**QDD400GBDCOZRP4DBM-C-ST01-C**

Cisco® Compatible TAA 400GBase-Open ZR+ Coherent QSFP-DD Transceiver (SMF, Tunable, 120km, LC, DOM, 4dBm)

**Features:**

- Hot Pluggable QSFP-DD Footprint (Type 2A)
- Supports 400/300/200/100Gbps
- Duplex LC Connector
- Tunable C-Band Transmitter
- Coherent Receivers
- Power Dissipation is 22.5W
- Single +3.3V Power Supply
- Operating Case Temperature: 15 to 75 Celsius
- Tunable Power, max TX power +4dBm at 193.7THz +1dBm at C band
- Supports both CFEC and oFEC RoHS Compliant and Lead Free

**Applications:**

- 400GBase Ethernet
- Open ZR+

**Product Description**

This Cisco® QSFP-DD transceiver provides 400GBase-Open ZR+ throughput up to 120km over single-mode fiber (SMF) using a tunable wavelength via an LC connector. It is guaranteed to be 100% compatible with the equivalent Cisco® 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. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

ProLabs' transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S. – made or designated country end products."

TAA COMPLIANT

**Applications Supported**

| Description | Host Format | Modulation | FEC | Range (Note 1) | DAC-Rate | CD | |
|---|---|---|---|---|---|---|---|
| | | | | | | Min | Max |
| **OIF 400ZR app code 0x001** | 1 x 400GAUI-8 | 16QAM | CFEC | 120km | 1x1.50 | -2400 | 2400 |
| **OpenZR+ MSA** | 1 x 400GAUI-8 | 16QAM | oFEC | 450km | 1x1.50 | -26000 | 26000 |
| **Open ZR+ MSA** | 4 x 100GAUI-2 | 16QAM | oFEC | 450km | 1x1.25 | -26000 | 26000 |
| **Open ZR+ MSA** | 4 x 100GAUI-2 | 16QAM | oFEC | 450km | 1x1.50 | -26000 | 26000 |
| **Open ZR+ MSA** | 3 x 100GAUI-2 | 8QAM | oFEC | 600km | 1x1.50 | -50000 | 50000 |
| **OpenZR+ MSA** | 2 x 100GAUI-2 | QPSK | oFEC | 1000km | 1x1.50 | -50000 | 50000 |
| **Open ZR+ Extension** | 2 x 100GAUI-2 | 8QAM | oFEC | 2000km | 1x1.25 | -50000 | 50000 |
| **Open ZR+ Extension** | 2 x 100GAUI-2 | 16QAM | oFEC | 2000km | 1x1.25 | -50000 | 50000 |
| **OpenZR+ MSA** | 1 x 100GAUI-2 | QPSK | oFEC | 2000km | 1x1.50 | -80000 | 80000 |

**Note:**

1. Amplified: -10dBm to +1dBm output power @ C-band.

**Absolute Maximum Ratings**

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| **Maximum Supply Voltage** | Vcc | -0.3 | 3.3 | 3.6 | V | Not damaged |
| **Storage Temperature** | Tstg | -40 | | 85 | °C | |
| **Operating Case Temperature** | Tc | 0 | | 70 | °C | |
| **Storage Relative Humidity** | RH | 5 | | 85 | % | Non-condensing |
| **Operating Relative Humidity** | RH | 15 | | 85 | % | |
| **Receiver Damage Threshold** | PRdmg | 10 | | | dBm | Total optical power |
| **ESD Sensitivity** | | | | 1000 | V | |

**Recommended Operating Conditions**

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| **Operating Case Temperature** | TC | 0 | | 70 | ℃ | |
| **Power Supply Voltage** | VCC | 3.135 | 3.3 | 3.465 | V | |
| | ICC | | | 7.2 | A | |
| **Maximum Sustained Peak Current (<500ms)** | | | | 7.4 | A | |
| **Maximum Instantaneous Peak Current (<50us)** | | | | 9 | A | |
| **Electro-Static Discharge** | ESD | | | 1000 | V | |
| **Power Consumption** | PD | | 22 | 22.5 | W | 1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Relative Humidity** | | RH | 15 | | 85 | % | |
| **Client Mode** | **400G (400ZR)** | | 1 x 400GAUI-8 | | | | |
| | | | 4 x 100GAUI-2 | | | | |
| | **400G (400ZR+)** | | 1 x 400GAUI-8 | | | | |
| | | | 4 x 100GAUI-2 | | | | |
| | **300G (300ZR+)** | | 3 x 100GAUI-2 | | | | |
| | **200G (200ZR+)** | | 2 x 100GAUI-2 | | | | |
| | | | 2 x CAUI-4 | | | | |
| | **100G (100ZR+)** | | 1 x 100GAUI-2 | | | | |
| | | | 1 x CAUI-4 | | | | |
| **Transmission Distance** | **400G (400ZR)** | | | | 120 | km | |
| | **400G (400ZR+)** | | | | 450 | km | |
| | **300G (300ZR+)** | | | | 600 | km | |
| | **200G (200ZR+)** | | | | 1000 | km | |
| | **100G (100ZR+)** | | | | 2000 | km | |
| **Power Supply Noise** | | Vrip | | | 1% | DC-1MHz | |
| | | Vrip | | | 2% | 1-10MHz | |

**Notes:**

1. In 400GbE mode, the typical power consumption is 22W and the maximum power consumption is 22.5W. When switching to 4×100GbE mode, the typical power consumption will be 23W and the maximum power consumption will be 23.5W, the current will also change accordingly.

**High-Speed Electrical Characteristics 400GAUI-8 C2M and 100GAUI-2 C2M**

| Parameter | Symbol | Min. | Max. | Unit | Notes |
|---|---|---|---|---|---|
| **Transmitter** | | | | | |
| **Signaling Rate, Each Lane** | | 26.5625 ± 100 ppm | | GBd | PAM-4 |
| **AC Common-Mode Output Voltage (RMS)** | RMS | | 17.5 | mV | |
| **Differential Voltage Pk-Pk** | Vin, pp | 750 | 900 | mV | |
| **Near-end ESMW (Eye Symmetry Mask Width)** | | 0.265 | | UI | Non-condensing |
| **Near-end Eye Height, Differential** | | 70 | | mV | |
| **Far-end ESMW** | | 0.2 | | UI | Total optical power |
| **Far-end Eye Height, Differential** | | 30 | | mV | |
| **Far-end Pre-Cursor ISI Ratio** | | -4.5 | 2.5 | % | |
| **Differential Output Return Loss** | | Equation (83E-2) | | | IEEE Std 802.3-2018 Annex 120E |
| **Common to Differential Mode Conversion Return Loss** | | Equation (83E-3) | | | IEEE Std 802.3-2018 Annex 120E |
| **Differential Termination Mismatch** | | | 10 | % | At 1 MHz |

| | | | | | |
|---|---|---|---|---|---|
| **Transition Time (20% to 80%)** | Trise/Tfall | 9.5 | | Ps | 20% to 80% |
| **DC Common Mode Voltage** | Vcm | -350 | 2850 | mV | |
| **Receiver** | | | | | |
| **Signaling Rate Per Lane** | | 26.5625 ± 100 ppm | | GBd | PAM-4 |
| **Differential Pk-Pk Input Voltage Tolerance** | Vout, pp | 900 | | mV | |
| **Differential Input Return Loss (min)** | | Equation (83E–5) | | | IEEE Std 802.3-2018 Annex 120E |
| **Differential to Common-Mode Input Return Loss (min)** | | Equation (83E–6) | | | IEEE Std 802.3-2018 Annex 120E |
| **Differential Termination Mismatch** | | | 10 | % | |
| **Module Stressed Input Test** | | See 120E.3.4.1 | | | IEEE Std 802.3-2018 Annex 120E |
| **Single-Ended Voltage Tolerance Range (min)** | | -0.4 | 3.3 | V | |
| **DC common mode voltage(min)** | | -350 | 2850 | mV | |

### High-Speed Electrical Characteristics CAUI-4 C2M

| Parameter | Symbol | Min. | Max. | Unit | Notes |
|---|---|---|---|---|---|
| **Transmitter** | | | | | |
| **Signaling Rate, Each Lane** | | 25.78125 ± 100 ppm | | GBd | NRZ |
| **AC Common-Mode Output Voltage (RMS)** | RMS | | 17.5 | mV | |
| **Differential Voltage Pk-Pk** | Vin, pp | 750 | 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) | | | IEEE Std 802.3-2018 Annex 120E |
| **Common to Differential Mode Conversion Return Loss** | | Equation (83E-3) | | | IEEE Std 802.3-2018 Annex 120E |
| **Differential Termination Mismatch** | | | 10 | % | At 1 MHz |
| **Transition Time (20% to 80%)** | Trise/Tfall | 9.5 | | Ps | 20% to 80% |
| **DC Common Mode Voltage** | Vcm | -350 | 2850 | mV | |
| **Receiver** | | | | | |
| **Signaling Rate Per Lane** | | 25.78125 ± 100 ppm | | GBd | NRZ |
| **Differential Pk-Pk Input Voltage Tolerance** | Vout, pp | 900 | | mV | |
| **Differential Input Return Loss (min)** | | Equation (83E–5) | | | IEEE Std 802.3-2018 Annex 120E |
| **Differential to Common-Mode Input Return Loss (min)** | | Equation (83E–6) | | | IEEE Std 802.3-2018 Annex 120E |
| **Differential Termination Mismatch** | | | 10 | % | |

| | | | | | |
|---|---|---|---|---|---|
| **Module Stressed Input Test** | | See 83E.3.4.1 | | | |
| **Single-Ended Voltage Tolerance Range (min)** | | -0.4 | 3.3 | V | |
| **DC common mode voltage(min)** | | -350 | 2850 | mV | |

**Low-Speed Electrical Characteristics**

| Parameter | Symbol | Min. | Max. | Unit | Notes |
|---|---|---|---|---|---|
| **SCL and SDA** | VOL | 0 | 0.4 | V | 1 |
| | VOH | Vcc-0.5 | Vcc+0.3 | V | |
| **SCL and SDA** | VIL | -0.3 | Vcc*0.3 | V | |
| | VIH | VCC*0.7 | Vcc+0.5 | V | |
| **Capacitance for SCL and SDA I/O Signal** | Ci | | 14 | pF | |
| **Total Bus Capacitive Load for SCL and SDA** | Cb | | 100 | pF | 2 |
| | Cb | | 200 | pF | 3 |
| **InitMode, ResetL and ModSelL IntL** | VIL | -0.3 | 0.8 | V | |
| | VIH | 2 | VCC+0.3 | V | |
| | \|Iin\| | | 360 | uA | 0V<Vin<Vcc |
| | VOL | 0 | 0.4 | V | IOL=2.0mA |
| | VOH | VCC-0.5 | VCC+0.3 | V | 10k ohms pull up to Host Vcc |
| **ModPrsL** | VOL | 0 | 0.4 | V | IOL=2.0mA |
| | VOH | | | | 4 |

**Notes:**

1. IOL(max)=3mA for fast mode, 20ma for Fast-mode plus.
2. For 400kHz clock rate use 3.0 k Ohms Pullup resistor, max. For 1000kHz clock rate refer to Figure 45 (QSFP-DD-Hardware-rev5p0).
3. For 400kHz clock rate use 1.6 k Ohms pullup resistor, max. For 1000kHz clock rate refer to Figure 45 (QSFP-DD-Hardware-rev5p0)
4. ModPrsL can be implemented as a short-circuit to GND on the module.

## Optical Characteristics

| Parameter | | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| **Transmitter** | | | | | | |
| **Modulation Format** | **400G** | ZR400-CFEC-16QAM | | | | CFEC FEC, NCG 10.8dB |
| | | ZR400-OFEC-16QAM | | | | OFEC FEC, NCG 11.6dB |
| | **300G** | ZR300-OFEC-8QAM | | | | |
| | **200G** | ZR200-OFEC-QPSK | | | | |
| | **100G** | ZR100-OFEC-QPSK | | | | |
| **Baud Rate** | **400G** | 59.843750000±20ppm | | | GBd | |
| | | 60.138546798±20ppm | | | GBd | |
| | **300G** | 60.138546798±20ppm | | | GBd | |
| | **200G** | 60.138546798±20ppm | | | GBd | |
| | **100G** | 30.069273399±20ppm | | | GBd | |
| **Transmitter Frequency Range** | | 191.3 | | 196.1 | THz | |
| **Flexible DWDM Grid** | | 6.25 | | | GHz | |
| **Frequency Fine Tuning Range** | | -5 | | 5 | GHz | Bright tuning |
| **Frequency Fine Tuning Step** | | 0.1 | | | GHz | |
| **Laser Frequency Accuracy** | | -1.8 | | 1.8 | GHz | |
| **TX Spectral Upper Mask** | | | | (30.0, 0.0)<br>(37.0,-1 0.0)<br>(39.2,-1 5.0)<br>(40.4,-2 0.0) | (GHz,d B) | 1 |
| **TX Spectral Lower Mask** | | (30.0,-9.0)<br>(31.3,-2 0.0)<br>(31.3,-3 5.0) | | | (GHz,d B) | 2 |
| **Transmitter Laser Disable Time** | | | | 100 | ms | |
| **Transmitter Wavelength Switching Time** | | | | 60 | s | |
| **Transmitter Laser Enable Time** | | | | 10 | s | |
| **Transmit Output Power Adjustable Range** | | -10 | | 1 | dBm | 3 |
| **Transmit Output Power Adjust Step** | | 0.1 | | | dB | |
| **Optical Power Setting Accuracy** | | -1 | | 1 | dB | 4 |
| **Output Power Monitor Accuracy** | | -1 | | 1 | dB | |
| **Power Stability** | | -0.5 | | 0.5 | dB | At fixed wavelength, room temperature |
| | | -1 | | 1 | dB | 5 |
| **Total Output Power with Tx Disabled** | | | | -20 | dBm | |
| **Total Output Power During Wavelength Switching** | | | | -20 | dBm | |
| **Transmitter Reflectance** | | | | -20 | dB | Looking into the Tx |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Inband (IB) OSNR** | | 38 | | | dB | | |
| **Lorentzian Linewidth** | | | | 300 | kHz | Tx and LO | |
| **Relative Intensity Noise** | | | | -140 | dB/Hz | | |
| **Mean I-Q Amplitude Imbalance** | | | | 1 | dB | | |
| **Transmitter Polarization Dependent Power** | | | | 1.5 | dB | | |
| **DC I-Q Offset (Mean per Polarization)** | | | | -26 | dB | | |
| **I-Q Instantaneous Offset** | | | | -20 | dB | | |
| **Receiver** | | | | | | | |
| **Modulation Format** | **400G** | ZR400-CFEC-16QAM | | | | CFEC FEC, NCG 10.8dB | |
| | **400G** | ZR400-OFEC-16QAM | | | | OFEC FEC, Net Coding Gain(NCG) 11.6dB，Thretical Max PreFEC BER 2.0E-2 | |
| | **300G** | ZR300-OFEC-8QAM | | | | | |
| | **200G** | ZR200-OFEC-QPSK | | | | | |
| | **100G** | ZR100-OFEC-QPSK | | | | | |
| **Baud Rate** | **400G** | 59.843750000±20ppm | | | GBd | 400ZR,SFF-8024 Media ID 3Eh/3Fh | |
| | **400G** | 60.138546798±20ppm | | | GBd | 400ZR+, SFF-8024 Media ID 46h | |
| | **300G** | 60.138546798±20ppm | | | GBd | 300ZR+, SFF-8024 Media ID 47h | |
| | **200G** | 60.138546798±20ppm | | | GBd | 200ZR+, SFF-8024 Media ID 48h | |
| | **100G** | 30.069273399±20ppm | | | GBd | 100ZR+, SFF-8024 Media ID 49h | |
| **Frequency Offset Between Received Carrier and LO** | | -3.6 | | +3.6 | GHz | | |
| **Input Power Range** | **400G** | -12 | | 0 | dBm | Signal power, OSNR>26dB,400ZR | |
| | **400G** | -12 | | 0 | dBm | Signal power, OSNR>24dB,400ZR+ | |
| | **300G** | -15 | | 0 | dBm | Signal power, OSNR>21dB,300ZR+ | |
| | **200G** | -18 | | 0 | dBm | Signal power, OSNR>16dB,200ZR+ | |
| | **100G** | -18 | | 0 | dBm | Signal power, OSNR>12.5dB,100ZR+ | |
| **OSNR Tolerance** | **400G** | | | 26 | dB/0.1nm | 400ZR | Measured back-to-back with short optical channel |
| | **400G** | | | 24 | dB/0.1nm | 400ZR+ | |
| | **300G** | | | 21 | dB/0.1nm | 300ZR+ | |
| | **200G** | | | 16 | dB/0.1nm | 200ZR+ | |
| | **100G** | | | 12.5 | dB/0.1nm | 100ZR+ | |
| **RX Sensitivity** | **400G** | -20 | | | dBm | 400ZR | Inband (IB) OSNR ≥34dB |
| **Non-damaging Input Power** | | | | 10 | dBm | Total power | |
| **Optical Input Power Monitor Accuracy** | | -2 | | 2 | dB | Total power | |
| **MAX FEC Pre Ber** | | 0.017 | | 0.020 | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Chromatic Dispersion Tolerance** | **400G** | | | 2,400 | ps/nm | 400ZR | Tolerance to CD with ≤0.5 dB penalty to OSNR sensitivity when change in SOP is ≤1 rad/ms |
| | | | | 20,000 | ps/nm | 400ZR+ | |
| | **300G** | | | 40,000 | ps/nm | 300ZR+ | |
| | **200G** | | | 50,000 | ps/nm | 200ZR+ | |
| | **100G** | | | 100,000 | ps/nm | 100ZR+ | |
| **CD Monitor Accuracy** | | -200 | | 200 | ps/nm | | |
| **DGD Tolerance** | **400G** | 33 | | | ps | 400ZR | OSNR penalty<0.5dB |
| | | 66 | | | ps | 400ZR+ | |
| | **300G** | 83 | | | ps | 300ZR+ | |
| | **200G** | 83 | | | ps | 200ZR+ | |
| | **100G** | 100 | | | ps | 100ZR+ | |
| **DGD Monitor Accuracy** | | -15 | | 15 | ps | 6 | |
| **Peak PDL Tolerance** | | | | 3.0 | dB | 7 | |
| | | | | 3.5 | dB | 8 | |
| **Tolerance to Change in SOP** | | 50 | | | krad/s | 9 | |
| **Optical Return Loss** | | 20 | | | dB | Optical reflectance at Rx connector input. | |
| **Optical Rx_LOS Assert Threshold** | **400G** | -20 | -18 | -16 | dBm | | |
| | **300G** | -23 | -21 | -19 | dBm | | |
| | **200G** | -26 | -24 | -22 | dBm | | |
| | **100G** | -26 | -24 | -22 | dBm | | |
| **Optical Rx_LOS Hysteresis** | | 1 | 1.5 | 2.5 | dB | | |
| **Optical Input Power Transient Tolerance** | | -2 | | 2 | dB | | |
| **Service Recovery Time** | | | | 40 | ms | | |

**Notes:**

1. Refer to OIF-400ZR-02.0 13.3.201b.
   Refer to openzrplus_2p0 11.4.10.
2. Refer to OIF-400ZR-02.0 13.3.201b.
   Refer to openzrplus_2p0 11.4.10.
3. The absolute accuracy is ±1dB.
4. Difference between setting and reporting.
5. At fixed wavelength, environment temperature.
6. 0~40ps for 400ZR
   0~100ps for 400/300/200/100ZR+
7. Tolerance to peak PDL with ≤1.3dB additional OSNR penalty when change in SOP is ≤1 rad/ms.
8. Tolerance to peak PDL with ≤1.8dB additional OSNR penalty when change in SOP is ≤1 rad/ms.
9. With ≤ 0.5 dB additional OSNR penalty over all PMD and PDL values.
10. Tolerance to change in input power with < 0.5 dB penalty to OSNR tolerance.
    The 20% to 80% rise/fall times for the input power change shall be no faster than 50 μs.

11. The transmitter and receiver comply with the 400GAUI-8 C2M and CEI-56G-VSR-PAM4 electrical specification, Electrical interface definitions see IEEE Std 802.3-2018 Annex 120E. The data lines are AC-coupled and terminated in the module per the following figure from the QSFP-DD MSA.

**Control and Status I/O Timing Characteristics**

| Parameter | Symbol | Min. | Max. | Unit | Notes |
|---|---|---|---|---|---|
| **MgmtInitDuration** | Max MgmtInit | | 2000 | ms | 1 |
| **ResetL Assert Time** | t_reset_init | 10 | | us | 2 |
| **IntL Assert Time** | ton_IntL | | 200 | ms | 3 |
| **IntL De-assert Time** | toff_IntL | | 500 | us | 4 |
| **Rx LOS Assert Time** | ton_los | | 100 | ms | 5 |
| **Rx LOS Assert Time (Optional Fast Mode)** | ton_losf | | 10 | ms | 6 |
| **Rx LOS De-assert Time** | toff_los | | 100 | ms | |
| **Tx Fault Assert Time** | ton_Txfault | | 200 | ms | 7 |
| **Flag Assert Time** | ton_flag | | 200 | ms | 8 |
| **Mask Assert Time** | ton_mask | | 100 | ms | 9 |
| **Mask De-assert Time** | toff_mask | | 100 | ms | 10 |
| **High Power Up State** | | | 180 | s | |
| **Software TX Disable Assert Time** | | | 100 | ms | |
| **Software TX Disable De-assert Time** | | | 10 | s | |

**Notes:**

1. Time from power on, hot plug or rising edge of reset until completion of the MgmtInit State.
2. Minimum pulse time on the ResetL signal to initiate a module reset.
3. Time from occurrence of condition triggering IntL until Vout:IntL=Vol.
4. Time from clear on read operation of associated flag until Vout:IntL=Voh. This includes de-assert times for Rx LOS, Tx Fault and other flag bits.
5. Time from Rx LOS condition present to Rx LOS bit set (value = 1b) and IntL asserted.
6. Time from Rx LOS state to Rx LOS bit set (value = 1b) and IntL asserted.
7. Time from Tx Fault state to Tx Fault bit set (value=1b) and IntL asserted.
8. Time from occurrence of condition triggering flag to associated flag bit set (value=1b) and IntL asserted.
9. Time from mask bit set (value=1b) until associated IntL assertion is inhibited.
10. Time from mask bit cleared (value=0b) until associated IntL operation resumes.

**Pin Descriptions**

| Pin | Logic | Symbol | Name/Description | Plug Sequence | Notes |
|---|---|---|---|---|---|
| **1** | | GND | Ground | 1B | 1 |
| **2** | CML-I | Tx2n | Transmitter Inverted Data Input | 3B | |
| **3** | CML-I | Tx2p | Transmitter Non-Inverted Data Input | 3B | |
| **4** | | GND | Ground | 1B | 1 |
| **5** | CML-I | Tx4n | Transmitter Inverted Data Input | 3B | |
| **6** | CML-I | Tx4p | Transmitter Non-Inverted Data Input | 3B | |
| **7** | | GND | Ground | 1B | 1 |
| **8** | LVTTL-I | ModSelL | Module Select | 3B | |
| **9** | LVTTL-I | ResetL | Module Reset | 3B | |
| **10** | | VccRx | +3.3V Power Supply Receiver | 2B | 2 |
| **11** | LVCMOS-I/O | SCL | 2-wire serial interface clock | 3B | |
| **12** | LVCMOS-I/O | SDA | 2-wire serial interface data | 3B | |
| **13** | | GND | Ground | 1B | 1 |
| **14** | CML-O | Rx3p | Receiver Non-Inverted Data Output | 3B | |
| **15** | CML-O | Rx3n | Receiver Inverted Data Output | 3B | |
| **16** | | GND | Ground | 1B | 1 |
| **17** | CML-O | Rx1p | Receiver Non-Inverted Data Output | 3B | |
| **18** | CML-O | Rx1n | Receiver Inverted Data Output | 3B | |
| **19** | | GND | Ground | 1B | 1 |
| **20** | | GND | Ground | 1B | 1 |
| **21** | CML-O | Rx2n | Receiver Inverted Data Output | 3B | |
| **22** | CML-O | Rx2p | Receiver Non-Inverted Data Output | 3B | |
| **23** | | GND | Ground | 1B | 1 |
| **24** | CML-O | Rx4n | Receiver Inverted Data Output | 3B | |
| **25** | CML-O | Rx4p | Receiver Non-Inverted Data Output | 3B | |
| **26** | | GND | Ground | 1B | 1 |
| **27** | LVTTL-O | ModPrsL | Module Present | 3B | |
| **28** | LVTTL-O | IntL | Interrupt | 3B | |
| **29** | | VccTx | +3.3V Power supply transmitter | 2B | 2 |
| **30** | | Vcc1 | +3.3V Power supply | 2B | 2 |
| **31** | LVTTL-I | LPMode | Low Power mode; | 3B | |
| **32** | | GND | Ground | 1B | 1 |
| **33** | CML-I | Tx3p | Transmitter Non-Inverted Data Input | 3B | |
| **34** | CML-I | Tx3n | Transmitter Inverted Data Input | 3B | |
| **35** | | GND | Ground | 1B | 1 |

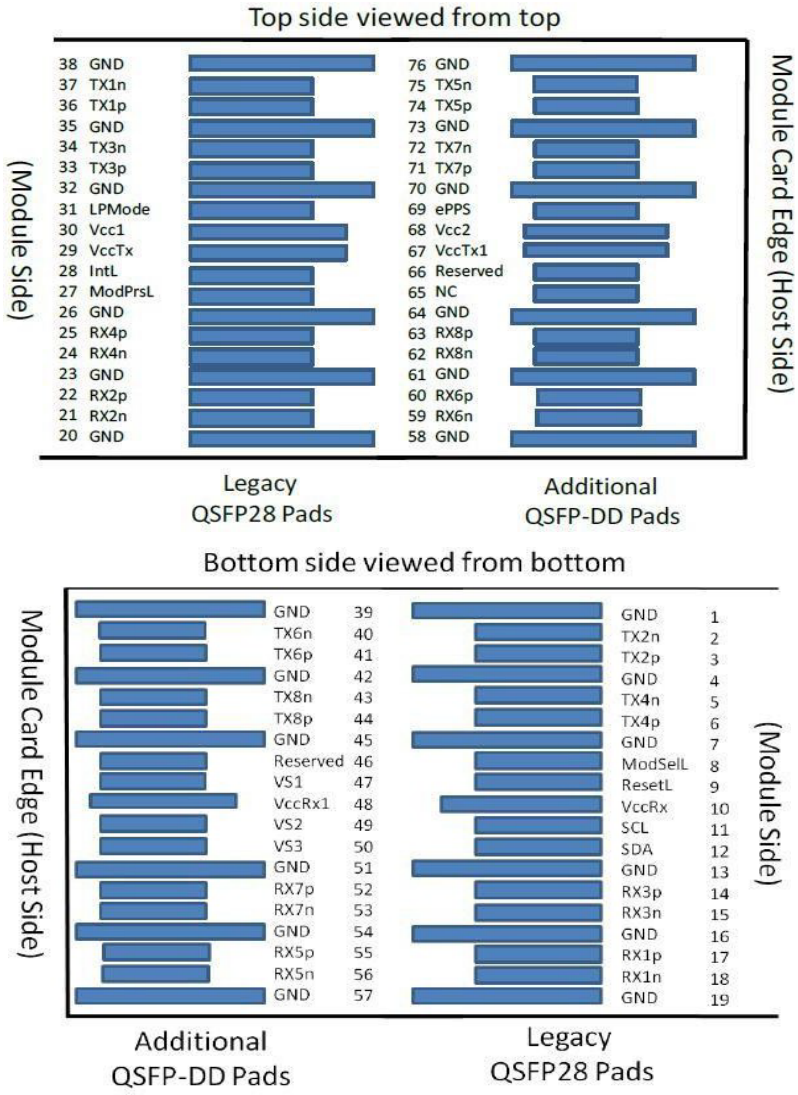
| | | | | | |
|---|---|---|---|---|---|
| **36** | CML-I | Tx1p | Transmitter Non-Inverted Data Input | 3B | |
| **37** | CML-I | Tx1n | Transmitter Inverted Data Input | 3B | |
| **38** | | GND | Ground | 1B | 1 |
| **39** | | GND | Ground | 1A | 1 |
| **40** | CML-I | Tx6n | Transmitter Inverted Data Input | 3A | |
| **41** | CML-I | Tx6p | Transmitter Non-Inverted Data Input | 3A | |
| **42** | | GND | Ground | 1A | 1 |
| **43** | CML-I | Tx8n | Transmitter Inverted Data Input | 3A | |
| **44** | CML-I | Tx8p | Transmitter Non-Inverted Data Input | 3A | |
| **45** | | GND | Ground | 1A | 1 |
| **46** | | Reserved | For future use | 3A | 3 |
| **47** | | VS1 | Module Vendor Specific 1 | 3A | 3 |
| **48** | | VccRx1 | 3.3V Power Supply | 2A | 2 |
| **49** | | VS2 | Module Vendor Specific 2 | 3A | 3 |
| **50** | | VS3 | Module Vendor Specific 3 | 3A | 3 |
| **51** | | GND | Ground | 1A | 1 |
| **52** | CML-O | Rx7p | Receiver Non-Inverted Data Output | 3A | |
| **53** | CML-O | Rx7n | Receiver Inverted Data Output | 3A | |
| **54** | | GND | Ground | 1A | 1 |
| **55** | CML-O | Rx5p | Receiver Non-Inverted Data Output | 3A | |
| **56** | CML-O | Rx5n | Receiver Inverted Data Output | 3A | |
| **57** | | GND | Ground | 1A | 1 |
| **58** | | GND | Ground | 1A | 1 |
| **59** | CML-O | Rx6n | Receiver Inverted Data Output | 3A | |
| **60** | CML-O | Rx6p | Receiver Non-Inverted Data Output | 3A | |
| **61** | | GND | Ground | 1A | 1 |
| **62** | CML-O | Rx8n | Receiver Inverted Data Output | 3A | |
| **63** | CML-O | Rx8p | Receiver Non-Inverted Data Output | 3A | |
| **64** | | GND | Ground | 1A | 1 |
| **65** | | NC | No Connect | 3A | 3 |
| **66** | | Reserved | For future use | 3A | 3 |
| **67** | | VccTx1 | 3.3V Power Supply | 2A | 2 |
| **68** | | Vcc2 | 3.3V Power Supply | 2A | 2 |
| **69** | LVTTL-I | ePPS | Precision Time Protocol (PTP) reference clock input. Not used | 3A | 3 |
| **70** | | GND | Ground | 1A | 1 |
| **71** | CML-I | Tx7p | Transmitter Non-Inverted Data Input | 3A | |
| **72** | CML-I | Tx7n | Transmitter Inverted Data Input | 3A | |

| | | | | | |
|---|---|---|---|---|---|
| **73** | | GND | Ground | 1A | 1 |
| **74** | CML-I | Tx5p | Transmitter Non-Inverted Data Input | 3A | |
| **75** | CML-I | Tx5n | Transmitter Inverted Data Input | 3A | |
| **76** | | GND | Ground | 1A | 1 |

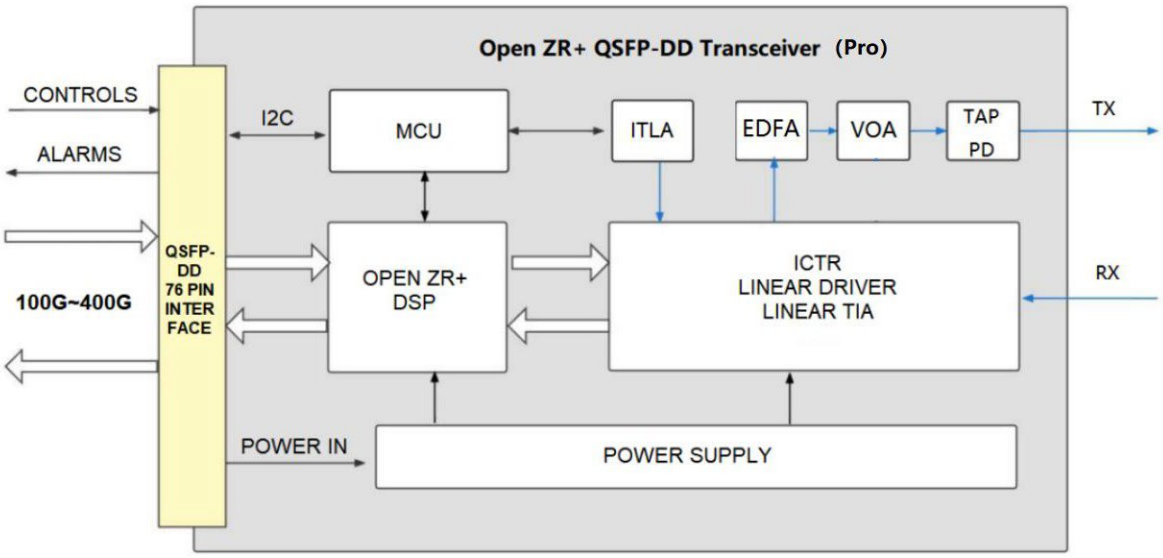
**Notes:**

1. QSFP-DD uses common ground (GND)for all signals and supply (power). All are common within the QSFP-DD 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, VccRx1, Vcc1, Vcc2, VccTx and VccTx1 shall be applied concurrently. Requirements defined for the host side of the Host Card Edge Connector. VccRx, VccRx1, Vcc1, Vcc2, VccTx and VccTx1 may be internally connected within the module in any combination. The connector Vcc pins are each rated for a maximum current of 1500 mA.
3. All Vendor Specific, Reserved and No Connect pins may be terminated with 50ohms to ground on the host. Pad 65 (No Connect) shall be left unconnected within the module. Vendor specific and Reserved pads shall have an impedance to GND that is greater than 10K ohms and less than 100pF.
4. Plug Sequence specifies the mating sequence of the host connector and module. The sequence is 1A, 2A, 3A, 1B, 2B, 3B. (see Figure 2 for pad locations) Contact sequence A will make, then break contact with additional QSFP-DD pads. Sequence 1A, 1B will then occur simultaneously, followed by 2A, 2B, followed by 3A, 3B.

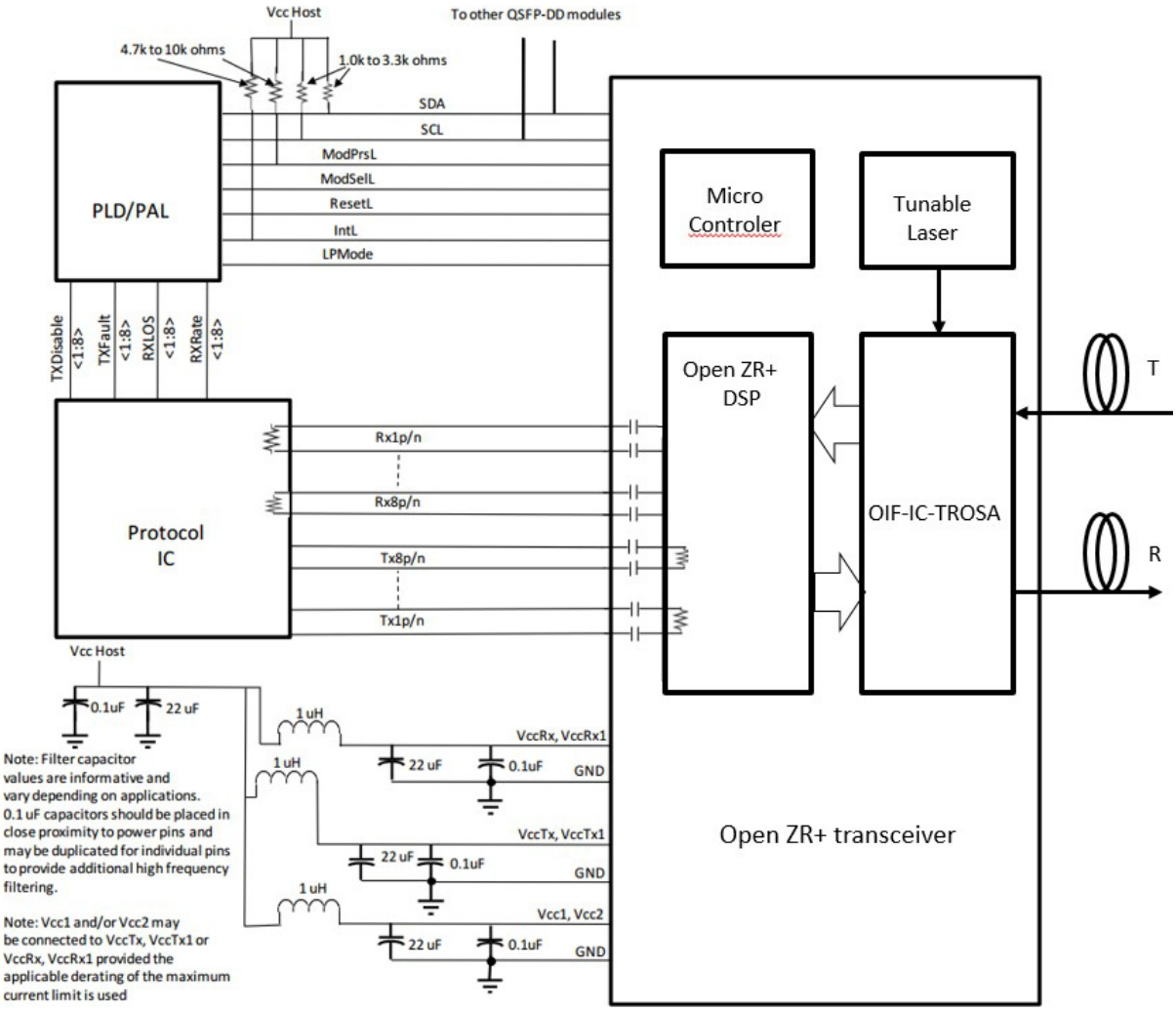
**Electrical Pad Layout**



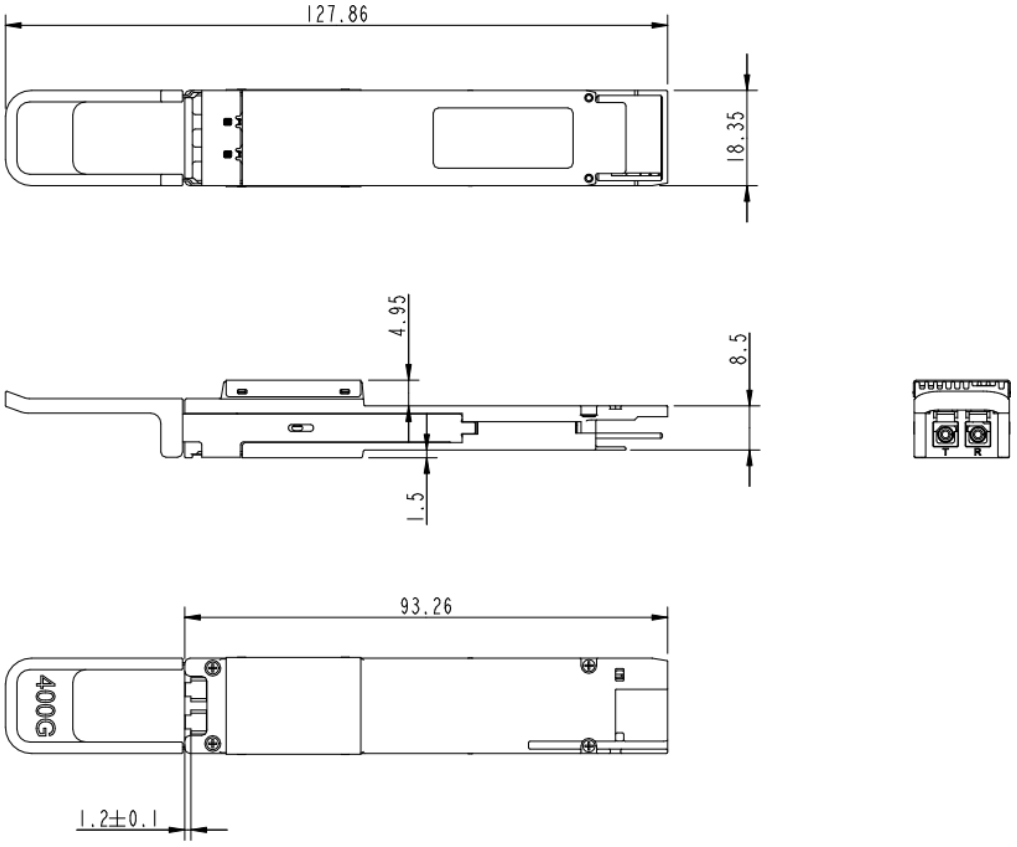

**Block Diagram**



**Recommended Interface Circuit**



**Mechanical Specifications**



**About ProLabs**

Our experience comes as standard; for over 15 years ProLabs has delivered optical connectivity solutions that give our customers freedom and choice through our ability to provide seamless interoperability. At the heart of our company is the ability to provide state-of-the-art optical transport and connectivity solutions that are compatible with over 90 optical switching and transport platforms.

**Complete Portfolio of Network Solutions**

ProLabs is focused on innovations in optical transport and connectivity. The combination of our knowledge of optics and networking equipment enables ProLabs to be your single source for optical transport and connectivity solutions from 100Mb to 400G while providing innovative solutions that increase network efficiency. We provide the optical connectivity expertise that is compatible with and enhances your switching and transport equipment.

**Trusted Partner**

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure that you get immediate answers to your questions and compatible product when needed. With Engineering and Manufacturing offices in the U.K. and U.S. augmented by field offices throughout the U.S., U.K. and Asia, ProLabs is able to be our customers best advocate 24 hours a day.

**Contact Information**

ProLabs US

Email: sales@prolabs.com
Telephone: 952-852-0252

ProLabs UK

Email: salessupport@prolabs.com
Telephone: +44 1285 719 600