**QDD-511-OPC**

Gigamon Systems® QDD-511 Compatible TAA 400GBase-DR4 QSFP-DD Transceiver (SMF, 1310nm, 500m, MPO, DOM, CMIS 4.0)

**Features**

- Compliant with IEEE802.3bs Standard: 400GAUI-8 Electrical Interface
- Compliant with IEEE 802.3bs Standard: 400GBASE-DR4 Optical Interface
- QSFP-DD MSA Compliant
- MPO-12 Connector
- CMIS 4.0
- Class 1 Laser
- Operating Temperature: 0 to 70 Celsius
- RoHS Compliant and Lead-Free
- RoHS compliant and Lead Free
- Excellent ESD Protection
- RoHS Compliant and Lead Free

**Applications:**

- 400GBase Ethernet
- Access and Enterprise

**Product Description**

This Gigamon Systems® QDD-511 compatible QSFP-DD transceiver provides 400GBase-DR4 throughput up to 500m over single-mode fiber (SMF) using a wavelength of 1310nm via an MPO 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 Gigamon Systems®. 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 | Notes |
|---|---|---|---|---|---|---|
| **Storage Temperature** | Tstg | -40 | | 85 | °C | |
| **Operating Case Temperature** | Tc | 0 | 25 | 70 | °C | |
| **Supply Voltage** | Vcc | -0.5 | | 3.6 | V | |
| **Relative Humidity** | RH | 5 | | 95 | % | |
| **Operating Distance** | | 2 | | 500 | m | |
| **Signaling Speed Per Lane** | DRL | | 53.125 | | GBd | PAM4 |
| **Maximum Power Dissipation** | $P_D$ | | | 9 | W | |
| **Maximum Power Dissipation (Low-Power Mode)** | $P_{DLP}$ | | | 2 | W | |
| **Rx Differential Data Output Load** | | | 100 | | Ω | |

## Electrical Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| **Power Supply Voltage** | Vcc | 3.135 | 3.3 | 3.465 | V | |
| **Control Input Voltage** | VI | -0.3 | | Vcc+0.5 | V | |
| **Instantaneous Peak Current at Hot Plug** | Icc_IP | | | 3600 | mA | |
| **Sustained Peak Current at Hot Plug** | Icc_SP | | | 2970 | mA | |
| **2-Wire Serial Interface Clock Rate** | | | | 400 | kHz | |
| **Power Supply Noise (10Hz-10MHz)** | | | | 66 | mVp-p | |
| **Transmitter - Module Input** | | | | | | |
| **Differential Pk-Pk Input Voltage Tolerance** | | 900 | | | mV | |
| **Differential Termination Mismatch** | | | | 10 | % | |
| **Single-Ended Voltage Tolerance Range** | | -0.4 | | 3.3 | V | |
| **DC Common-Mode Voltage** | | -350 | | 2850 | mV | |
| **Receiver - Module Output** | | | | | | |
| **AC Common-Mode Output Voltage (RMS)** | | | | 17.5 | mV | |
| **Differential Output Voltage** | | | | 900 | mV | |
| **Differential Near-End Eye Height** | | 70 | | | mV | |
| **Differential Far-End Eye Height** | | 30 | | | mV | |
| **Far-End Pre-Cursor Ratio** | | -4.5 | | 2.5 | % | |
| **Differential Termination Mismatch** | | | | 10 | % | |
| **Transition Time (Minimum, 20-80%)** | | 9.5 | | | ps | |
| **DC Common-Mode Voltage** | | -350 | | 2850 | mV | |
| **Low-Speed Control and Sense Signals** | | | | | | |
| **Module Output SCL and SDA** | $V_{OL}$ | 0 | | 0.4 | V | |
| **Module Input SCL and SDA** | $V_{IL}$ | -0.3 | | Vcc*0.3 | V | |
| | $V_{IH}$ | Vcc*0.7 | | Vcc+0.5 | V | |
| **InitMode, ResetL, and ModSelL** | $V_{IL}$ | -0.3 | | 0.8 | V | |
| | $V_{IH}$ | 2 | | Vcc+0.3 | V | |
| **IntL** | $V_{OL}$ | 0 | | 0.4 | V | |
| | $V_{OH}$ | Vcc-0.5 | | Vcc+0.3 | V | |

**Optical Characteristics**

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| **Transmitter** | | | | | | |
| **Center Wavelength** | λC | 1304.5 | 1311 | 1317.5 | nm | |
| **Side-Mode Suppression Ratio** | SMSR | 30 | | | dB | |
| **Average Launch Power Per Lane** | P | -2.9 | | 4.0 | dBm | 1 |
| **Outer Optical Modulation Amplitude (OMAouter) Per Lane** | TOMA | -0.8 | | 4.2 | dBm | 2 |
| **Launch Power in OMAouter Minus TDECQ Per Lane** | TOMA | -2.2 | | | dBm | |
| **Transmitter and Dispersion Eye Closure for PAM4 (TDECQ) Per Lane** | TDECQ | | | 3.4 | dB | |
| **TDECQ-TECQ 10log10 (Ceq)** | | | | 3.4 | dB | |
| **Average Launch Power of Off Transmitter Per Lane** | Toff | | | -15 | dBm | |
| **Extinction Ratio Per Lane** | ER | 3.5 | | | dB | |
| **Transmitter Transition Time** | | | | 17 | ps | |
| **$RIN_{21.4}OMA$** | RIN | | | -136 | dB/Hz | |
| **Optical Return Loss Tolerance** | ORLT | | | 21.4 | dB | |
| **Transmitter Reflectance** | TR | | | -26 | dB | 3 |
| **Receiver** | | | | | | |
| **Center Wavelength** | λC | 1304.5 | 1311 | 1317.5 | nm | |
| **Damage Threshold Per Lane** | | 5 | | | dBm | |
| **Average Receiver Power Per Lane** | Pavg | -5.9 | | 4.0 | dBm | 1 |
| **Receive Power Per Lane (OMAouter)** | | | | 4.2 | dBm | |
| **Receiver Reflectance** | RR | | | -26 | dB | |
| **Receiver Sensitivity Per Lane (OMAouter)** | SOMA | | | -4.4 | dBm | 2 |
| **Stressed Receiver Sensitivity Per Lane (OMAouter)** | SRS | | | -1.9 | dBm | 3 |
| **Conditions of Stressed Receiver Sensitivity Test** | | | | | | |
| **Stressed Eye Closure for PAM4 (SECQ) Per Lane Under Test** | | | 3.4 | | dB | |
| **SECQ -10log10 (Ceq) Per Lane Under Test** | | | | 3.4 | dB | |
| **OMAouter of Each Aggressor Lane** | | | 4.2 | | dBm | |

**Notes:**

1. Average launch power, per lane (minimum), is informative and not the principal indicator of signal strength.
2. Even if TDECQ < 1.4dB, OMAouter (minimum) must exceed this value.
3. Transmitter reflectance is defined looking into the transmitter.
4. Average receive power, per lane (minimum), is informative and not the principal indicator of signal strength.
5. Receiver sensitivity (OMAouter), per lane (maximum), is informative and is defined for a transmitter with a value of SECQ up to 3.4dB.

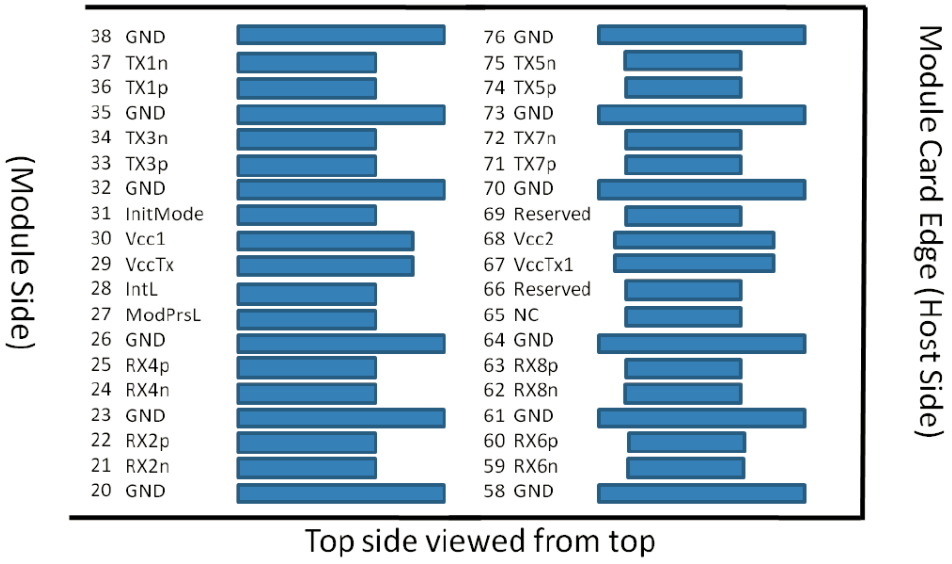
6. Measured with conformance test signals at TP3 for the BER=2.4x$10^{-4}$.

**Pin Descriptions**

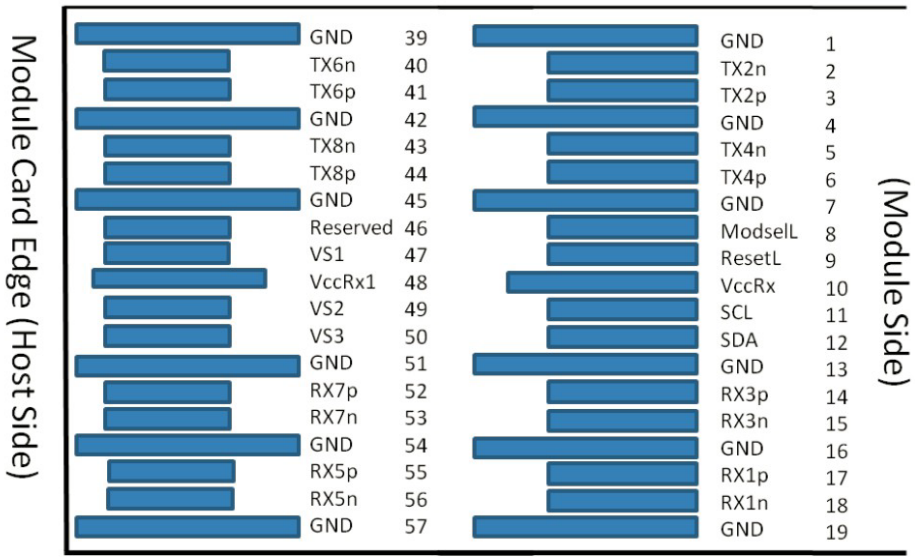
| Pin | Logic | Symbol | Name/Description | Notes |
|---|---|---|---|---|
| **1** | | GND | Module Ground. | |
| **2** | CML-I | Tx2- | Transmitter Inverted Data Input. | |
| **3** | CML-I | Tx2+ | Transmitter Non-Inverted Data Input. | |
| **4** | | GND | Module Ground. | |
| **5** | CML-I | Tx4- | Transmitter Inverted Data Input. | |
| **6** | CML-I | Tx4+ | Transmitter Non-Inverted Data Input. | |
| **7** | | GND | Module Ground. | |
| **8** | LVTTL-I | ModSelL | Module Select. | |
| **9** | LVTTL-I | ResetL | Module Reset. | |
| **10** | | VccRx | +3.3V Receiver Power Supply. | |
| **11** | LVCMOS-I/O | SCL | 2-Wire Serial Interface Clock. | |
| **12** | LVCMOS-I/O | SDA | 2-Wire Serial Interface Data. | |
| **13** | | GND | Module Ground. | |
| **14** | CML-O | Rx3+ | Receiver Non-Inverted Data Output. | |
| **15** | CML-O | Rx3- | Receiver Inverted Data Output. | |
| **16** | | GND | Module Ground. | |
| **17** | CML-O | Rx1+ | Receiver Non-Inverted Data Output. | |
| **18** | CML-O | Rx1- | Receiver Inverted Data Output. | |
| **19** | | GND | Module Ground. | |
| **20** | | GND | Module Ground. | |
| **21** | CML-O | Rx2- | Receiver Inverted Data Output. | |
| **22** | CML-O | Rx2+ | Receiver Non-Inverted Data Output. | |
| **23** | | GND | Module Ground. | |
| **24** | CML-O | Rx4- | Receiver Inverted Data Output. | |
| **25** | CML-O | Rx4+ | Receiver Non-Inverted Data Output. | |
| **26** | | GND | Module Ground. | |
| **27** | LVTTL-O | ModPrsL | Module Present. | |
| **28** | LVTTL-O | IntL | Interrupt | |
| **29** | | VccTx | +3.3V Transmitter Power Supply. | |
| **30** | | Vcc1 | +3.3V Power Supply. | |
| **31** | LVTTL-I | InitMode | Initialization Mode. | |
| **32** | | GND | Module Ground. | |
| **33** | CML-I | Tx3+ | Transmitter Non-Inverted Data Input. | |
| **34** | CML-I | Tx3- | Transmitter Inverted Data Input. | |
| **35** | | GND | Module Ground. | |
| **36** | CML-I | Tx1+ | Transmitter Non-Inverted Data Input. | |
| **37** | CML-I | Tx1- | Transmitter Inverted Data Output. | |
| **38** | | GND | Module Ground. | |

| | | | | |
|---|---|---|---|---|
| **39** | | GND | Module Ground. | |
| **40** | CML-I | Tx6- | Transmitter Inverted Data Input. | |
| **41** | CML-I | Tx6+ | Transmitter Non-Inverted Data Input. | |
| **42** | | GND | Module Ground. | |
| **43** | CML-I | Tx8- | Transmitter Inverted Data Input. | |
| **44** | CML-I | Tx8+ | Transmitter Non-Inverted Data Input. | |
| **45** | | GND | Module Ground. | |
| **46** | | Reserved | | |
| **47** | | VS1 | Module Vendor-Specific 1. | |
| **48** | | VccRx1 | +3.3V Receiver Power Supply. | |
| **49** | | VS2 | Module Vendor-Specific 2. | |
| **50** | | VS3 | Module Vendor-Specific 3. | |
| **51** | | GND | Module Ground. | |
| **52** | CML-O | Rx7+ | Receiver Non-Inverted Data Output. | |
| **53** | CML-O | Rx7- | Receiver Inverted Data Output. | |
| **54** | | GND | Module Ground. | |
| **55** | CML-O | Rx5+ | Receiver Non-Inverted Data Output. | |
| **56** | CML-O | Rx5- | Receiver Inverted Data Output. | |
| **57** | | GND | Module Ground. | |
| **58** | | GND | Module Ground. | |
| **59** | CML-O | Rx6- | Receiver Inverted Data Output. | |
| **60** | CML-O | Rx6+ | Receiver Non-Inverted Data Output. | |
| **61** | | GND | Module Ground. | |
| **62** | CML-O | Rx8- | Receiver Inverted Data Output. | |
| **63** | CML-O | Rx8+ | Receiver Non-Inverted Data Output. | |
| **64** | | GND | Module Ground. | |
| **65** | | NC | Not Connected. | |
| **66** | | Reserved | | |
| **67** | | VccTx1 | +3.3V Transmitter Power Supply. | |
| **68** | | Vcc2 | +3.3V Power Supply. | |
| **69** | | Reserved | | |
| **70** | | GND | Module Ground. | |
| **71** | CML-I | Tx7+ | Transmitter Non-Inverted Data Input. | |
| **72** | CML-I | Tx7- | Transmitter Inverted Data Input. | |
| **73** | | GND | Module Ground. | |
| **74** | CML-I | Tx5+ | Transmitter Non-Inverted Data Input. | |
| **75** | CML-I | Tx5- | Transmitter Inverted Data Input. | |
| **76** | | GND | Module Ground. | |

**Electrical Pin-Out Details**

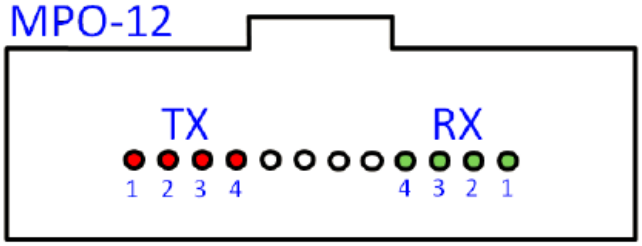



Top side viewed from top

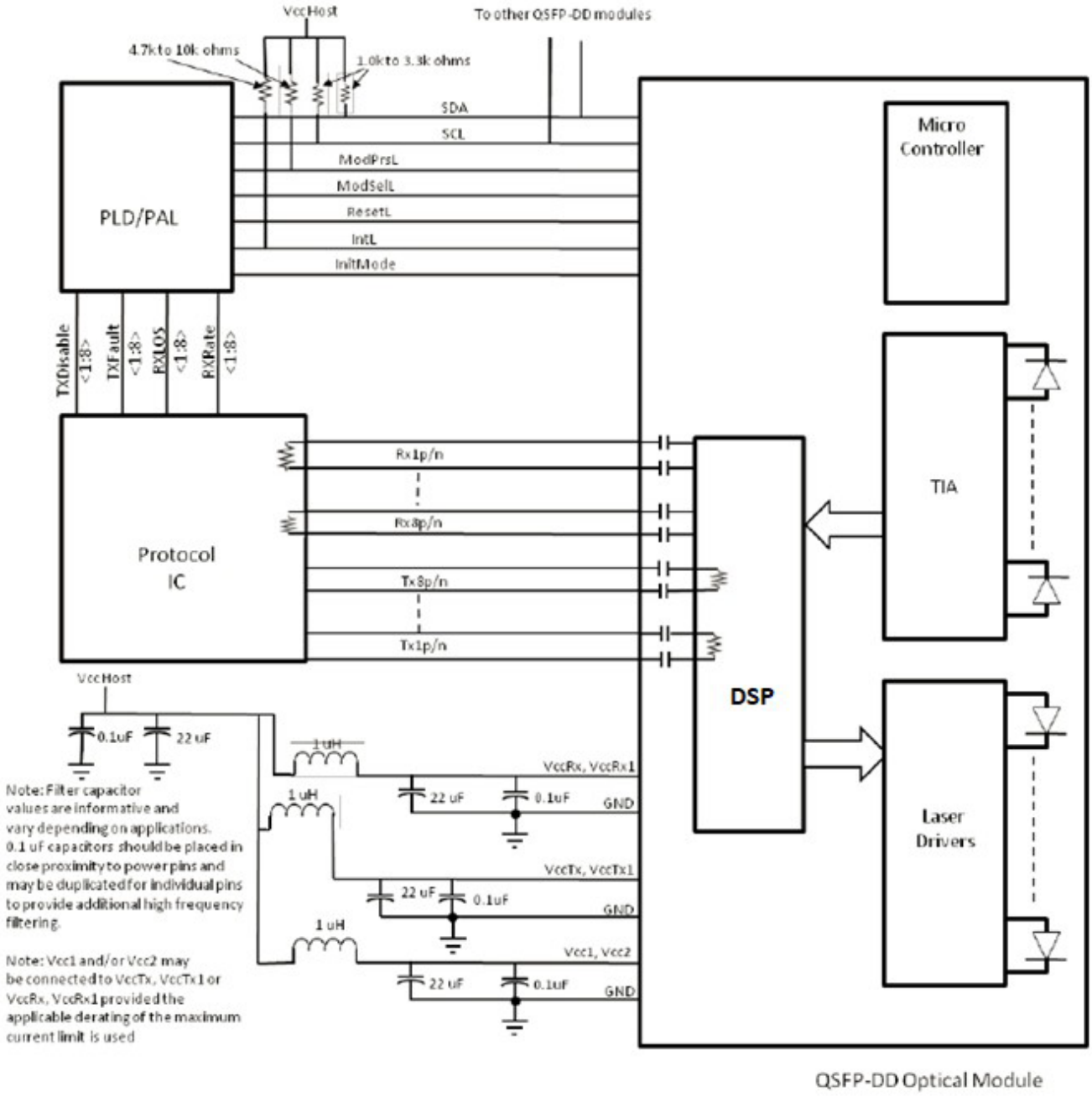



Bottom side viewed from bottom

**Active Fiber Ports in MPO-12 Connector on Module Side**



**Host Board Schematic**




QSFP-DD Optical Module

**Mechanical Specifications**