

100Gbps QSFP28 100M SR4 MMF

SLQS28-100G-SR4



Overview

This product is a parallel 100Gb/s Quad Small Form-factor Pluggable (QSFP28) optical module. It provides increased port density and total system cost savings. The QSFP28 full-duplex optical module offers 4 independent transmit and receive channels, each capable of 25Gb/s operation for an aggregate data rate of 100Gb/s on 100 meters of OM4 multi-mode fiber.

An optical fiber ribbon cable with an MTP/MPO connector can be plugged into the QSFP28 module receptacle. Proper alignment is ensured by the guide pins inside the receptacle. The cable usually cannot be twisted for proper channel to channel alignment. Electrical connection is achieved through an MSA-compliant 38-pin edge type connector.

Features

- ◆ 4 independent full-duplex channels
- ◆ Up to 28Gb/s data rate per channel
- ◆ QSFP28 MSA compliant
- ◆ Up to 100m OM4 MMF transmission
- ◆ Operating case temperature: 0 to 70°C
- ◆ Single 3.3V power supply
- ◆ Maximum power consumption 3.5W
- ◆ MTP/MPO optical connector
- ◆ RoHS-6 compliant

Applications

- ◆ Rack to Rack
- ◆ Data Center
- ◆ Infiniband QDR, DDR and SDR
- ◆ 100G Ethernet

Ordering Information

| Part Number | Product Description |
|-----------------|---------------------------------|
| SLQS28-100G-SR4 | 100G QSFP28 SR4 100m on OM4 MMF |

Datasheet
Absolute Maximum Ratings

| Parameter | Symbol | Min | Max | Unit |
|---|--|-------------------------|-----|------|
| Supply Voltage | V _{CC-Tx/V_{CC-Rx/V_{CC1}}} | -0.5 | 3.6 | V |
| Storage Temperature Range | T _{STG} | -40 | +85 | °C |
| Maximum Average Input Optical Power per lane (Damage Threshold) | P _{IN} | 3.4 | | dBm |
| Relative Humidity | RH | 0to 85%(non-condensing) | | |

Operating Conditions

| Parameter | Symbol | Min | Max | Unit |
|----------------------------|-------------------|-----|-----|------|
| Supply Voltage | V _{CC} | 3.1 | 3.5 | V |
| Operating Case temperature | T _{CASE} | 0 | 70 | °C |
| Power Consumption | P _{DISS} | | 3.5 | W |
| Link Length(OM3) | M | | 70 | m |
| Link Length(OM4) | M | | 100 | m |

Electrical Specifications

| Parameter | Symbol | Min | Typical | Max | Units | Notes |
|--|--------------------|------|---------|------|-------|----------------|
| General | | | | | | |
| Power Consumption | | | | 3.5 | w | |
| Supply Current | I _{CC} | | | 1060 | Ma | |
| Transceiver Power-on Initialization Time | | | | 2000 | ms | 1 |
| Transmitter (each Lane) | | | | | | |
| Single Ended Input Voltage Tolerance (Note2) | | -0.3 | | 3.6 | | |
| AC Common Mode Input Voltage Tolerance | | 15 | | | mV | RMS |
| Differential Input Voltage Swing Threshold | | 50 | | | mVpp | LOSA Threshold |
| Differential Input Voltage Swing | V _{in,pp} | 180 | | 1000 | mVpp | |
| Differential Input Impedance | Z _{in} | 90 | 100 | 110 | Ohm | |
| Total Jitter | | | | 0.4 | UI | |
| Deterministic Jitter | | | | 0.15 | UI | |

Datasheet

| Receiver (each Lane) | | | | | | |
|-----------------------------------|---------|------|-----|------|------|-----|
| Single Ended Output Voltage | | -0.3 | | 4 | V | |
| AC Common Mode Output Voltage | | | | 7.5 | mV | RMS |
| Differential Output Voltage Swing | Vout,pp | 300 | | 900 | mVpp | |
| Differential Output Impedance | Zout | 90 | 100 | 110 | Ohm | |
| Total Jitter | | | | 0.3 | UI | |
| Deterministic Jitter | | | | 0.15 | UI | |

Notes:

1. Power-on Initialization Time is the time from when the power supply voltages reach and remain above the minimum recommended operating supply voltages to the time when the module is fully functional.
2. The single ended input voltage tolerance is the allowable range of the instantaneous input signals.

Optical Characteristics

| Parameter | Symbol | Min | Typical | Max | Units | Notes |
|--|-----------------------|-------------------------------|---------|-----|-------|-------|
| Transmitter | | | | | | |
| Center Wavelength | λ_c | 840 | 850 | 860 | nm | |
| RMS Spectral Width | $\Delta\lambda_{rms}$ | | | 0.6 | nm | |
| Average Launch Power, each Lane | P_{AVG} | -8.4 | | 2.4 | dBm | |
| Optical Modulation Amplitude(OMA), each Lane | P_{OMA} | -6.4 | | 3.0 | dBm | 1 |
| Difference in Launch Power between any Two Lanes (OMA) | $P_{tx,diff}$ | | | 4.0 | dB | |
| Launch Power in OMA minus TDEC, each Lane | | -7.3 | | | dBm | |
| Transmitter and Dispersion Eye Closure (TDEC), each Lane | | | | 4.3 | dB | |
| Extinction Ratio | ER | 2.0 | | | dB | |
| Optical Return Loss Tolerance | TOL | | | 12 | dB | |
| Encircled Flux | | ≥ 86% at 19um | | | | |
| Transmitter Eye Mask Definition {X1, X2, X3, Y1, Y2, Y3}, 5×10 ⁻⁵ hits/sample | | {0.3,0.38,0.45,0.35,0.41,0.5} | | | | 2 |
| Average Launch Power OFF Transmitter, each Lane | P_{off} | | | -30 | dBm | |
| Receiver | | | | | | |
| Center Wavelength | λ_c | 840 | 850 | 860 | nm | |
| Damage Threshold, each Lane | THd | 3.4 | | | dBm | 3 |

Datasheet

| | | | | | | |
|--|------|-------|--|------|-----|---|
| Average Receive Power, each Lane | | -10.3 | | 2.4 | dBm | |
| Receiver Reflectance | RR | | | -12 | dB | |
| Receive Power (OMA), each Lane | | | | 3.0 | dBm | |
| Receiver Sensitivity (OMA), each Lane | SEN | | | -9.2 | dBm | |
| Stressed Receiver Sensitivity (OMA), each Lane | | | | -5.2 | dBm | 4 |
| LOS Assert | LOSA | -30 | | | dBm | |
| LOS Deassert | LOSD | | | -12 | dBm | |
| LOS Hysteresis | LOSH | 0.5 | | | dB | |

Conditions of Stress Receiver Sensitivity Test (Note 5):

| | | | | | | |
|---|--|------------------------------|------|------|-----|---|
| Stressed Eye Closure (SEC), Lane under Test | | | 4.3 | | dB | |
| Stressed Eye J2 Jitter, Lane under Test | | | 0.39 | | UI | |
| Stressed Eye J4 Jitter, Lane under Test | | | | 0.53 | UI | |
| OMA of each Aggressor Lane | | | 3 | | dBm | |
| Stressed receiver eye mask definition {X1, X2, X3, Y1, Y2, Y3} | | {0.28,0.5,0.5,0.33,0.33,0.4} | | | | |
| Stressed Receiver Sensitivity (OMA), each Lane | | | | -5.2 | dBm | 4 |

Notes:

1. Even if the TDP < 0.9 dB, the OMA min must exceed the minimum value specified here.
2. See Figure 2 below.
3. The receiver shall be able to tolerate, without damage, continuous exposure to a modulated optical input signal having this power level on one lane. The receiver does not have to operate correctly at this input power.
4. Measured with conformance test signal at receiver input for BER = 1x10⁻¹².
5. Stressed eye closure and stressed eye jitter are test conditions for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

Functional Block Diagram

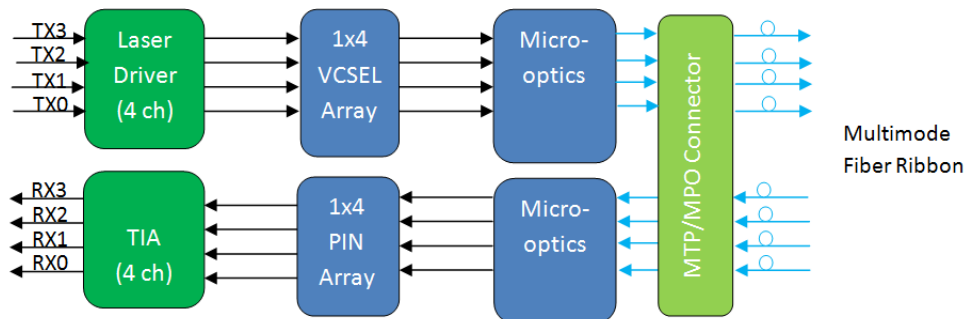


Figure1. Functional Block Diagram

Recommended Host Board Power Supply Filtering

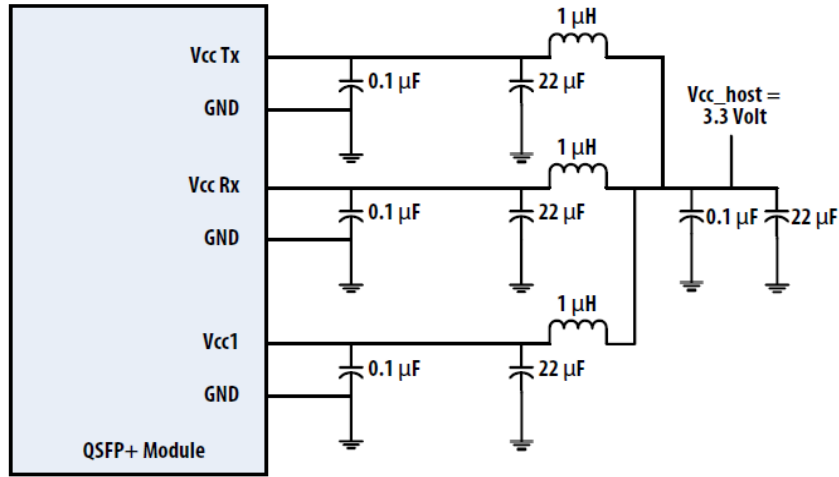


Figure2. QSFP voltage supply and filtering scheme

QSFP Edge Connector and Pinout Description

The electrical interface to the transceiver is a 38-pin edge connector. The 38-pins provide high speed data, low speed monitoring and control signals, I²C communication, power and ground connectivity. The top and bottom views of the connector are provided below, as well as a table outlining the contact numbering, symbol and full description.

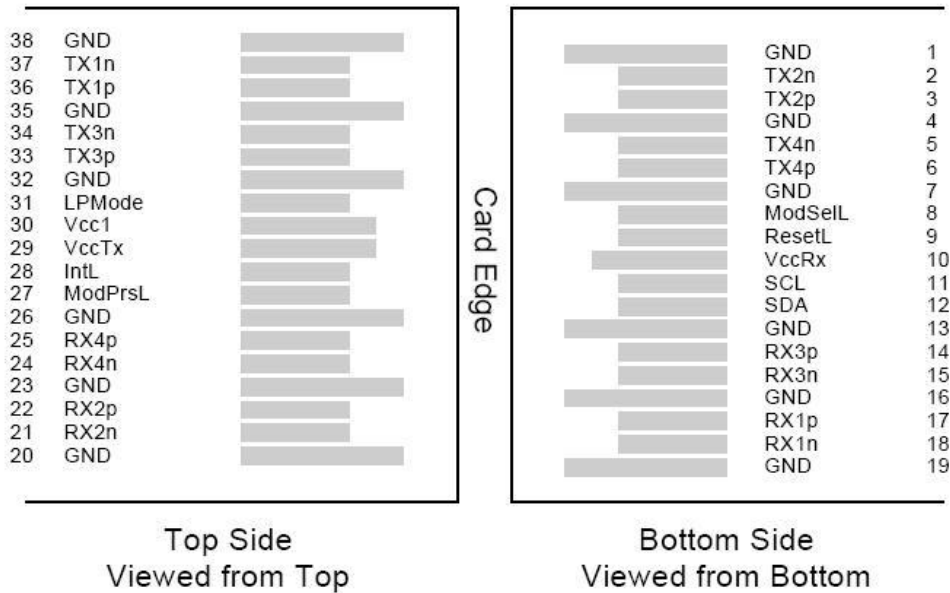


Figure3. QSFP Edge Connector and Pinout Description

Datasheet

QSFP Transceiver Pinout

| Pin | Logic | Symbol | Name/Description | Ref. |
|-----|-------------|---------|---|------|
| 1 | | GND | Ground | 1 |
| 2 | CML-I | Tx2n | Transmitted Inverted Data Input | |
| 3 | CML-I | Tx2p | Transmitted Non-inverted Data Input | |
| 4 | | GND | Ground | 1 |
| 5 | CML-I | Tx4n | Transmitted Inverted Data Input | |
| 6 | CML-I | Tx4p | Transmitted Non-inverted Data Input | |
| 7 | | GND | Ground | 1 |
| 8 | LVTTTL-I | ModSeiL | Module Select | |
| 9 | LVTTTL-I | ResetL | Module Reset | |
| 10 | | Vcc Rx | +3.3 VDC Receiver Power Supply | 2 |
| 11 | LVC MOS-I/O | SCL | Serial Clock for I ² C Interface | |
| 12 | LVC MOS-I/O | SDA | Serial Data for I ² C Interface | |
| 13 | | GND | Ground | |
| 14 | CML-O | RX3p | Receiver Non-inverted Data Output | |
| 15 | CML-O | RX3n | Receiver Inverted Data Output | |
| 16 | | GND | Ground | 1 |
| 17 | CML-O | RX1p | Receiver Non-inverted Data Output | |
| 18 | CML-O | RX1n | Receiver Inverted Data Output | |
| 19 | | GND | Ground | 1 |
| 20 | | GND | Ground | 1 |
| 21 | CML-O | RX2n | Receiver Inverted Data Output | |
| 22 | CML-O | RX2p | Receiver Non-inverted Data Output | |
| 23 | | GND | Ground | 1 |
| 24 | CML-O | RX4n | Receiver Inverted Data Output | 1 |
| 25 | CML-O | RX4p | Receiver Non-inverted Data Output | |
| 26 | | GND | Ground | 1 |
| 27 | LVTTTL-O | ModPrsL | Module Present | |
| 28 | LVTTTL-O | IntL | Interrupt | |
| 29 | | Vcc Tx | +3.3 VDC Transmitter Power Supply | 2 |
| 30 | | Vcc1 | +3.3 VDC Power Supply | 2 |
| 31 | LVTTTL-I | LPMODE | Low Power Mode | |
| 32 | | GND | Ground | 1 |
| 33 | CML-I | TX3p | Transmitted Non-inverted Data Input | |
| 34 | CML-I | TX3n | Transmitted Inverted Data Input | |
| 35 | | GND | Ground | 1 |

Datasheet

| | | | | |
|----|-------|------|-------------------------------------|---|
| 36 | CML-I | TX1p | Transmitted Non-inverted Data Input | |
| 37 | CML-I | TX1n | Transmitted Inverted Data Input | |
| 38 | | GND | Ground | 1 |

Notes:

- GND is the symbol for signal and supply (power) common for QSFP28 modules. All are common within the QSFP28 module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal common ground plane.
- VccRx, Vcc1 and VccTx are the receiver and transmitter power suppliers and shall be applied concurrently. Recommended host board power supply filtering is shown in Figure 4 below. Vcc Rx, Vcc1 and Vcc Tx may be internally connected within the QSFP28 transceiver module in any combination. The connector pins are each rated for a maximum current of 1000mA.

Optical Interface Lanes and Assignment

Figure 4 shows the orientation of the multi-mode fiber facets of the optical connector. Table 1 provides the lane assignment.

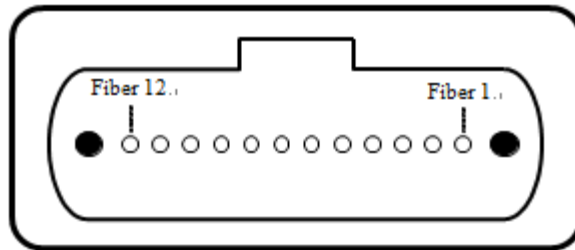


Figure4. Outside View of the QSFP28 Module MPO

Lane Assignment

| Fiber# | 1 | 2 | 3 | 4 | 5,6,7,8 | 9 | 10 | 11 | 12 |
|-----------------|-----|-----|-----|-----|----------|-----|-----|-----|-----|
| Lane Assignment | RX0 | RX1 | RX2 | RX3 | Not used | TX3 | TX2 | TX1 | TX0 |

Mechanical Dimensions

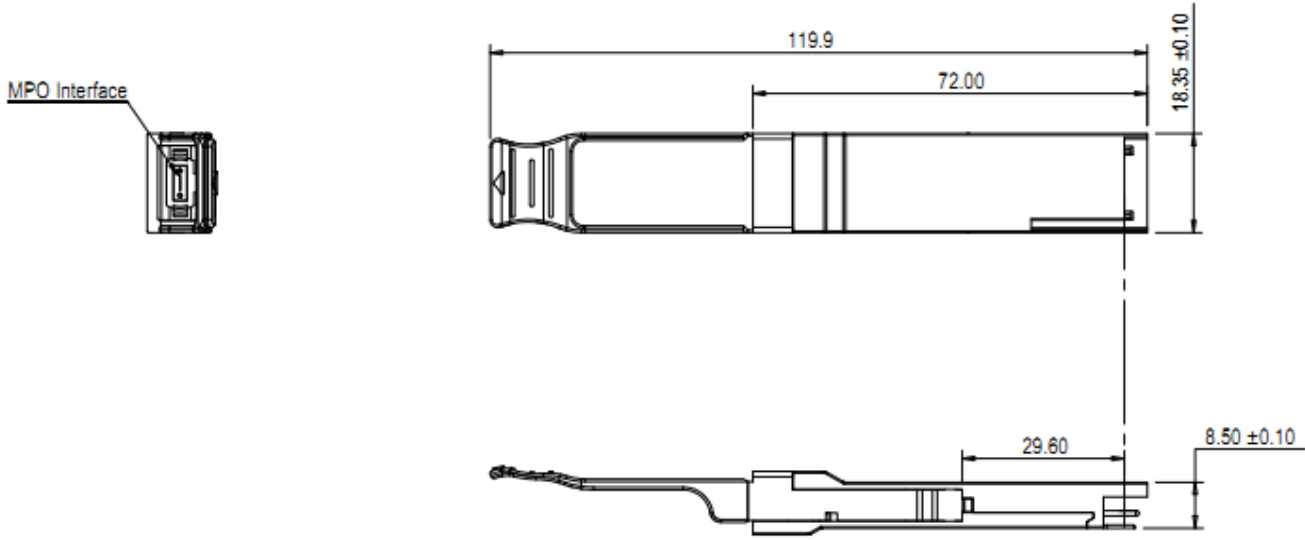


Figure5. Mechanical Specifications

ESD

This transceiver is specified as ESD threshold 1kV for SFI pins and 2kV for all other electrical input pins, tested per MIL-STD-883, Method 3015.4 /JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

Laser Safety

This is a Class 1 Laser Product according to IEC 60825-1:2007. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007).

Shenzhen Sourcelight Technology Co., Ltd

Sourcelight Technology reserves the right to make changes to or discontinue any optical link product or service identified in this document without notice in order to improve design and/or performance. If you have any question regarding this specification sheet, please contact our sales representative or send email to sales@sourcelight.com.cn