

TITLE**100G QSFP28 SR4 Transceiver****1. SCOPE**

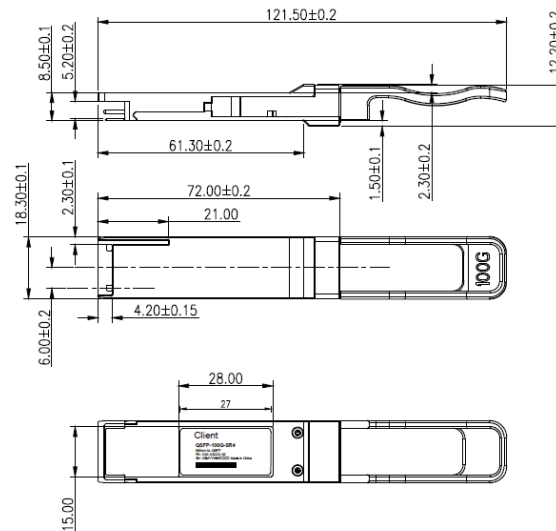
The transceiver is a Parallel 100Gb/s Quad Small Form-factor, Hot-Pluggable optical module. The module integrates 4 independent transmitters And 4 independent receivers inside. Four-channel 850nm VCSEL array, PIN array, amplifier and driver are used in the module for compact size, low power consumption and low cost. Each channel can operate at 25Gbps up to 100m using OM3 fiber. The transceiver is compliant to the industry standard SFF-8636 QSFP28 r specification. A digital diagnostic function is provided to monitor the working of the module. The electrical interface uses a 38 contact edge type connector. The optical interface uses an 8 or 12 fiber MTP (MPO) connector.

2. PRODUCT FEATURES

- Supports 103.1Gb/s aggregate bit rate
- Hot pluggable QSFP28 form factor
- Power dissipation < 2.5W
- RoHS-6 compliant
- Commercial case temperature range of 0°C to 70°C
- Single 3.3 V power Supply
- Maximum link length of 100m on OM4 Multimode Fiber(MMF)
- 4X25Gb/s 850nm VCSEL-based transmitter
- 4X25G electrical interface
- Single MPO12 receptacle
- I2C management interface
- 100BASE-SR4 100G Ethernet

3. PRODUCT DESCRIPTION**3.1 PRODUCT NAME AND SERIES NUMBER(S)****100G QSFP28 SR4 Transceiver**

| Part Number | Data Rate | Wavelength (nm) | Distance | Media | Power (dBm) | Sen. (dBm) | Connector | Tem. |
|-----------------|-----------|-----------------|----------|-------|-------------|------------|-----------|------|
| ZFTFS4F0850A5ST | 100G | 850 | 100m | MMF | -6.4 ~ 3 | -5.2 | MPO | C |

TITLE**100G QSFP28 SR4 Transceiver****3.2 DIMENSIONS, MATERIALS, PLATINGS AND MARKING**

Unit is millimeter. All dimensions are ± 0.1 mm unless otherwise specified.

To minimize MPO connection induced reflections, an MPO receptacle with 8-degree angled end-face is utilized for this product. A female MPO connector with 8-degree end-face should be used with this product as illustrated in below.

4. APPLICABLE DOCUMENTS AND SPECIFICATIONS

- Compliant with 100G Ethernet
- IEEE 802.3 bm100GBASE-SR4
- Compliant to SFF-8665 (QSFP28 Solution) Revision 1.8
- MPO optical connector

5. QUALIFICATION

- Electrostatic Discharge (ESD) to the Electrical Pins
- Electrostatic Discharge (ESD) to the MPO Connector
- RoHS compliance

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6. Absolute Maximum Ratings & Recommended Operating Conditions

| Absolute Maximum Ratings | | | | |
|-------------------------------------|----------------|------|------|------|
| Parameter | Symbol | Min. | Max. | Unit |
| Storage Temperature | T _s | -40 | +85 | °C |
| Supply Voltage | VCC3 | -0.5 | 4 | V |
| Relative Humidity(Non-condensing) | RH | 15 | 85 | % |
| Receiver Damage Threshold ,per Lane | Prdmg | 3.4 | | dBm |

| Recommended Operating Conditions | | | | | |
|---|----------------|------|----------|------|------|
| Parameter | Symbol | Min. | Typical | Max. | Unit |
| Operating Case Temperature | TC | 0 | 25 | 70 | °C |
| Operating Case Temperature | T _I | -40 | 25 | 85 | °C |
| Power Supply Voltage | VCC3 | 3.1 | 3.3 | 3.5 | V |
| Data Rate PER Channel | - | - | 25.78125 | - | Gbps |
| Supply Current | ICC3 | | | 0.8 | A |
| Module Total Power | PD | | | 2.5 | W |

Notes:

Module Total Power : Maximum total power value is specified across the full operational temperature and voltage range when CDRs are locked or a lack of input signal results in squelch being activated. If incorrect frequencies cause the CDRs to continuously attempt to lock, maximum power dissipation may reach 3.5 W.

| Transmitter Operating Characteristic-Optical, Electrical | | | | | | |
|---|------------------|---------|----------|------|------|------|
| Parameter | Symbol | Min. | Typical | Max. | Unit | Note |
| Optical Characteristic | | | | | | |
| Bit Rate | BR | 10.3125 | 25.78125 | - | Gbps | 1 |
| Center Wavelength Range | λ _c | 840 | 850 | 860 | nm | |
| RMS Spectral Width | Δλ | - | - | 0.6 | nm | |
| Average Launch Power per Lane | TXP _x | -8.4 | | 2.4 | dBm | |

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| | | | | | | |
|-----------------------------------|------------------------------------|-------------------|---|------|------|---|
| Average Launch power Tx_off | Poff | - | | --30 | dBm | |
| Transmit OMA per Lane | TxOMA | -6.4 | | 3 | dBm | |
| Extinction Ratio | ER | 2 | - | - | dB | |
| Eye Mask {X1, X2, X3, Y1, Y2, Y3} | {0.3, 0.38, 0.45, 0.35, 0.41, 0.5} | | | | | 2 |
| Electrical Characteristic | | | | | | |
| Signaling rate per lane | | 25.78125 ± 100ppm | | | Gb/s | |
| Differential Data Input Swing | V _{in,P-P} | | - | 900 | mV | |
| Single-ended voltage tolerance | V _{in,PP} | -0.35 | | 3.3 | V | |

Notes:

1. Transmitter consists of 4 lasers operating at a maximum speed of 25.78125Gb/s ±100ppm each.
2. Hit Ratio 1.5 x 10⁻³ hits/sample.

Receiver Operating Characteristic-Optical, Electrical

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
|--------------------------------------|------------------|---------|----------|------|------|------|
| Optical Characteristic | | | | | | |
| Signaling Speed per Lane | BR | 10.3125 | 25.78125 | - | Gbps | |
| Center Wavelength Range | λ _c | 840 | - | 860 | nm | |
| Damage Thredhold | DT | 3.4 | | | dBm | |
| Average Receive Power per Lane | RXP _x | -10.3 | | 2.4 | dBm | 1 |
| Stressed receiver sensitivity in OMA | RxSOMA | | | -5.2 | dBm | 2 |
| Receive Power (OMA) per Lane | RxOMA | | | 3 | dBm | |
| LOS Assert | - | -30 | - | - | dBm | |
| LOS De-Assert | - | - | - | -12 | dBm | |
| LOS Hysteresis | | 0.5 | 2 | | dB | |
| Electrical Characteristic | | | | | | |

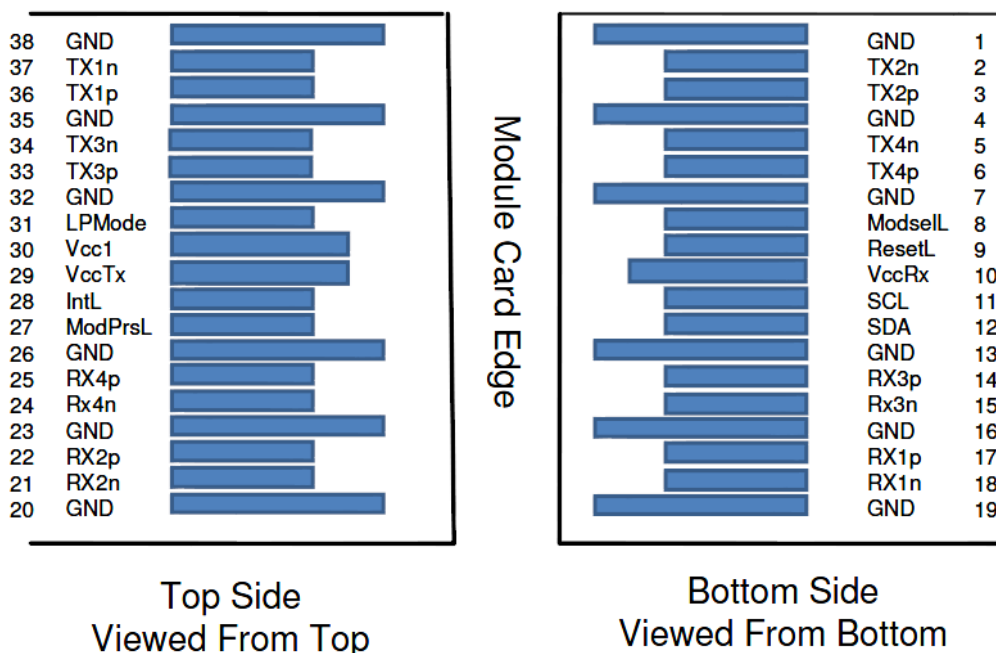
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|--------------------------------|------------------|------|-----|------|------|---|
| Differential Data Output Swing | V _{out} | 100 | - | 400 | mVpp | 3 |
| | | 300 | | 600 | | |
| | | 400 | 600 | 800 | | |
| | | 600 | | 1200 | | |
| Eye width | | 0.57 | | | UI | |
| Eye HEIGHT, differential | | 228 | | | mV | |
| Vertical eye closure | VEC | 5.5 | | | dB | |
| Transition time(20% ~ 80%) | tr,tf | 12 | | | ps | |

Note:

1. Minimum value is informative only and not the principal indicator of signal strength.
2. Hit Ratio 5×10^{-5} hits/sample.
3. Output voltage is settable in 4 discrete ranges via I2C. Default range is Range 2 (400 – 800 mV).

7. Applications Note :



Pin Definitions

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Pin Assignment

| Pin | Logic | Name/Description | Note |
|-----|---------|-------------------------------------|------|
| 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 | 2 |
| 9 | ResetL | Module Reset | 2 |
| 10 | Vcc Rx | +3.3V Power Supply Receiver | |
| 11 | SCL | 2-wire serial interface clock | 2 |
| 12 | SDA | 2-wire serial interface data | 2 |
| 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 | 1 |
| 25 | Rx4p | Receiver Non-Inverted Data Output | |
| 26 | GND | Ground | 1 |
| 27 | ModPrsL | Module Present | |
| 28 | IntL | Interrupt | 2 |
| 29 | VccTx | +3.3V Power supply transmitter | |
| 30 | Vcc1 | +3.3V Power supply | |
| 31 | LPMODE | Low Power Mode | 2 |
| 32 | GND | Ground | 1 |
| 33 | Tx3p | Transmitter Non-Inverted Data Input | |
| 34 | Tx3n | Transmitter Inverted Data Input | |

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|----|------|-------------------------------------|---|
| 35 | GND | Ground | 1 |
| 36 | Tx1p | Transmitter Non-Inverted Data Input | |
| 37 | Tx1n | Transmitter Inverted Data Input | |
| 38 | GND | Ground | 1 |

Notes:

[1] GND is the symbol for signal and supply (power) common for the QSFP28 module. All are common within the QSFP+ 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 the receiver and transmitter power supplies and shall be applied concurrently. Recommended host board power supply filtering is shown. VccRx, Vcc1 and VccTx may be internally connected within the QSFP28 Module in any combination. The connector pins are each rated for a maximum current of 500 mA.

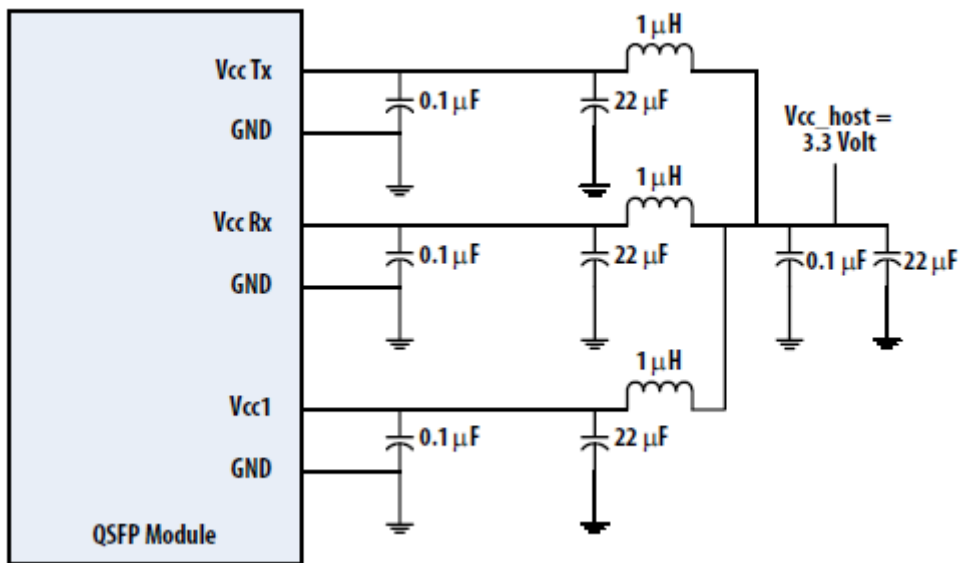
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Digital Diagnostic Function

| Parameters | Unit | Accuracy |
|-------------|------|----------|
| Temperature | °C | ±3 |
| Voltage | V | ±3% |
| Ibias | mA | ±10% |
| Rx power | dB | ±3 |
| Tx power | dB | ±3 |

Recommended Host Board Power Supply Filter Network



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Recommended Application Interface Block Diagram

