

# 100Gbps QSFP28 SR4 Transceiver

## Product Specification

### Product Features

- Hot-pluggable QSFP28 form factor
- Supports 25.78125Gb/s bit rate per channel
- Maximum link length of 70m over OM3 Multimode Fiber (MMF) and 100m over OM4 (MMF)
- 4 channels 850nm VCSEL laser and 4 channels PIN photo detector array
- Single MPO connector receptacle
- Internal CDR circuits on both receiver and transmitter channels
- Case operating temperature range: 0 ~ +70°C
- Single 3.3V power supply
- Power dissipation: <2.5 W
- QSFP28 housing with enhanced EMI shielding



### Applications

- Data center and Cloud services
- 100GBASE-SR4 Ethernet
- Infiniband EDR interconnects
- Servers, Switches, Storage and Host Card Adapters

### Standards

- Compliant with QSFP28 MSA
- Compliant with IEEE 802.3bm
- Compliant with SFF-8636
- RoHS Compliant

## General Description

The QSFP28-100G-SR4 is a Four-Channel, Pluggable, Fiber-Optic QSFP28 SR4 for 100Gigabit Ethernet and Infiniband EDR applications. This transceiver is a high performance module for data communication and interconnect applications. It integrates four data lanes in each direction with 103.1Gbps bandwidth. The length of MNC QSFP28 SR4 is up to 70 meters over OM3 MMF or 100 meters over OM4 MMF. This module is designed to operate over multimode fiber systems using a nominal wavelength of 850nm. The electrical interface uses a 38 contact edge type connector. The optical interface uses a 12 fiber MPO connector.

## Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

| Parameter            | Symbol | Min     | Max     | Unit | Notes |
|----------------------|--------|---------|---------|------|-------|
| Storage Temperature  | Ts     | -40     | +85     | °C   |       |
| Operating Humidity   | RH     | 5       | 95      | %    |       |
| Power Supply Voltage | Vcc    | -0.5    | 3.6     | V    |       |
| Signal Input Voltage |        | Vcc-0.3 | Vcc+0.3 | V    |       |

## Recommended Operating Environment

Recommended Operating Environment specifies parameters for which the electrical and optical characteristics hold unless otherwise noted.

| Parameter                                        | Symbol | Min             | Typical | Max   | Unit |
|--------------------------------------------------|--------|-----------------|---------|-------|------|
| Operating Case Temperature                       | Tc     | 0               |         | +70   | °C   |
| Power Supply Voltage                             | Vcc    | 3.135           | 3.3     | 3.465 | V    |
| Power Supply Current                             | Icc    |                 |         | 750   | mA   |
| Bit Rate, each channel                           | BR     | 25.78125±100ppm |         |       | Gbps |
| Fiber Length on 50/125µm high-bandwidth(OM3) MMF |        |                 |         | 70    | m    |
| Fiber Length on 50/125µm high-bandwidth(OM4) MMF |        |                 |         | 100   | m    |

## Optical Characteristics

The following Optical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

| Parameter                                                | Symbol      | Min                                | Typical | Max | Unit | Notes |
|----------------------------------------------------------|-------------|------------------------------------|---------|-----|------|-------|
| <b>Transmitter Characteristics</b>                       |             |                                    |         |     |      |       |
| Center Wavelength                                        | $\lambda_c$ | 840                                | 850     | 860 | nm   |       |
| Average Launch Power, each lane                          | PAVG        | -8.4                               |         | 2.4 | dBm  |       |
| Optical Power OMA, each Lane                             | POMA        | -6.4                               |         | 3   | dBm  |       |
| Spectral Width (RMS)                                     | $\sigma$    |                                    |         | 0.6 | dB   |       |
| Optical Extinction Ratio                                 | ER          | 2                                  |         |     | dB   |       |
| Optical Return Loss Tolerance                            | ORL         |                                    |         | 12  | dB   |       |
| Transmitter Reflectance                                  | RT          |                                    |         | -12 | dB   |       |
| Output Eye Mask coordinates:<br>{X1, X2, X3, Y1, Y2, Y3} |             | {0.3, 0.38, 0.45, 0.35, 0.41, 0.5} |         |     |      | 1,2   |

| Receiver Characteristics              |                |                |       |     |     |     |
|---------------------------------------|----------------|----------------|-------|-----|-----|-----|
| Receiver Wavelength                   |                | $\lambda_{in}$ | 840   | 850 | 860 | nm  |
| Damage Threshold, each lane           |                | THd            | 3.0   |     |     | dBm |
| Average Receive Power, each lane      |                | RSENS          | -10.3 |     | 2.4 | dBm |
| Receiver Sensitivity (OMA), each lane |                | Psen1          |       |     | -8  | dBm |
| LOS                                   | LOS Assert     | LOSA           | -30   |     |     | dBm |
|                                       | LOS De-Assert  | LOSD           |       |     | -10 | dBm |
|                                       | LOS Hysteresis | LOSH           | 0.5   | 2   |     | dB  |
| Input Saturation Power (Overload)     |                | Psat           | 2.4   |     |     | dBm |
| Receiver Reflectance                  |                | Rr             |       |     | -12 | dB  |

#### Notes:

1. Compliant with IEEE 802.3bm.
2. Transmitter hit ratio 5E-5 hits/sample.
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. Measured with a PRBS 2<sup>31</sup>-1 test pattern, @25.78125Gb/s, BER<5E-5.

### Electrical Characteristics

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

| Parameter                             | Symbol  | Min   | Typical | Max   | Unit     | Notes |
|---------------------------------------|---------|-------|---------|-------|----------|-------|
| Supply Voltage                        | Vcc     | 3.135 | 3.3     | 3.465 | V        |       |
| Supply Current                        | Icc     |       |         | 750   | mA       |       |
| Transmitter                           |         |       |         |       |          |       |
| Input differential impedance          | ZIN     | 90    | 100     | 110   | $\Omega$ |       |
| Differential data input swing         | Vin,pp  | 180   |         | 1000  | mVPP     | 1     |
| Single ended input voltage tolerance  | VinT    | -0.3  |         | 4.0   | V        |       |
| Receiver                              |         |       |         |       |          |       |
| Single ended output voltage tolerance | VoutT   | -0.3  |         | 4.0   | V        |       |
| Differential data output swing        | Vout,pp | 300   |         | 850   | mVPP     | 2     |

#### Notes:

1. Differential data input swing is measured between TxnP and TxnN.
2. Differential data output swing is measured between RxnP and RxnN.

### Digital Diagnostic Monitoring Information

| Parameter    | Units | Min   | Max   | Accuracy | Calibration | Notes |
|--------------|-------|-------|-------|----------|-------------|-------|
| Temperature  | °C    | 0     | +70   | ±3°C     | Internal    |       |
| Voltage      | V     | 3.135 | 3.465 | ±3%      | Internal    |       |
| Bias Current | mA    | 0     | 12    | ±10%     | Internal    | 1     |
| TX Power     | dBm   | -8.4  | 2.4   | ±3dB     | Internal    |       |
| RX Power     | dBm   | -10.3 | 2.4   | ±3dB     | Internal    |       |

#### Notes:

1. Accuracy of Measured Tx Bias Current is 10% of the actual Bias Current from the laser driver to the laser.

## Pin Assignment

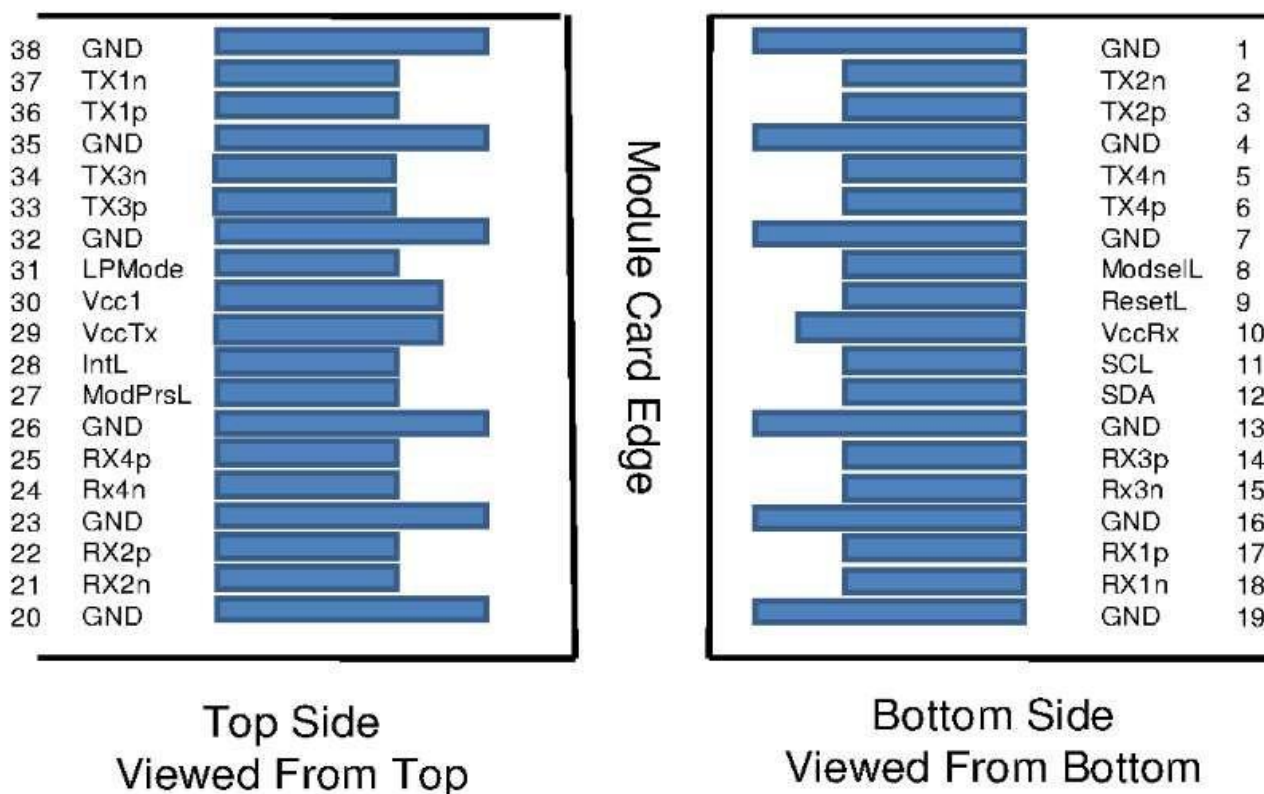


Figure 1 Pinout of Connector Block on Host Board

Table 1 PIN Definition

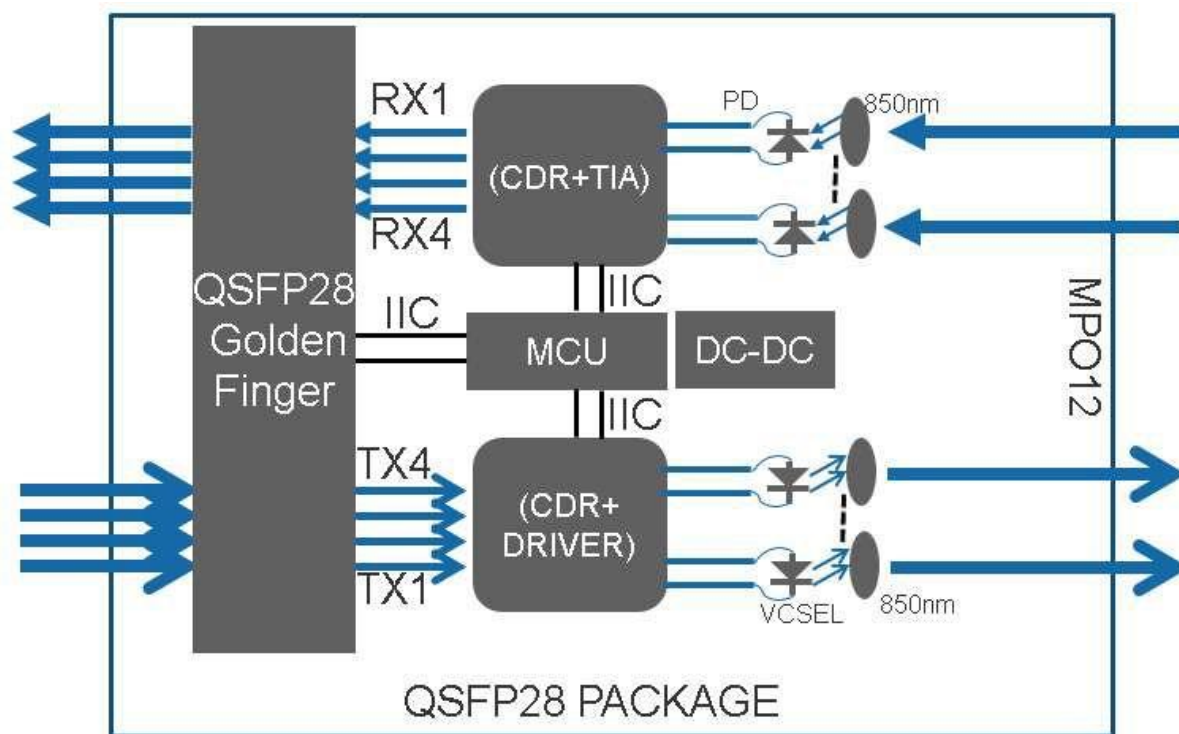
| Pin | Symbol  | Name/Description                                 | Notes |
|-----|---------|--------------------------------------------------|-------|
| 1   | GND     | Transmitter Ground (Common with Receiver Ground) | 1     |
| 2   | Tx2n    | Transmitter Inverted Data Input                  |       |
| 3   | Tx2p    | Transmitter Non-Inverted Data output             |       |
| 4   | GND     | Transmitter Ground (Common with Receiver Ground) | 1     |
| 5   | Tx4n    | Transmitter Inverted Data Input                  |       |
| 6   | Tx4p    | Transmitter Non-Inverted Data output             |       |
| 7   | GND     | Transmitter Ground (Common with Receiver Ground) | 1     |
| 8   | ModSelL | Module Select                                    |       |
| 9   | ResetL  | Module Reset                                     |       |
| 10  | VccRx   | 3.3V Power Supply Receiver                       | 2     |
| 11  | SCL     | 2-Wire serial Interface Clock                    |       |
| 12  | SDA     | 2-Wire serial Interface Data                     |       |
| 13  | GND     | Transmitter Ground (Common with Receiver Ground) |       |
| 14  | Rx3p    | Receiver Non-Inverted Data Output                |       |
| 15  | Rx3n    | Receiver Inverted Data Output                    |       |
| 16  | GND     | Transmitter Ground (Common with Receiver Ground) | 1     |
| 17  | Rx1p    | Receiver Non-Inverted Data Output                |       |
| 18  | Rx1n    | Receiver Inverted Data Output                    |       |
| 19  | GND     | Transmitter Ground (Common with Receiver Ground) | 1     |
| 20  | GND     | Transmitter Ground (Common with Receiver Ground) | 1     |

|    |         |                                                  |   |
|----|---------|--------------------------------------------------|---|
| 21 | Rx2n    | Receiver Inverted Data Output                    |   |
| 22 | Rx2p    | Receiver Non-Inverted Data Output                |   |
| 23 | GND     | Transmitter Ground (Common with Receiver Ground) | 1 |
| 24 | Rx4n    | Receiver Inverted Data Output                    | 1 |
| 25 | Rx4p    | Receiver Non-Inverted Data Output                |   |
| 26 | GND     | Transmitter Ground (Common with Receiver Ground) | 1 |
| 27 | ModPrsl | Module Present                                   |   |
| 28 | IntL    | Interrupt                                        |   |
| 29 | VccTx   | 3.3V power supply transmitter                    | 2 |
| 30 | Vcc1    | 3.3V power supply                                | 2 |
| 31 | LPMODE  | Low Power Mode, not connect                      |   |
| 32 | GND     | Transmitter Ground (Common with Receiver Ground) | 1 |
| 33 | Tx3p    | Transmitter Non-Inverted Data Input              |   |
| 34 | Tx3n    | Transmitter Inverted Data Output                 |   |
| 35 | GND     | Transmitter Ground (Common with Receiver Ground) | 1 |
| 36 | Tx1p    | Transmitter Non-Inverted Data Input              |   |
| 37 | Tx1n    | Transmitter Inverted Data Output                 |   |
| 38 | GND     | Transmitter Ground (Common with Receiver Ground) | 1 |

**Notes:**

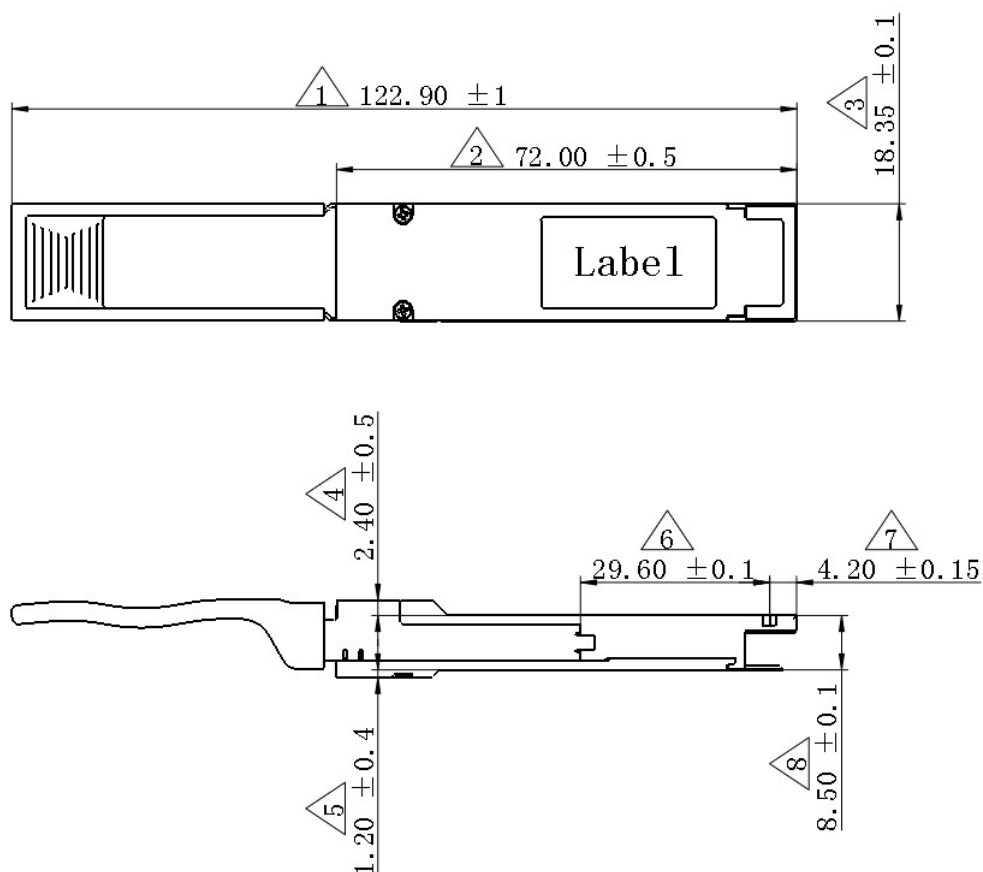
1. GND is the symbol for signal and supply (power) common for QSFP28 modules. All are common within the QSFP28 module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal common ground plane.
2. VccRx, Vcc1 and VccTx are the receiving and transmission power suppliers and shall be applied concurrently. Recommended host board power supply filtering is shown 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 500mA.

## Optical Module Block Diagram



## Mechanical Dimensions

Dimensions are in millimeters. (Unit: mm)



## Ordering Information

| Part Number     | Description                                |
|-----------------|--------------------------------------------|
| QSFP28-100G-SR4 | 100G QSFP28 SR4 850nm MMF 100m Transceiver |

E-mail: [info@connlight.com](mailto:info@connlight.com)

Web: [www.connlight.com](http://www.connlight.com)