

## RQ-100G-SR4

### 100G QSFP28 SR4 850nm MPO Optical Transceiver

FIBERWDM's 100G QSFP28 SR4 is a  $4 \times 25$ Gbps multi mode fiber, hot pluggable optical transceiver. The module integrates four parallel lanes with data rate at 25.78Gbps each lane. It can transmit up to 70 m on fiber OM3 fiber or 100 m on OM4 fiber with FEC.

#### Features

- ◆ Compliant with IEEE Std 802.3bm
- ◆ Compliant with SFF-8665
- ◆ Transmission data rate up to 25.78125GbpsData rate per channel
- ◆ High Reliability 850nm VCSEL technology
- ◆ Electrically hot-pluggable
- ◆ Single +3.3V power supply
- ◆ Case temperature range: 0 ~ +70°C
- ◆ Maximum power consumption 2.5W
- ◆ Single MPO12 connector
- ◆ RoHS complaint

#### Applications

- ◆ 100GBASE-SR4 Ethernet links
- ◆ Data centers

#### Absolute Maximum Ratings

| Parameter                 | Symbol           | Min                      | Max | Units |
|---------------------------|------------------|--------------------------|-----|-------|
| Storage Temperature Range | T <sub>STG</sub> | -40                      | +85 | °C    |
| Supply Voltage            | V <sub>CC</sub>  | 0                        | 4   | V     |
| Relative Humidity         | RH               | 5% to 85% non-condensing |     |       |

#### Operating Conditions

| Parameter                    | Symbol            | Min  | Max  | Units |
|------------------------------|-------------------|------|------|-------|
| Case Temperature- Operating  | T <sub>CASE</sub> | 0    | 70   | °C    |
| Supply Voltage               | V <sub>CC</sub>   | 3.14 | 3.46 | V     |
| Power Consumption            | P <sub>DISS</sub> |      | 2.5  | W     |
| Link Distance over OM4 Fiber |                   |      | 100  | M     |
| Link Distance over OM3 Fiber |                   |      | 70   | M     |

## Transmitter Optical Specifications

| Transmitter Parameter                                    | Min                           | Typical | Max   | Units |
|----------------------------------------------------------|-------------------------------|---------|-------|-------|
| Signaling Rate, each lane                                | 25.78125 ± 100 ppm            |         |       | Gbps  |
| Center Wavelength Range                                  | 840                           | 850     | 860   | nm    |
| Modulation Format                                        | NRZ                           |         |       |       |
| Average launch Power per lane                            | -8.4                          |         | 2.4   | dBm   |
| RMS spectral width                                       |                               |         | 0.6   | nm    |
| Optical Modulation Amplitude, each lane                  | -6.4                          |         | 3.0   | dBm   |
| Average Launch Power per Lane @ TX Off State             |                               |         | -30.0 | dBm   |
| Launch Power in OMA minus TDEC, each Lane                | -7.3                          |         |       | dBm   |
| Transmitter and Dispersion Eye Closure, each Lane        |                               |         | 4.3   | dB    |
| Extinction Ratio                                         | 2.0                           |         |       | dB    |
| Optical Return Loss Tolerance                            |                               |         | 12    | dB    |
| Transmitter Eye mask definition {X1, X2, X3, Y1, Y2, Y3} | {0.3,0.38,0.45,0.35,0.41,0.5} |         |       |       |

## Receiver Optical Specifications

| Receiver Parameter                                             | Min                          | Typical | Max   | Units |
|----------------------------------------------------------------|------------------------------|---------|-------|-------|
| Signaling Rate, each lane                                      | 25.78125 ± 100 ppm           |         |       | Gbps  |
| Lane Wavelength Range                                          | 840                          | 850     | 860   | nm    |
| Modulation Format                                              | NRZ                          |         |       |       |
| Damage Threshold                                               | 3.4                          |         |       | dBm   |
| Average Receive Power, each lane                               | -10.3                        |         | 2.4   | dBm   |
| Receiver Power, each lane (OMA)                                |                              |         | 3.0   | dBm   |
| Receiver Reflectance                                           |                              |         | -12.0 | dB    |
| Stressed Receiver Sensitivity (OMA), each lane                 |                              |         | -5.2  | dBm   |
| Stressed Conditions for Stress Receiver Sensitivity            |                              |         |       |       |
| Stressed Eye Closure                                           |                              | 4.3     |       | dB    |
| stressed Eye J2 Jitter                                         |                              | 0.39    |       | UI    |
| stressed Eye J4 Jitter                                         |                              | 0.53    |       | UI    |
| OMA of each aggressor lane                                     |                              | 3       |       | dBm   |
| Stressed Receiver Eye Mask Definition {X1, X2, X3, Y1, Y2, Y3} | {0.28,0.5,0.5,0.33,0.33,0.4} |         |       |       |
| RX_LOS_Assert Min/Max                                          | -30.0                        |         |       | dBm   |
| RX_LOS_De-Assert Min/Max                                       |                              |         | -12.0 | dBm   |
| RX_LOS_Hysteresis                                              | 0.5                          |         |       | dB    |

## QSFP28 Connector and Pinout Description

The electrical interface to the transceiver is a 38 pins edge connector. The 38 pins provide high speed data, low speed monitoring and control signals, I2C communication, power and ground connectivity. The top and bottom views of the connector are provided below, as well as a table outlining the contact numbering, symbol and full description.

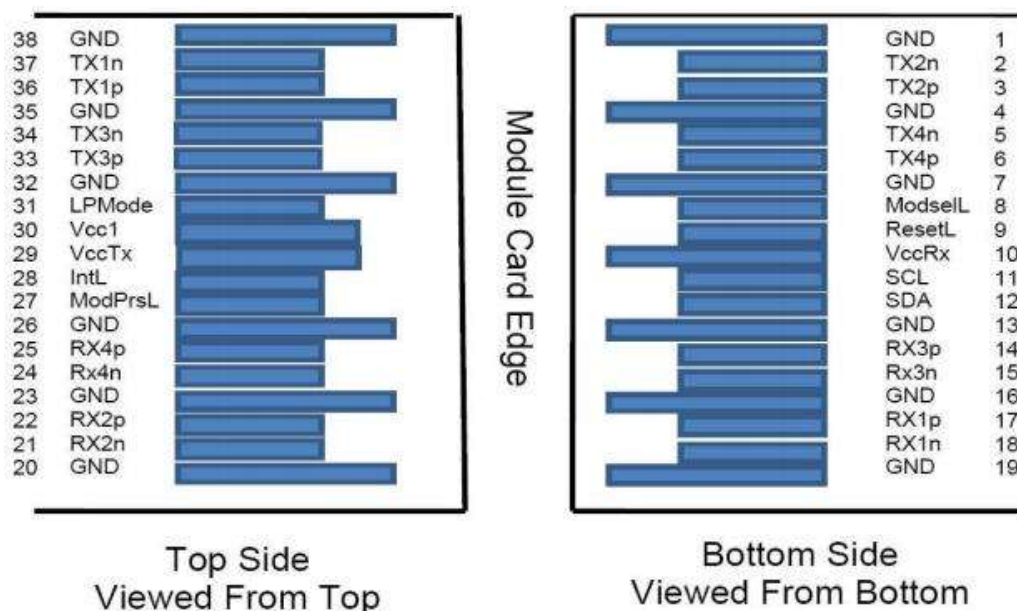


Figure 1. QSFP28-compliant 38-pin connector

## QSFP Transceiver Pinout

| Pin No. | Logic        | Symbol  | Description                          | Plug | Sequence |
|---------|--------------|---------|--------------------------------------|------|----------|
| 1       |              | GND     | Ground                               |      | 1        |
| 2       | CML-I        | TX2n    | Transmitted Inverted Data Input      |      | 3        |
| 3       | CML-I        | TX2p    | Transmitted Non- Inverted Data Input |      | 3        |
| 4       |              | GND     | Ground                               |      | 1        |
| 5       | CML-I        | TX4n    | Transmitted Inverted Data Input      |      | 3        |
| 6       | CML-I        | TX4p    | Transmitted Non- Inverted Data Input |      | 3        |
| 7       |              | GND     | Ground                               |      | 1        |
| 8       | LVTTL-I      | ModSeil | Module Select                        |      | 3        |
| 9       | LVTTL-I      | ResetL  | Module Reset                         |      | 3        |
| 10      |              | Vcc Rx  | + 3.3 VDC Receiver Power Supply      |      | 2        |
| 11      | LVC MOS- I/O | SCL     | Serial Clock for I2 C Interface      |      | 3        |
| 12      | LVC MOS- I/O | SDA     | Serial Data for I2 C Interface       |      | 3        |
| 13      |              | GND     | Ground                               |      | 1        |
| 14      | CML-O        | RX3p    | Receiver Non- Inverted Data Output   |      | 3        |
| 15      | CML-O        | RX3n    | Receiver Inverted Data Output        |      | 3        |
| 16      |              | GND     | Ground                               |      | 1        |
| 17      | CML-O        | RX1p    | Receiver Non- Inverted Data Output   |      | 3        |

|    |         |         |                                      |   |
|----|---------|---------|--------------------------------------|---|
| 18 | CML-O   | RX1n    | Receiver Inverted Data Output        | 3 |
| 19 |         | GND     | Ground                               | 1 |
| 20 |         | GND     | Ground                               | 1 |
| 21 | CML-O   | RX2n    | Receiver Inverted Data Output        | 3 |
| 22 | CML-O   | RX2p    | Receiver Non- Inverted Data Output   | 3 |
| 23 |         | GND     | Ground                               | 1 |
| 24 | CML-O   | RX4n    | Receiver Inverted Data Output        | 3 |
| 25 | CML-O   | RX4p    | Receiver Non- Inverted Data Output   | 3 |
| 26 |         | GND     | Ground                               | 1 |
| 27 | LVTTL-O | ModPrsL | Module Present                       | 3 |
| 28 | LVTTL-O | IntL    | Interrupt                            | 3 |
| 29 |         | Vcc Tx  | + 3.3 VDC Transmitter Power Supply   | 2 |
| 30 |         | Vcc1    | + 3.3 VDC Power Supply               | 2 |
| 31 | LVTTL-I | LPMode  | Low Power Mode                       | 3 |
| 32 |         | GND     | Ground                               | 1 |
| 33 | CML-I   | TX3p    | Transmitted Non- Inverted Data Input | 3 |
| 34 | CML-I   | TX3n    | Transmitted Inverted Data Input      | 3 |
| 35 |         | GND     | Ground                               | 1 |
| 36 | CML-I   | TX1p    | Transmitted Non- Inverted Data Input | 3 |
| 37 | CML-I   | TX1n    | Transmitted Inverted Data Input      | 3 |
| 38 |         | GND     | Ground                               | 1 |

## High Speed Electrical Specifications

| Transmitter Parameter                              | Min                | Typical | Max  | Unit |
|----------------------------------------------------|--------------------|---------|------|------|
| Signaling rate per lane (range)                    | 25.78125 ± 100 ppm |         |      | GBd  |
| AC common- mode output voltage (RMS)               |                    |         | 17.5 | mV   |
| Differential output voltage                        |                    |         | 900  | mV   |
| Eye width                                          | 0.57               |         |      | UI   |
| Eye height, differential                           | 228                |         |      | mV   |
| Vertical eye closure                               |                    |         | 5.5  | dB   |
| Differential output return loss                    | Equation (83E- 2)  |         |      | dB   |
| Common to differential mode conversion return loss | Equation (83E- 3)  |         |      | dB   |
| Differential termination mismatch                  |                    |         | 10   | %    |
| Transition time (20% to 80%)                       | 12                 |         |      | ps   |
| DC common mode voltage                             | -350               |         | 2850 | mV   |
| Receiver Parameter                                 | Min                | Typical | Max  | Unit |
| Signaling rate per lane (range)                    | 25.78125 ± 100 ppm |         |      | GBd  |
| AC common- mode output voltage (RMS)               |                    |         | 17.5 | mV   |
| Differential output voltage                        |                    |         | 900  | mV   |
| Eye width                                          | 0.57               |         |      | UI   |
| Eye height, differential                           | 228                |         |      | mV   |
| Vertical eye closure                               |                    |         | 5.5  | dB   |
| Differential output return loss                    | Equation (83E- 2)  |         |      | dB   |
| Common to differential mode conversion return loss | Equation (83E- 3)  |         |      | dB   |
| Differential termination mismatch                  |                    |         | 10   | %    |
| Transition time ( 20% to 80%)                      | 12                 |         |      | ps   |

### Functional Block Diagram

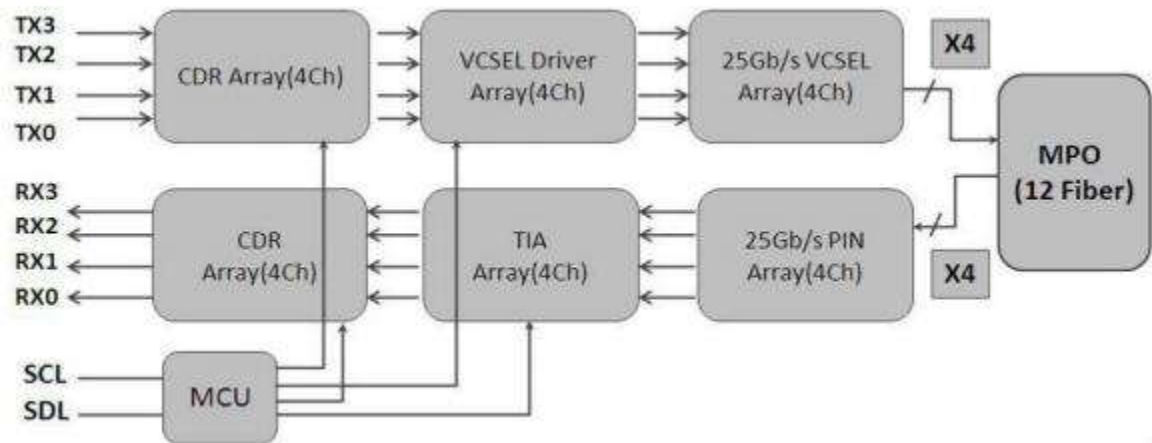


Figure 2. Functional Block Diagram

### Mechanical Specifications

Pull Tab: Beige  
 Pantone: 7402U  
 Unit: mm

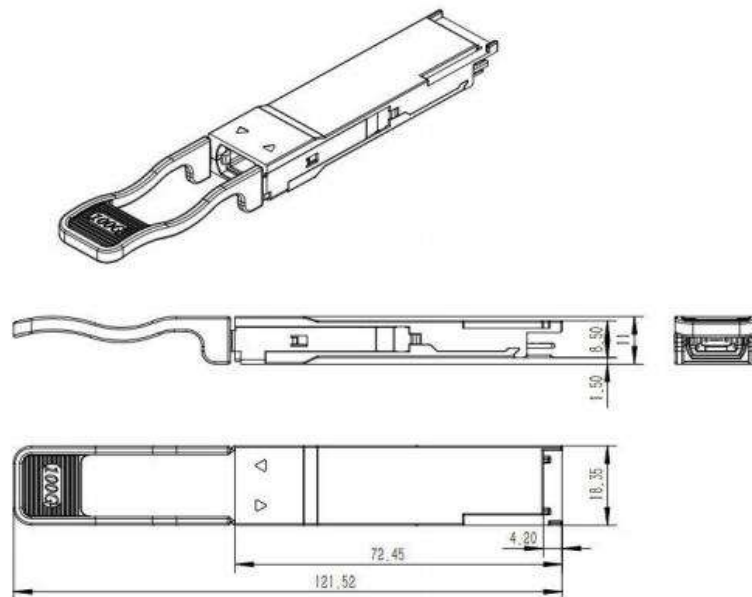


Figure 3. Mechanical Dimensions