

## QSFP28-100GB-ZR4-CX-OPC

Calix® Compatible TAA 100GBase-ZR4 QSFP28 Transceiver (SMF, 1295nm to 1309nm, 80km, LC, DOM)

### Features

- Compliant with IEEE 802.3ba, ITU-T G.959
- Compliant with 4x28G (CEI-28G-VSR)
- Single 3.3V Power Supply
- Maximum Power Consumption of 5.5W
- Transmitter: cooled 4x25Gbps LAN WDM EML TOSA
- Receiver: 4x25Gbps SOA+PIN ROSA
- 4x25G Electrical Interface
- Hot-pluggable QSFP28 MSA form factor
- Duplex LC Connector
- Single-mode Fiber
- Commercial Temperature 0 to 70 Celsius
- RoHS Compliant and Lead Free



### Applications:

- 100GBase Ethernet
- Access and Enterprise

### Product Description

This Calix® compatible QSFP28 transceiver provides 100GBase-ZR4 throughput up to 80km over single-mode fiber (SMF) using a wavelength of 1295nm to 1309nm via an LC connector. 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 Calix®. 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. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

## Absolute Maximum Ratings

| Parameter                           | Symbol | Min. | Typ.     | Max. | Unit |
|-------------------------------------|--------|------|----------|------|------|
| Supply Voltage                      | Vcc    | -0.5 |          | 3.6  | V    |
| Storage Temperature                 | Tstg   | -40  |          | 85   | °C   |
| Operating Case Temperature          | Tc     | 0    |          | 70   | °C   |
| Relative Humidity                   | RH     | 5    |          | 85   | %    |
| Rx Damage Threshold Per Lane        | THd    | 5.5  |          |      | dBm  |
| Data Rate                           | DR     |      | 25.78125 |      | Gbps |
| Link Distance with G.652 (With FEC) | D1     |      |          | 80   | km   |

## Electrical Characteristics

| Parameter                      | Symbol      | Min.    | Typ. | Max.     | Unit | Notes |
|--------------------------------|-------------|---------|------|----------|------|-------|
| Supply Voltage                 | Vcc         | 3.135   | 3.3  | 3.465    | V    |       |
| Supply Current                 | Icc         |         |      | 1.66     | A    |       |
| Power Consumption              |             |         |      | 5.5      | W    |       |
| Transmitter                    |             |         |      |          |      |       |
| Input Differential Impedance   | RIN         |         | 100  |          | Ω    | 1     |
| Differential Data Input Swing  | VIN,pp      | 180     |      | 1000     | mV   |       |
| Transmit Disable Voltage       | VD          | Vcc-1.3 |      | Vcc      | V    |       |
| Transmit Enable Voltage        | VEN         | Vee     |      | Vee+0.8  | V    | 2     |
| Receiver                       |             |         |      |          |      |       |
| Differential Data Output Swing | VOUT,pp     | 300     |      | 850      | mV   | 3     |
| LOS Fault                      | VLOS Fault  | Vcc-1.3 |      | Host_Vcc | V    | 4     |
| LOS Normal                     | VLOS Normal | Vee     |      | Vee+0.8  | V    | 4     |

### Notes:

1. Connected directly to the Tx data input pins. AC coupled thereafter.
2. Optional for Tx disable.
3. Into 100Ω differential termination.
4. Loss of Signal is LVTTTL. “Logic 0” indicates normal operation. “Logic 1” indicates no signal detected.
5. Tested under recommended operating conditions, unless otherwise noted.

## Optical Characteristics

| Parameter                                |        | Symbol      | Min.    | Typ.    | Max.    | Unit | Notes |
|------------------------------------------|--------|-------------|---------|---------|---------|------|-------|
| Transmitter                              |        |             |         |         |         |      |       |
| Center Wavelength                        | Lane 0 | $\lambda_0$ | 1294.53 | 1295.56 | 1296.59 | nm   |       |
|                                          | Lane 1 | $\lambda_1$ | 1299.02 | 1300.05 | 1301.09 | nm   |       |
|                                          | Lane 2 | $\lambda_2$ | 1301.54 | 1304.58 | 1305.63 | nm   |       |
|                                          | Lane 3 | $\lambda_3$ | 1308.09 | 1309.14 | 1310.19 | nm   |       |
| Total Launch Power (100GE)               |        | Pavg        | 7       |         | 12.5    | dBm  | 1     |
| Average Launch Power Per Lane (100GE)    |        | PLane       | 1       |         | 6.5     | dBm  | 1     |
| Difference in Launch Power Between Lanes |        | PΔ          |         |         | 3       | dB   |       |
| Average Laser Output Power (Laser Off)   |        | Poff        |         |         | -30     | dBm  |       |
| Side-Mode Suppression Ratio              |        | SMSR        | 30      |         |         | dB   |       |
| Extinction Ratio (100GE & OTU4)          |        | ER          | 6       |         |         | dB   |       |
| Receiver                                 |        |             |         |         |         |      |       |
| Center Wavelength                        | Lane 0 | $\lambda_0$ | 1294.53 | 1295.56 | 1296.59 | nm   |       |
|                                          | Lane 1 | $\lambda_1$ | 1299.02 | 1300.05 | 1301.09 | nm   |       |
|                                          | Lane 2 | $\lambda_2$ | 1301.54 | 1304.58 | 1305.63 | nm   |       |
|                                          | Lane 3 | $\lambda_3$ | 1308.09 | 1309.14 | 1310.19 | nm   |       |
| Damage Threshold                         |        | PDAM        |         |         | 5.5     | dBm  |       |
| Average Rx Power Per Lane                |        | PRX_Lane    | -28     |         | 4.5     | dBm  |       |
| Receiver Sensitivity Per Lane (OMA)      |        |             |         |         | -26.4   | dBm  | 2     |
| LOS Assert                               |        | LOSA        | -40     |         |         | dBm  |       |
| LOS De-Assert                            |        | LOSD        |         |         | -29     | dBm  |       |
| LOS Hysteresis                           |        | LOSH        | 0.5     |         |         | dB   |       |

### Notes:

1. The optical power is launched into SMF.
2. Measured with a PRBS  $2^{31}-1$  test pattern @25.78125Gbps,  $BER \leq 5E^{-5}$ .

## Pin Descriptions

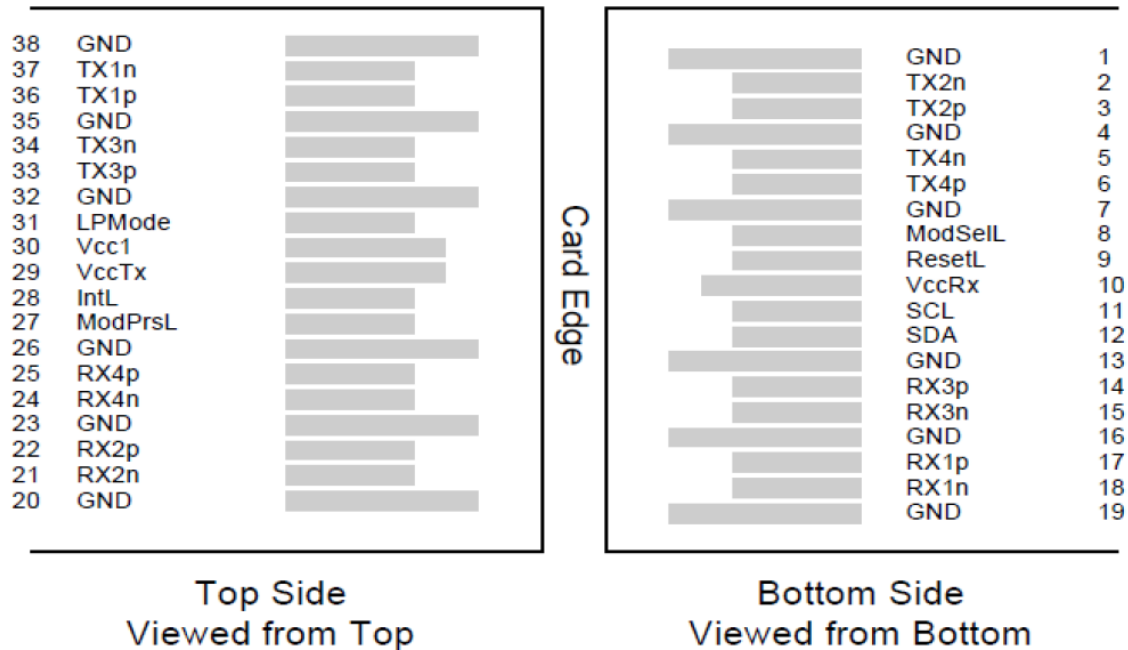
| Pin | Logic       | Symbol       | Name/Description                                                                          | Notes |
|-----|-------------|--------------|-------------------------------------------------------------------------------------------|-------|
| 1   |             | GND          | Module Ground.                                                                            | 1     |
| 2   | CML-I       | Tx2-         | Transmitter Inverted Data Input.                                                          |       |
| 3   | CML-I       | Tx2+         | Transmitter Non-Inverted Data Input.                                                      |       |
| 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   | LVTTL-I     | ModSelL      | Module Select.                                                                            |       |
| 9   | LVTTL-I     | ResetL       | Module Reset.                                                                             |       |
| 10  |             | VccRx        | +3.3V Receiver Power Supply.                                                              | 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          | 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  | LVTTL-O     | ModPrsL      | Module Present.                                                                           |       |
| 28  | LVTTL-O     | IntL/RxLOSL  | Interrupt. Optionally configurable as RxLOSL via the management interface (SFF-8636).     |       |
| 29  |             | VccTx        | +3.3V Transmitter Power Supply.                                                           | 2     |
| 30  |             | Vcc1         | +3.3V Power Supply.                                                                       | 2     |
| 31  | LVTTL-I     | LPMode/TxDis | Low-Power Mode. Optionally configurable as TxDis via the management interface (SFF-8636). |       |
| 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.   |   |
| 37 | CML-I | Tx1- | Transmitter Inverted Data Input. |   |
| 38 |       | GND  | Module Ground.                   | 1 |

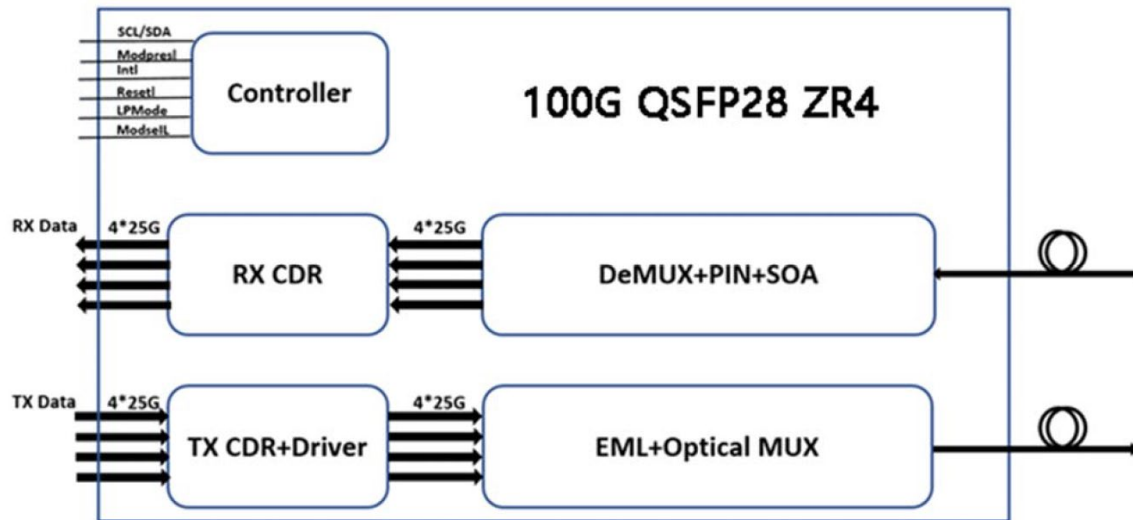
#### Notes:

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.

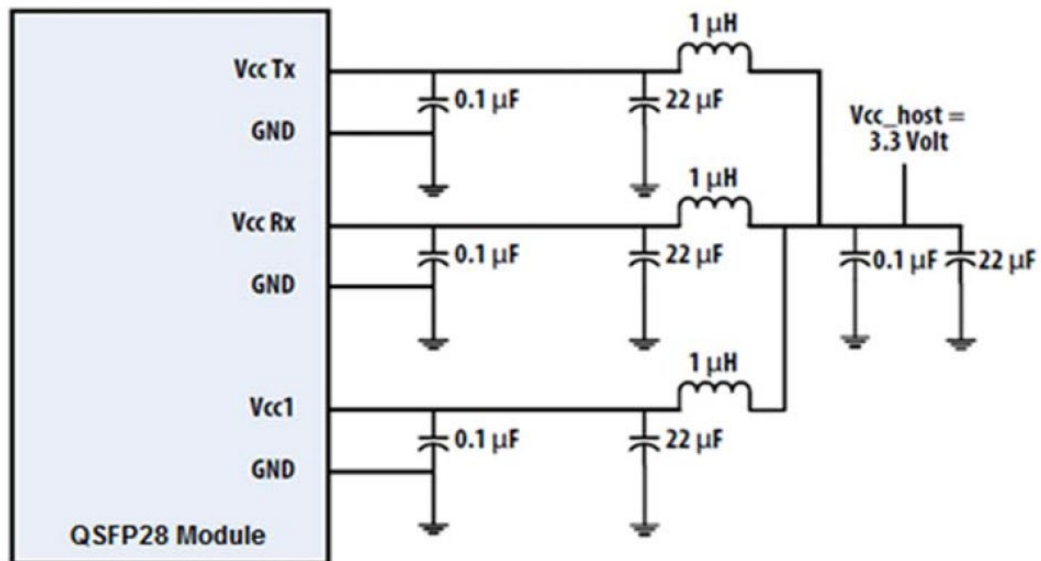
#### Electrical Pin-Out Details



## Functional Diagram



## Recommended Power Supply Filter



Mechanical Specifications

