

QSFPDD-400G-ZR4

Optical SFP Module

400G QSFP-DD ZR4 Transceiver, DWDM C-band, 80KM



Features

- Support Client-side Interfaces: 400GAUI-8
- Support Line-side DP-16QAM with CFEC
- Support Flex-grid channel spacing DWDM in C-band
- Standard QSFP-DD type 2A form factor
- 76pin QSFP-DD MSA compliant connector
- Compliant with CMIS 4.0
- Commercial operating case temperature range: 0~ 70° C
- Compatible with RoHS
- Power dissipation <18.5W

Application

- 400G Ethernet
- Data Center
- Infiniband QDR
- Fiber channel

Standard

- IEEE 802.3TM
- QSFP-DD MSA compliant
- Compliant to SFF-8636

Absolute Maximum Ratings

| Parameter | Symbol | Min | Max | Unit |
|-----------------------------|--------|---------|----------|------|
| Storage Ambient Temperature | TSTG | -40 | 85 | °C |
| Operating Humidity | HO | 5 | 85 | % |
| Power Supply Voltage | Vcc | -0.3 | 3.6 | V |
| Signal Input Voltage | | Vcc-0.3 | Vcc +0.3 | V |

Recommended Operating Conditions

| Parameter | Symbol | Min | Typical | Max | Unit |
|-------------------------------|--------|------|---------|------|------|
| Operating Case Temperature | Tc | 0 | | 70 | °C |
| Power Supply Voltage | Vcc | 3.13 | 3.3 | 3.47 | V |
| Data Rate, each Lane (PAM4) | | | 53.125 | | Gbps |
| Fiber Length 9/125µm core MMF | | | 80 | | km |

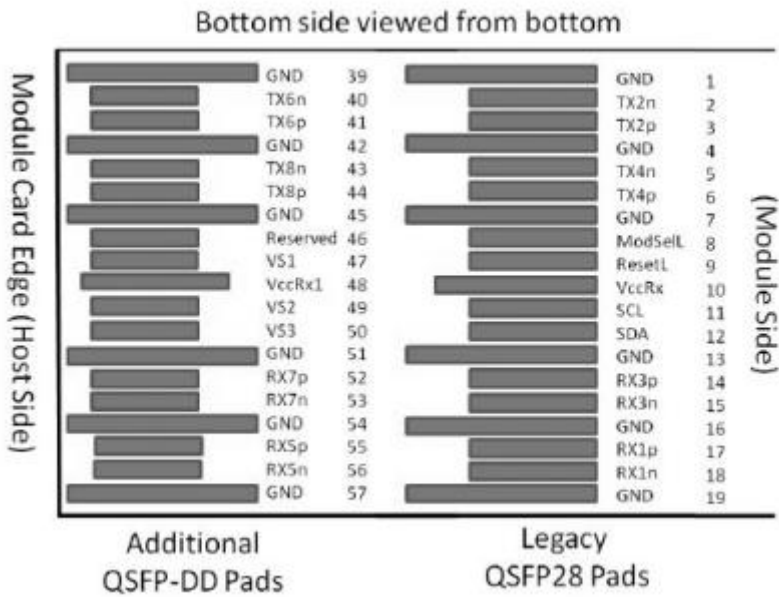
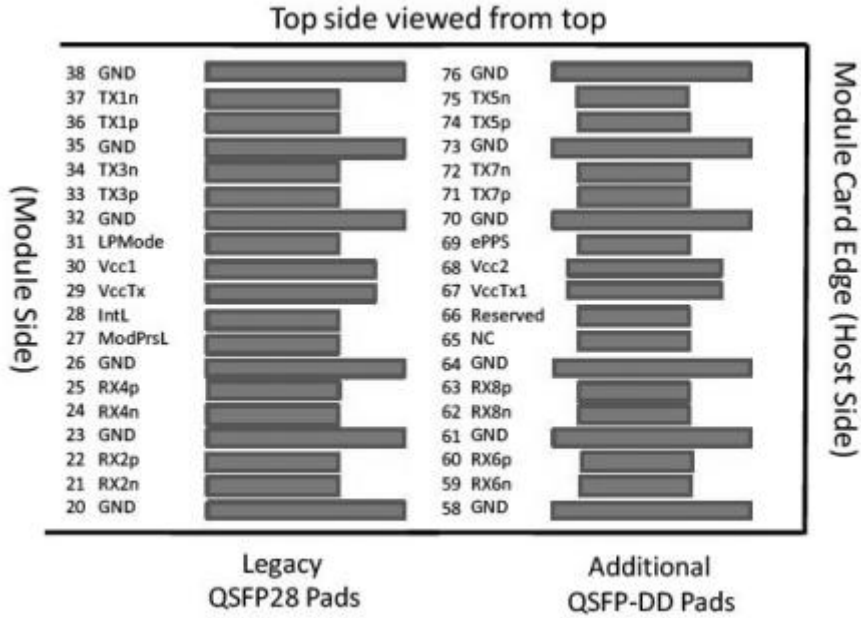
Optical and Electrical Characteristics

| Optical Transmitter Characteristics | | | | | |
|---|-------|---------|-------|-----------|---|
| Parameter | Min | Typical | Max | Unit | Notes |
| Transmitter Frequency Range | 191.3 | 193.7 | 196.1 | THz | C band 75GHz ITU-T grid. Frequency range over which the specifications hold unless noted otherwise. |
| Laser Frequency Stability | -1.8 | | 1.8 | GHz | Frequency stability relative to ITU grid. |
| Laser Frequency Accuracy | -1.8 | | 1.8 | GHz | |
| Laser Frequency Fine Tuning Range | -6.0 | | 6.0 | GHz | |
| Fine Tuning Resolution | | 100 | | MHz | |
| Channel Tuning Speed | - | | 60 | s | |
| Laser LineWidth | | | 300 | kHz | |
| Transmitter Output Power Range | | -11.5 | | dBm | |
| Transmitter Laser Disable Time | | | 180 | ms | |
| Output Power Stability | -0.5 | | 0.5 | dB | Difference over temperature, time, wavelength and aging. |
| Output Power Accuracy | -2 | | 2 | dB | Difference between the set value and actual value over aging. |
| Transmitter Turn-up Time from Cold Start | - | | 100 | s | |
| Transmitter OSNR (Inband) | 34 | | - | dB/0.1 nm | |
| Transmitter Back Reflectance | - | | -24 | dB | |
| Transmitter Output Power with TX Disabled | - | | -20 | dBm | |
| Transmitter Polarization Dependent Power | - | | 1.5 | dB | Power difference between X and Y polarization |
| Optical Receiver Characteristics | | | | | |
| Parameter | Min | Typical | Max | Unit | Notes |
| Receiver Frequency Range | 191.3 | 193.7 | 196.1 | THz | |
| Input Power Range | -12 | | 0 | dBm | Signal power of the channel at the OSNR Penalty < 0.5dB |

| | | | | | |
|---------------------------------------|------|-----|-----|-----------|---|
| OSNR Sensitivity | | | 26 | dB/0.1 nm | |
| Receiver Sensitivity | -20 | | | dBm | Input power needed to achieve post FEC BER <1E-15 when OSNR Tolerance> 26dB/0.1nm |
| Los Assert | -20 | -18 | -16 | dBm | |
| Los Hysteresis | 1.0 | | 2.5 | dB | |
| CD Tolerance | 2400 | | | ps/nm | Tolerance to Chromatic Dispersion. |
| PMD Tolerance | 10 | | | ps | Tolerance to PMD with < 0.5 dB penalty to OSNR sensitivity. |
| Peak PDL Tolerance | 3.5 | | | dB | Tolerance to peak PDL with < 1.3 dB penalty to OSNR sensitivity when change in SOP is <=1 rad/ms. |
| Tolerance to Change in SOP | 50 | | | rad/ms | |
| Input Power Transient Tolerance | -2 | | 2 | dB | Tolerance to change in input power with < 0.5 dB penalty to OSNR sensitivity. |
| Input Power Reading Accuracy | -2 | | 2 | dB | |
| Optical Return Loss | -20 | | | dB | Optical reflectance at Rx connector input. |
| Receiver Turn-up Time from Cold Start | - | | 100 | s | From module reset, with valid optical input signal present. |

Pin Definitions

Pin Diagram



QSFP-DD MSA-compliant 76-pin connector

| Pin | Symbol | Name/Description | Notes |
|-----|----------|---|-------|
| 1 | GND | Ground | 1 |
| 2 | Tx2n | Transmitter Inverted Data Input | |
| 3 | Tx2p | Transmitter Non-Inverted Data Input | |
| 4 | GND | Ground | 1 |
| 5 | Tx4n | Transmitter Inverted Data Input | |
| 6 | Tx4p | Transmitter Non-Inverted Data Input | |
| 7 | GND | Ground | 1 |
| 8 | ModSelL | Module Select | |
| 9 | ResetL | Module Reset | |
| 10 | VccRx | +3.3V Power Supply Receiver | 2 |
| 11 | SCL | 2-wire serial interface clock | |
| 12 | SDA | 2-wire serial interface data | |
| 13 | GND | Ground | 1 |
| 14 | Rx3p | Receiver Non-Inverted Data Output | |
| 15 | Rx3n | Receiver Inverted Data Output | |
| 16 | GND | Ground | 1 |
| 17 | Rx1p | Receiver Non-Inverted Data Output | |
| 18 | Rx1n | Receiver Inverted Data Output | |
| 19 | GND | Ground | 1 |
| 20 | GND | Ground | 1 |
| 21 | Rx2n | Receiver Inverted Data Output | |
| 22 | Rx2p | Receiver Non-Inverted Data Output | |
| 23 | GND | Ground | 1 |
| 24 | Rx4n | Receiver Inverted Data Output | |
| 25 | Rx4p | Receiver Non-Inverted Data Output | |
| 26 | Ground | Ground | 1 |
| 27 | ModPrsL | Module Present | |
| 28 | IntL | Interrupt | |
| 29 | Vcc Tx | +3.3V Power supply transmitter | 2 |
| 30 | Vcc1 | +3.3V Power supply | 2 |
| 31 | InitMode | Initialization mode; In legacy QSFP applica- tions, the InitMode pad is called LPMODE | |
| 32 | GND | Ground | 1 |
| 33 | Tx3p | Transmitter Non-Inverted Data Input | |
| 34 | Tx3n | Transmitter Inverted Data Input | |
| 35 | GND | Ground | 1 |
| 36 | Tx1p | Transmitter Non-Inverted Data Input | |
| 37 | Tx1n | Transmitter Inverted Data Input | |
| 38 | GND | Ground | 1 |
| 39 | GND | Ground | 1 |
| 40 | Tx6n | Transmitter Inverted Data Input | |
| 41 | Tx6p | Transmitter Non-Inverted Data Input | |

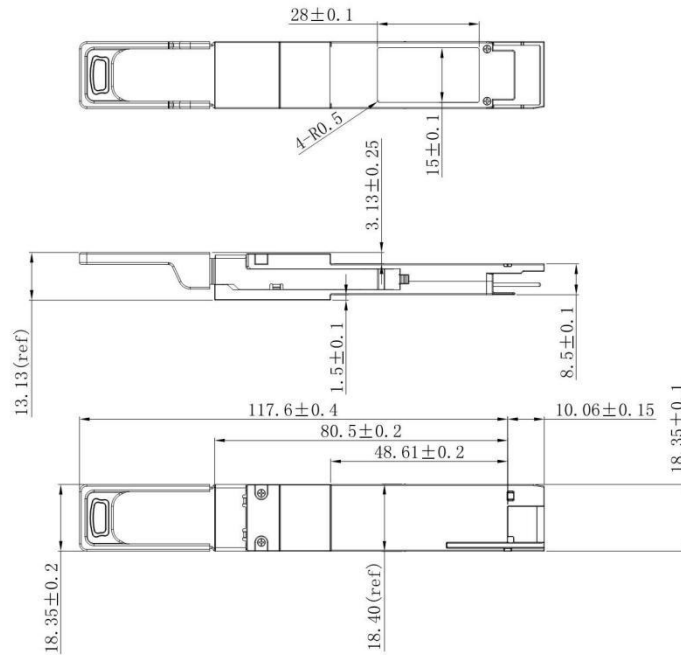
| | | | |
|----|----------|-------------------------------------|---|
| 42 | GND | Ground | 1 |
| 43 | Tx8n | Transmitter Inverted Data Input | |
| 44 | Tx8p | Transmitter Non-Inverted Data Input | |
| 45 | GND | Ground | 1 |
| 46 | Reserved | For Future Use | |
| 47 | VS1 | Module Vendor Specific 1 | |
| 48 | Vcc Rx1 | +3.3V Power Supply Receiver | 2 |
| 49 | VS2 | Module Vendor Specific 2 | |
| 50 | VS3 | Module Vendor Specific 3 | |
| 51 | GND | Ground | 1 |
| 52 | Rx7p | Receiver Non-Inverted Data Output | |
| 53 | Rx7n | Receiver Inverted Data Output | |
| 54 | Ground | Ground | 1 |
| 55 | Rx5p | Receiver Non-Inverted Data Output | |
| 56 | Rx5n | Receiver Inverted Data Output | |
| 57 | GND | Ground | 1 |
| 58 | GND | Ground | 1 |
| 59 | Rx6n | Receiver Inverted Data Output | |
| 60 | Rx6p | Receiver Non-Inverted Data Output | |
| 61 | GND | Ground | 1 |
| 62 | Rx8n | Receiver Inverted Data Output | |
| 63 | Rx8p | Receiver Non-Inverted Data Output t | |
| 64 | GND | Ground | 1 |
| 65 | NC | For Future Use | |
| 66 | Reserved | Interrupt | |
| 67 | Vcc Tx1 | +3.3V Power supply transmitter | 2 |
| 68 | Vcc2 | +3.3V Power supply | 2 |
| 69 | Reserved | For Future Use | |
| 70 | GND | Ground | 1 |
| 71 | Tx7p | Transmitter Non-Inverted Data Input | |
| 72 | Tx7n | Transmitter Inverted Data Input | |
| 73 | GND | Ground | 1 |
| 74 | Tx5p | Transmitter Non-Inverted Data Input | |
| 75 | Tx5n | Transmitter Inverted Data Input | |
| 76 | GND | Ground | 1 |

QSFP-DD Module PIN Definition

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 referred 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. VccRx, VccRx1, Vcc1, Vcc2, VccTx and VccTx1 may be internally connected within the module in any combination. Each connector Vcc pin is rated for a maximum current of 1000 mA.

Mechanical Dimensions



Ordering information

| Part. No | Specifications | | | | | | |
|-----------------|----------------|-------------|---------|-----------|-----------|------------|-----|
| | Pack | Rate (Gbps) | Tx (nm) | Sen (dBm) | Temp (°C) | Reach (km) | DDM |
| QSFPDD-400G-ZR4 | QSFP-DD | 400G | DWDM | <-20 | 0~70 | 80 | Y |



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