15  | CML-O       | Rx3n    | Receiver Inverted Data Output        |       |
| 16  |             | GND     | Ground                               | 1     |
| 17  | CML-O       | Rx1p    | Receiver Non-Inverted Data Output    |       |
| 18  | CML-O       | Rx1n    | Receiver Inverted Data Output        |       |
| 19  |             | GND     | Ground                               | 1     |
| 20  |             | GND     | Ground                               | 1     |
| 21  | CML-O       | Rx2n    | Receiver Inverted Data Output        |       |
| 22  | CML-O       | Rx2p    | Receiver Non-Inverted Data Output    |       |
| 23  |             | GND     | Ground                               | 1     |
| 24  | CML-O       | Rx4n    | Receiver Inverted Data Output        | 1     |
| 25  | CML-O       | Rx4p    | Receiver Non-Inverted Data Output    |       |
| 26  |             | GND     | Ground                               | 1     |
| 27  | LVTTL-O     | ModPrsL | Module Present                       |       |
| 28  | LVTTL-O     | IntL    | Interrupt                            |       |

|    |          |        |                                     |   |
|----|----------|--------|-------------------------------------|---|
| 29 |          | VccTx  | +3.3 V Power Supply transmitter     | 2 |
| 30 |          | Vcc1   | +3.3 V Power Supply                 | 2 |
| 31 | LVTTTL-I | LPMode | Low Power Mode                      |   |
| 32 |          | GND    | Ground                              | 1 |
| 33 | CML-I    | Tx3p   | Transmitter Non-Inverted Data Input |   |
| 34 | CML-I    | Tx3n   | Transmitter Inverted Data Output    |   |
| 35 |          | GND    | Ground                              | 1 |
| 36 | CML-I    | Tx1p   | Transmitter Non-Inverted Data Input |   |
| 37 | CML-I    | Tx1n   | Transmitter Inverted Data Output    |   |
| 38 |          | GND    | Ground                              | 1 |

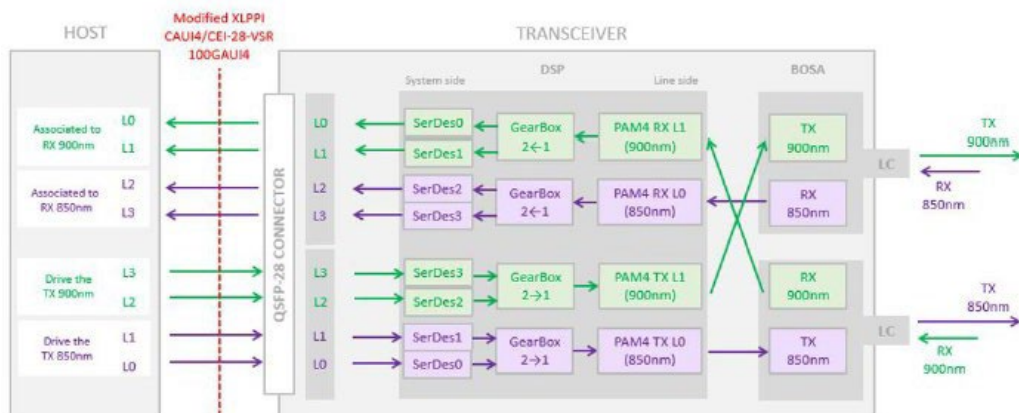
#### Notes:

1. GND is the symbol for signal and supply (power) common for the QSFP28 module. All are common within the QSFP28 module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.
2. VccRx, Vcc1 and VccTx are the receiver and transmitter power supplies and shall be applied concurrently. Recommended host board power supply filtering is shown in Figure 4 below. Vcc Rx, Vcc1 and Vcc Tx may be internally connected within the QSFP28 transceiver module in any combination. The connector pins are each rated for a maximum current of 1000mA.

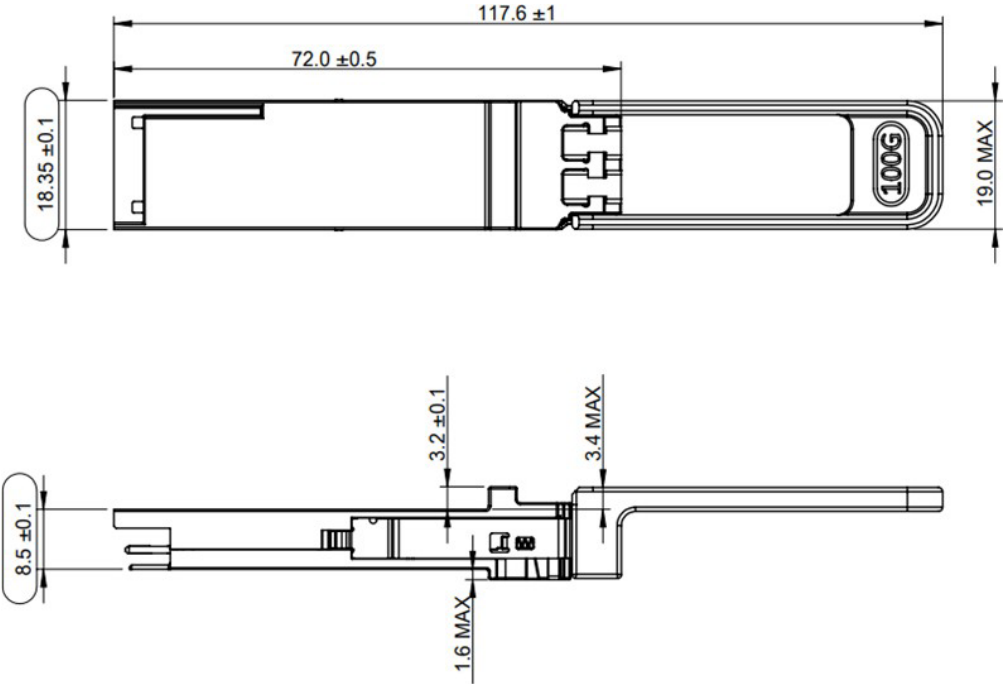
#### Electrical Pin-Out Details



### The orientation of the multi-mode fiber facets of the optical connector



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.

