**QDD-100GB-DCO-ZRP-OPC**

MSA and TAA 100GBase-ZR+ Coherent QSFP-DD Transceiver (SMF, 1528.77nm to 1567.13nm, Open ZR+, LC, DOM)

**Features**

- QSFP-DD MSA compliant
- Hot pluggable QSFP-DD footprint (Type 2A)
- Supports 100Gbps Payload (Open ZR+)
- Duplex LC Connector
- Tunable C-band Transmitter and Coherent Receivers
- O-FEC (15%) with 11.6dB Net Coding Gain
- 100GAUI-2 (2x 26.5625GBd PAM4) Serial Electrical Interface, RS-FEC (544/514)
- CAUI-4 (4x 25.78125Gbps NRZ) Serial Electrical Interface, RS-FEC (544/528)/No FEC
- Operating Temperature 0 to 70 Celsius
- RoHS Compliant and Lead-free

**Applications:**

- 100GBase Ethernet
- Access and Enterprise

**Product Description**

This MSA compliant QSFP-DD transceiver provides 100GBase-ZR+ Open ZR+ throughput over single-mode fiber (SMF) using a wavelength of 1528.77nm to 1567.13nm via an LC connector. It can operate at temperatures between 0 and 70C. All of our transceivers are built to comply with Multi-Source Agreement (MSA) standards and are uniquely serialized and tested for data-traffic and application to ensure 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 | Notes |
|---|---|---|---|---|---|---|
| **Power Supply Voltage** | Vcc | 3.218 | 3.3 | 3.465 | V | |
| **Storage Temperature** | Tstg | -40 | | 85 | °C | |
| **Case Operating Temperature** | Tc | 0 | | 70 | °C | |
| **Relative Humidity (Non-Condensing)** | RH | | | 85 | % | |
| **Optical Receiver Overload** | | | | 4 | dBm | 1 |
| **Supported Host Signal Types** | | | 103.125 | | Gbps | 2 |
| **Line Baud Rate** | | | 30.07 | | GBd | 3 |

**Notes:**

1. The optical input to the receiver should not exceed this value. Transmitters must never be directly connected to receivers before ensuring that proper optical attenuation is used.
2. As per IEEE 802.3-2012.
3. 100G DP-QPSK, O-FEC.

**Electrical Characteristics**

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| **Power Supply Voltage** | Vcc | 3.218 | 3.3 | 3.465 | V | |
| **Power Supply Current** | Icc | | | 6 | A | |
| **Power Consumption** | PD | | | 16.5 | W | |
| **Power Consumption** | PD | | | 1.5 | W | 1 |

**Notes:**

1. Low-power mode.

**Optical Characteristics**

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| **Transmitter** | | | | | | |
| **Average Output Power** | Po | -6 | -4.5 | -2 | dBm | 1, 2 |
| **Laser Linewidth** | | | | 300 | kHz | |
| **Transmitter VOA Dynamic Range** | | 10 | | | dB | 3 |
| **Output Power Stability** | | -1 | | 1 | dB | |
| **In-Band OSNR** | | 35 | | | dB/0.1nm | |
| **Out-of-Band OSNR** | | 35 | | | dB/0.1nm | |
| **Frequency Range** | | 191.275 | | 196.125 | THz | 4 |
| **Centre Frequency** | | $\nu_T$ -1.5 | $\nu_T$ | $\nu_T$ +1.5 | GHz | 5 |
| **Channel Spacing** | | 6.25 | | | GHz | |
| **Centre Wavelength Range** | Tλ | 1528.58 | | 1567.34 | nm | |
| **Centre Wavelength** | Tλ | λT-15 | λT | λT+15 | pm | |
| **Receiver** | | | | | | |
| **Receiver Operating Wavelength** | Rλ | 1528.58 | | 1567.34 | nm | |
| **Receiver Sensitivity** | S | | | -32 | dBm | 6 |
| **Receiver Overload** | $P_{OL}$ | 4 | | | dBm | 7 |
| **Receiver Input Power Range** | | -20 | | 4 | dBm | 8 |
| **Extended Receiver Input Power Range** | | -25 | | 4 | dBm | 9 |
| **Acquisition Range** | | -3.6 | | 3.6 | GHz | 10 |
| **Upstream Tx Linewidth** | | | | 1000 | kHz | |
| **OSNR Tolerance** | | | 14 | 15.5 | dB | 11 |
| **Crosstalk Tolerance** | | | | 17 | dB | 12 |
| **Chromatic Dispersion Tolerance** | | | | 5000 | ps/nm | 13 |

**Notes:**

1. Output power coupled into a 9/125µm single-mode fiber.
2. The output power is adjustable in steps of 0.1dB within the specified wavelength range.
3. With Tx VOA attenuation is set to minimum.
4. Per ITU-T G.694.1 DWDM grid definition.
5. Applies also to LO.
6. Minimum input power needed to achieve post-FEC BER≤$10^{-15}$, 100G DP-QPSK, and OSNR>35dB.
7. The optical input to the receiver should not exceed this value. Transmitters must never be directly connected to receivers before ensuring that proper optical attenuation is used.
8. An input power in this range guarantees optimum OSNR performance.
9. With ≤1dB OSNR tolerance degradation.
10. Frequency offset between received carrier and LO.
11. At optimum input power range.

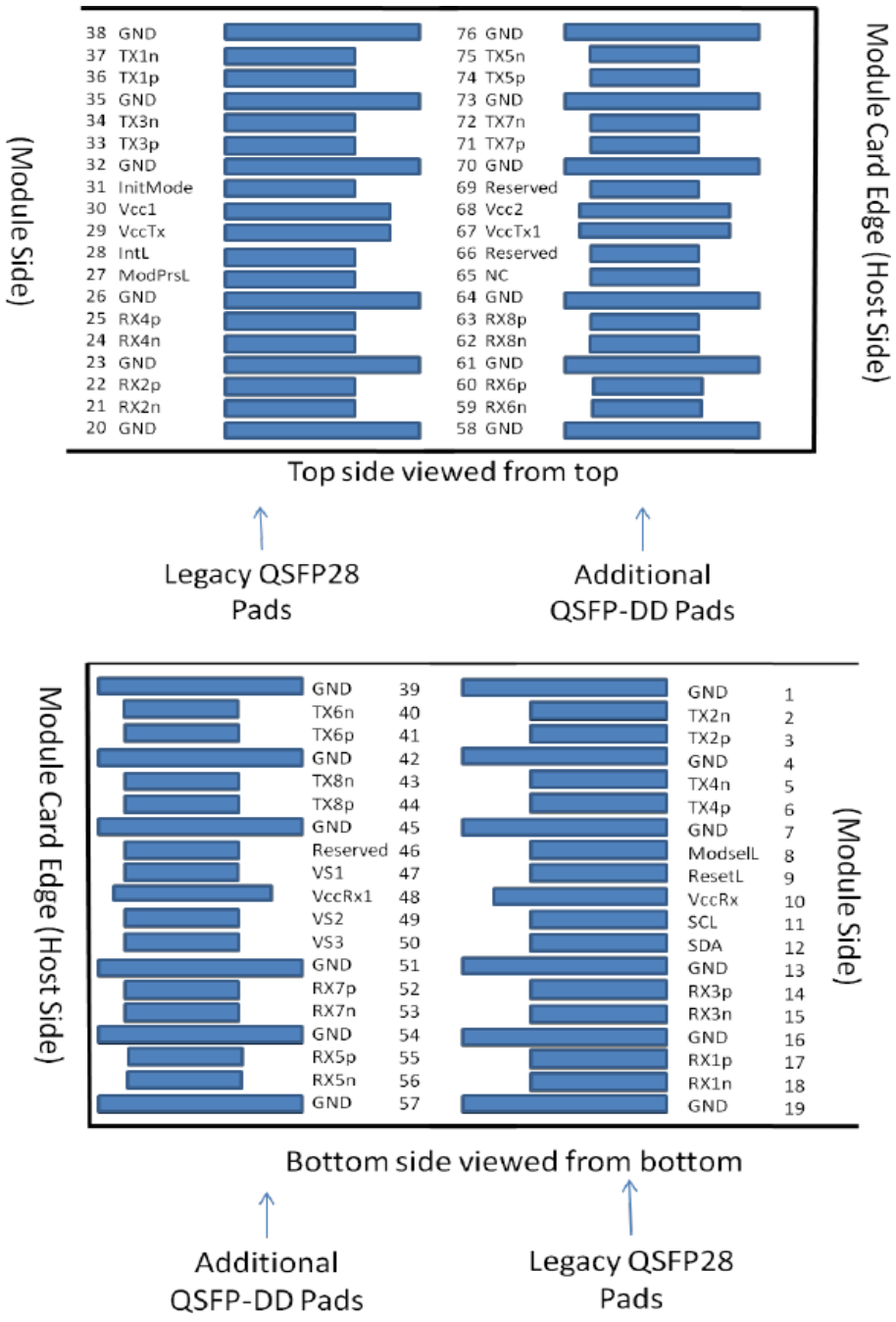
12. Ratio of accumulated crosstalk channels to signal power.
13. Less than 0.5dB receiver sensitivity penalty compared to OSNR>35dB.

**Pin Descriptions**

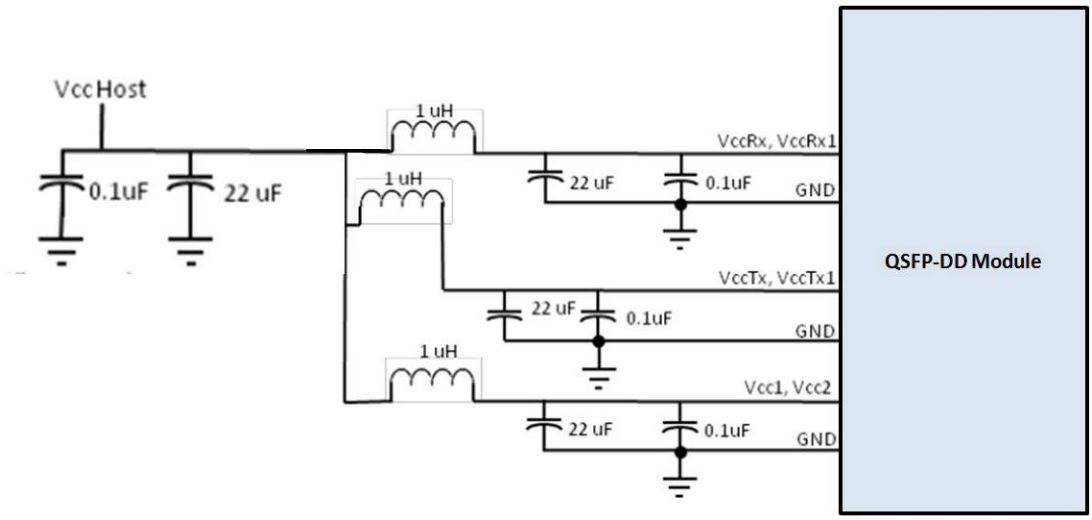
| Pin | Logic | Symbol | Name/Description | Plug Sequence |
|---|---|---|---|---|
| **1** | | GND | Module Ground. | 1B |
| **2** | CML-I | Tx2- | Transmitter Inverted Data Input. | 3B |
| **3** | CML-I | Tx2+ | Transmitter Non-Inverted Data Input. | 3B |
| **4** | | GND | Module Ground. | 1B |
| **5** | CML-I | Tx4- | Transmitter Inverted Data Input. | 3B |
| **6** | CML-I | Tx4+ | Transmitter Non-Inverted Data Input. | 3B |
| **7** | | GND | Module Ground. | 1B |
| **8** | LVTTL-I | ModSelL | Module Select. | 3B |
| **9** | LVTTL-I | ResetL | Module Reset. | 3B |
| **10** | | VccRx | +3.3V Receiver Power Supply. | 2B |
| **11** | LVCMOS-I/O | SCL | 2-Wire Serial Interface Clock. | 3B |
| **12** | LVCMOS-I/O | SDA | 2-Wire Serial Interface Data. | 3B |
| **13** | | GND | Module Ground. | 1B |
| **14** | CML-O | Rx3+ | Receiver Non-Inverted Data Output. | 3B |
| **15** | CML-O | Rx3- | Receiver Inverted Data Output. | 3B |
| **16** | | GND | Module Ground. | 1B |
| **17** | CML-O | Rx1+ | Receiver Non-Inverted Data Output. | 3B |
| **18** | CML-O | Rx1- | Receiver Inverted Data Output. | 3B |
| **19** | | GND | Module Ground. | 1B |
| **20** | | GND | Module Ground. | 1B |
| **21** | CML-O | Rx2- | Receiver Inverted Data Output. | 3B |
| **22** | CML-O | Rx2+ | Receiver Non-Inverted Data Output. | 3B |
| **23** | | GND | Module Ground. | 1B |
| **24** | CML-O | Rx4- | Receiver Inverted Data Output. | 3B |
| **25** | CML-O | Rx4+ | Receiver Non-Inverted Data Output. | 3B |
| **26** | | GND | Module Ground. | 1B |
| **27** | LVTTL-O | ModPrsL | Module Present. | 3B |
| **28** | LVTTL-O | IntL | Interrupt. | 3B |
| **29** | | VccTx | +3.3V Transmitter Power Supply. | 2B |
| **30** | | Vcc1 | +3.3V Power Supply. | 2B |
| **31** | LVTTL-I | InitMode | Initialization Mode. In legacy QSFP applications, the InitMode pad is called LPMode. | 3B |
| **32** | | GND | Module Ground. | 1B |
| **33** | CML-I | Tx3+ | Transmitter Non-Inverted Data Input. | 3B |
| **34** | CML-I | Tx3- | Transmitter Inverted Data Input. | 3B |
| **35** | | GND | Module Ground. | 1B |
| **36** | CML-I | Tx1+ | Transmitter Non-Inverted Data Input. | 3B |

| | | | | |
|---|---|---|---|---|
| **37** | CML-I | Tx1- | Transmitter Inverted Data Input. | 3B |
| **38** | | GND | Module Ground. | 1B |
| **39** | | GND | Module Ground. | 1A |
| **40** | CML-I | Tx6- | Transmitter Inverted Data Input. | 3A |
| **41** | CML-I | Tx6+ | Transmitter Non-Inverted Data Input. | 3A |
| **42** | | GND | Module Ground. | 1A |
| **43** | CML-I | Tx8- | Transmitter Inverted Data Input. | 3A |
| **44** | CML-I | Tx8+ | Transmitter Non-Inverted Data Input. | 3A |
| **45** | | GND | Module Ground. | 1A |
| **46** | | Reserved | For Future Use. | 3A |
| **47** | | VS1 | Module Vendor-Specific 1. | 3A |
| **48** | | VccRx1 | +3.3V Receiver Power Supply. | 2A |
| **49** | | VS2 | Module Vendor-Specific 2. | 3A |
| **50** | | VS3 | Module Vendor-Specific 3. | 3A |
| **51** | | GND | Module Ground. | 1A |
| **52** | CML-O | Rx7+ | Receiver Non-Inverted Data Output. | 3A |
| **53** | CML-O | Rx7- | Receiver Inverted Data Output. | 3A |
| **54** | | GND | Module Ground. | 1A |
| **55** | CML-O | Rx5+ | Receiver Non-Inverted Data Output. | 3A |
| **56** | CML-O | Rx5- | Receiver Inverted Data Output. | 3A |
| **57** | | GND | Module Ground. | 1A |
| **58** | | GND | Module Ground. | 1A |
| **59** | CML-O | Rx6- | Receiver Inverted Data Output. | 3A |
| **60** | CML-O | Rx6+ | Receiver Non-Inverted Data Output. | 3A |
| **61** | | GND | Module Ground. | 1A |
| **62** | CML-O | Rx8- | Receiver Inverted Data Output. | 3A |
| **63** | CML-O | Rx8+ | Receiver Non-Inverted Data Output. | 3A |
| **67** | | GND | Module Ground. | 1A |
| **68** | | NC | Not Connected. | 3A |
| **69** | | Reserved | For Future Use. | 3A |
| **70** | | VccTx1 | +3.3V Transmitter Power Supply. | 2A |
| **71** | | Vcc2 | +3.3V Power Supply. | 2A |
| **72** | | Reserved | For Future Use. | 3A |
| **73** | | GND | Module Ground. | 1A |
| **74** | CML-I | Tx7+ | Transmitter Non-Inverted Data Input. | 3A |
| **75** | CML-I | Tx7- | Transmitter Inverted Data Input. | 3A |
| **76** | | GND | Module Ground. | 1A |

**Electrical Pad Layout**



**Recommended Power Supply Filter**




**Mechanical Specifications**