



## Q2B91020C02FGOK

Mellanox® Compatible 100GBase-BX LR1 PAM4 QSFP28 Transceiver Single Lambda (SMF, 1291nmTx/1311nmRx, 20km, LC, DOM, -40 to 85C)

### Product Description

This Mellanox® Compatible QSFP28 transceiver provides 100GBase-BX LR1 throughput up to 20km over single-mode fiber (SMF) using a wavelength of 1291nmTx/1311nmRx via an LC connector. This bidirectional unit must be used with another transceiver or network appliance of complimenting wavelengths. It is also capable of withstanding rugged environments and can operate at temperatures between -40 to 85C. It is guaranteed to be 100% compatible with the equivalent Mellanox® transceiver. This easy to install, hot swappable transceiver has been programmed, uniquely serialized and data-traffic and application tested to ensure that it will initialize and perform identically. Digital optical monitoring (DOM) support is also present to allow 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:

- Compliant with Industry Standards 100G-LR1-20 Lambda MSA
- PIN Receiver
- Compliant with SFF-8661, SFF-8636, and SFF-8679 MSA Hardware Specifications
- Up to 20km on 9/125µm SMF
- Operating Temperature: -40 to 85 Celsius
- EML Laser
- RoHS Compliant and Lead-Free



### Applications:

- 100GBase Ethernet
- Datacenter

---

*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.*

---

## Absolute Maximum Ratings

| Parameter                                       | Symbol | Min. | Typ.            | Max.               | Unit | Notes |
|-------------------------------------------------|--------|------|-----------------|--------------------|------|-------|
| Operating Temperature                           | Tc     | -40  |                 | 85                 | °C   |       |
| Storage Temperature                             | Tstg   | -40  |                 | 85                 | °C   |       |
| Relative Humidity                               | RH     | 15   |                 | 85                 | %    |       |
| Supply Voltage                                  | Vcc    | 0    |                 | 3.6                | V    |       |
| Data Input Voltage                              |        | -0.3 |                 | 3.6                | V    |       |
| Control Input Voltage                           |        | -0.3 |                 | 4                  | V    |       |
| Data Rate                                       | DR     |      | 53.125 ± 100ppm |                    | GBd  |       |
| Bit Error Rate                                  | BER    |      |                 | 2.4E <sup>-4</sup> |      | 1     |
| Supported Link Length on 9/125µm SMF @53.125GBd | L      |      | 20              |                    | km   | 2     |

### Notes:

1. Tested with a PRBS31Q test pattern for 53.125GBd operation.
2. Distances are based on FC-PI-6 Rev. 3.1 and IEEE 802.3 standards with FEC.

## Electrical Characteristics

| Parameter                      | Symbol  | Min. | Typ. | Max. | Unit  | Notes |
|--------------------------------|---------|------|------|------|-------|-------|
| Power Supply Voltage           | Vcc     | 3.13 | 3.3  | 3.47 | V     |       |
| Module Supply Current          | Icc     |      |      | 1437 | mA    | 1     |
| Power Dissipation              | PD      |      |      | 4500 | mW    |       |
| Transmitter                    |         |      |      |      |       |       |
| Differential Input Impedance   | ZIN     | 90   | 100  | 110  | Ω     |       |
| Differential Data Input Swing  | VIN,pp  | 180  |      | 900  | mVp-p |       |
| Receiver                       |         |      |      |      |       |       |
| Differential Output Impedance  | ZOUT    | 90   | 100  | 110  | Ω     |       |
| Differential Data Output Swing | VOUT,pp | 300  |      | 900  | mVp-p |       |

### Notes:

1. The maximum current is calculated at the minimum supply voltage.

## Optical Characteristics

| Parameter                                               | Symbol      | Min.      | Typ. | Max.    | Unit  | Notes |
|---------------------------------------------------------|-------------|-----------|------|---------|-------|-------|
| <b>Transmitter</b>                                      |             |           |      |         |       |       |
| Average Launch Optical Power                            | Po          | -0.2      |      | 6.6     | dBm   | 1     |
| Launch Optical Power (OMA)                              | Poma        | 2.8       |      | 6.8     | dBm   | 2     |
|                                                         |             | 1.4+TDECQ |      |         |       | 3     |
| Extinction Ratio                                        | ER          | 3.5       |      |         | dB    |       |
| Center Wavelength                                       | $\lambda_C$ | 1284.5    | 1291 | 1297.5  | nm    |       |
| Transmitter and Dispersion Penalty Eye Closure for PAM4 | TDECQ       |           |      | 3.6     | dB    |       |
| Transmitter Eye Closure for PAM4                        | TECQ        |           |      | 3.4     | dB    |       |
| RIN <sub>17.1</sub> OMA (Maximum)                       | RIN         |           |      | -136    | dB/Hz |       |
| Optical Return Loss Tolerance                           | ORLT        |           |      | 15.6    | dB    |       |
| POUT @Tx_Disable Asserted                               | Poff        |           |      | -15     | dBm   |       |
| <b>Receiver</b>                                         |             |           |      |         |       |       |
| Center Wavelength                                       | $\lambda_C$ | 1304.5    | 1311 | 1317.5  | nm    |       |
| Receiver Sensitivity (OMA)                              | RxSENS      |           |      | -7.6    | dBm   | 1, 4  |
|                                                         |             |           |      | -9+TECQ |       | 5     |
| Receiver Reflectance                                    |             |           |      | -26     | dB    |       |
| LOS De-Assert                                           | LOSD        |           |      | -12     | dBm   |       |
| LOS Assert                                              | LOSA        | -18       |      |         | dBm   |       |
| LOS Hysteresis                                          |             | 0.5       |      |         | dB    |       |

### Notes:

1. Measured with PRBS31Q test pattern, @53.125GBd, and BER<2.4E<sup>-4</sup>.
2. TDECQ < 1.4dB.
3. 1.4dB ≤ TDECQ ≤ TDECQ, maximum.
4. TECQ < 1.4dB.
5. 1.4dB < TECQ ≤ 3.6dB.

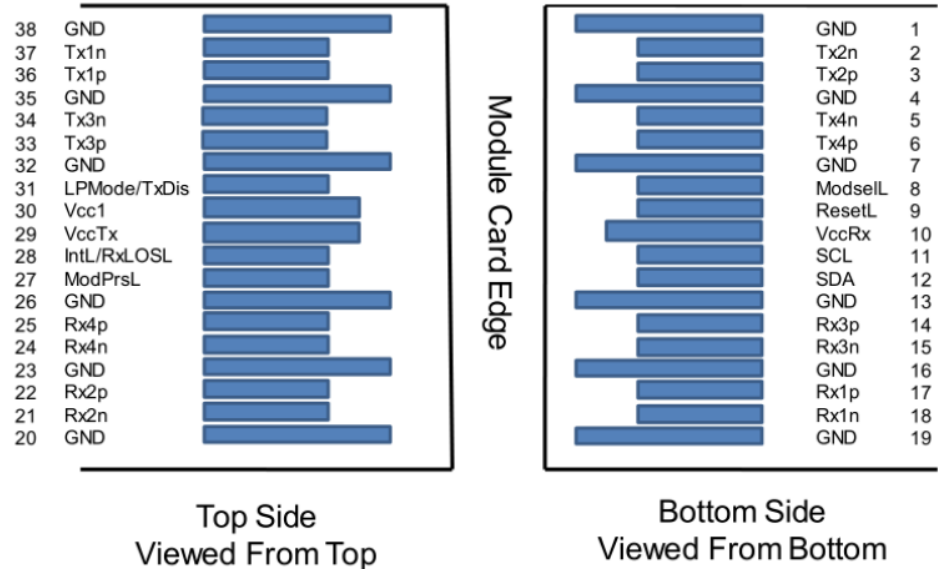
## Pin Descriptions

| Pin | Logic      | Symbol       | Name/Description                                                                          | Notes |
|-----|------------|--------------|-------------------------------------------------------------------------------------------|-------|
| 1   |            | GND          | Module Ground.                                                                            | 1     |
| 2   | CML-I      | Tx2-         | Transmitter Inverted Data Input.                                                          |       |
| 3   | CML-I      | Tx2+         | Transmitter Non-Inverted Data Output.                                                     |       |
| 4   |            | GND          | Module Ground.                                                                            | 1     |
| 5   | CML-I      | Tx4-         | Transmitter Inverted Data Input.                                                          |       |
| 6   | CML-I      | Tx4+         | Transmitter Non-Inverted Data Input.                                                      |       |
| 7   |            | GND          | Module Ground.                                                                            | 1     |
| 8   | LVTTTL-I   | ModSelL      | Module Select.                                                                            | 2     |
| 9   | LVTTTL-I   | ResetL       | Module Reset.                                                                             | 2     |
| 10  |            | VccRx        | +3.3V Receiver Power Supply.                                                              |       |
| 11  | LVCNOS-I/O | SCL          | 2-Wire Serial Interface Clock.                                                            | 2     |
| 12  | LVCNOS-I/O | SDA          | 2-Wire Serial Interface Data.                                                             | 2     |
| 13  |            | GND          | Module Ground.                                                                            | 1     |
| 14  | CML-O      | Rx3+         | Receiver Non-Inverted Data Output.                                                        |       |
| 15  | CML-O      | Rx3-         | Receiver Inverted Data Output.                                                            |       |
| 16  |            | GND          | Module Ground.                                                                            | 1     |
| 17  | CML-O      | Rx1+         | Receiver Non-Inverted Data Output.                                                        |       |
| 18  | CML-O      | Rx1-         | Receiver Inverted Data Output.                                                            |       |
| 19  |            | GND          | Module Ground.                                                                            | 1     |
| 20  |            | GND          | Module Ground.                                                                            | 1     |
| 21  | CML-O      | Rx2-         | Receiver Inverted Data Output.                                                            |       |
| 22  | CML-O      | Rx2+         | Receiver Non-Inverted Data Output.                                                        |       |
| 23  |            | GND          | Module Ground.                                                                            | 1     |
| 24  | CML-O      | Rx4-         | Receiver Inverted Data Output.                                                            |       |
| 25  | CML-O      | Rx4+         | Receiver Non-Inverted Data Output.                                                        |       |
| 26  |            | GND          | Module Ground.                                                                            | 1     |
| 27  | LVTTTL-O   | ModPrsL      | Module Present.                                                                           |       |
| 28  | LVTTTL-O   | IntL/RxLOSL  | Interrupt. Optionally configurable as RxLOSL via the management interface (SFF-8636).     | 2     |
| 29  |            | VccTx        | +3.3V Transmitter Power Supply.                                                           |       |
| 30  |            | Vcc1         | +3.3V Power Supply.                                                                       |       |
| 31  | LVTTTL-I   | LPMode/TxDis | Low-Power Mode. Optionally configurable as TxDis via the management interface (SFF-8636). | 2     |
| 32  |            | GND          | Module Ground.                                                                            | 1     |
| 33  | CML-I      | Tx3+         | Transmitter Non-Inverted Data Input.                                                      |       |
| 34  | CML-I      | Tx3-         | Transmitter Inverted Data Input.                                                          |       |
| 35  |            | GND          | Module Ground.                                                                            | 1     |
| 36  | CML-I      | Tx1+         | Transmitter Non-Inverted Data Input.                                                      |       |
| 37  | CML-I      | Tx1-         | Transmitter Inverted Data Input.                                                          |       |
| 38  |            | GND          | Module Ground.                                                                            | 1     |

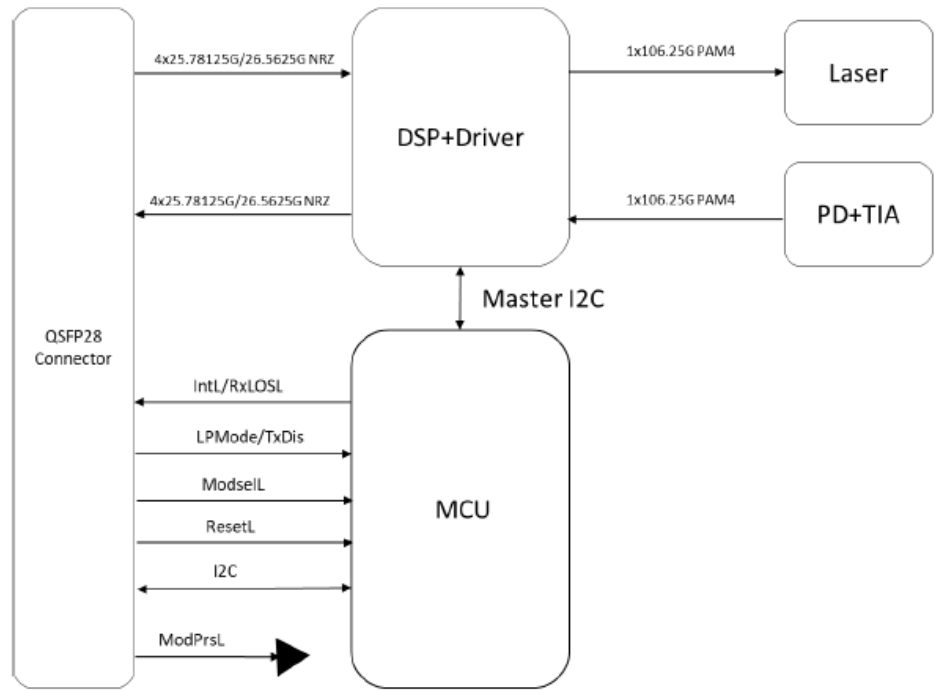
**Notes:**

- 1. GND is the symbol for signal and supply (power) common for the module. All are common within the 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 applied concurrently and may be internally connected within the module in any combination. Vcc contacts in SFF-8662 and SFF-8672 each have a steady state current rating of 1A.

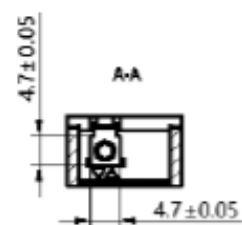
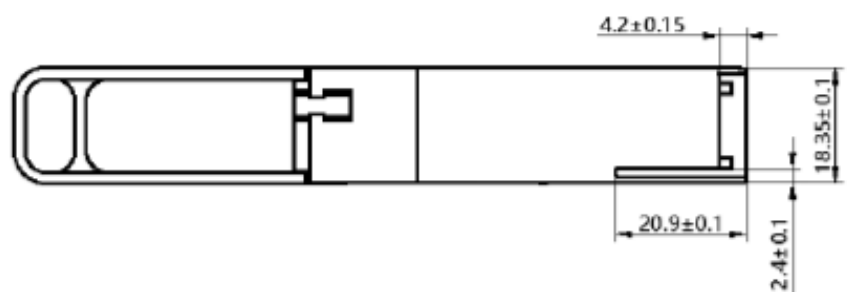
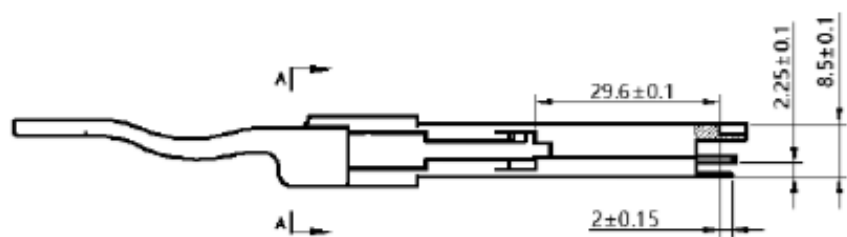
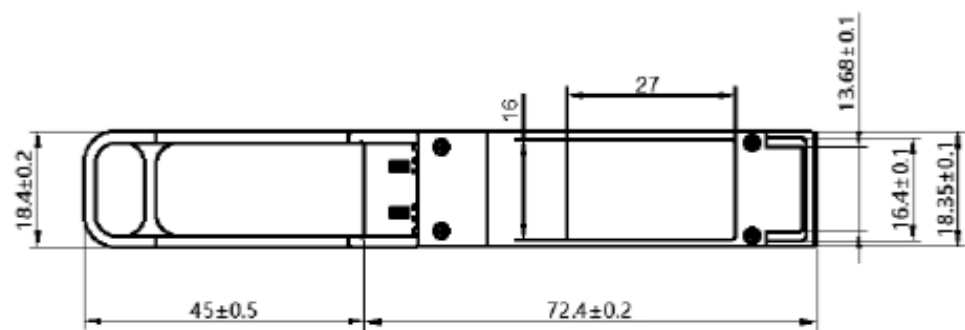
**Electrical Pin-Out Details**



**Block Diagram**



Mechanical Specifications



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.

