

TSQS-PC2HG-xxM

## 200G QSFP56 Direct Attach Cable

### Description

QSFP56 passive copper cable assembly feature eight differential copper pairs, providing four data transmission channels at speeds up to 56Gbps (PAM4) per channel, and meets 200G Ethernet and InfiniBand requirements. Available in a broad range of wire gages-from 26AWG through 30AWG-this 200G copper cable assembly features low insertion loss and low cross talk.

QSFP56 uses PAM4 signals for transmission, which doubles the rate. However, there are more stringent requirements for cable insertion loss. For detailed requirements, please see High Speed Characteristics. Designed for applications in the data center, networking and telecommunications markets that require a high speed, reliable cable assembly, this next generation product shares the same mating interface with QSFP+ form factor, making it backward compatible with existing QSFP ports.

### Features

- Compatible with IEEE 802.3bj and IEEE 802.3cd
- Supports aggregate data rates of 200Gbps (PAM4)
- Optimized construction to minimize insertion loss and cross talk
- Pull-to-release slide latch design
- 28AWG through 30AWG cable
- Straight and break out assembly configurations available
- Customized cable braid termination limits EMI radiation
- Customizable EEPROM mapping for cable signature
- RoHS compliant



### Applications

- Switches, servers and routers
- Data Center networks
- Storage area networks
- High performance computing
- Telecommunication and wireless infrastructure
- Medical diagnostics and networking
- Test and measurement equipment
- 200G Ethernet (IEEE 802.3cd)
- InfiniBand

## Recommended Operation Condition

| Parameters                           | Symbol  | Min.  | Max.     | Unit |
|--------------------------------------|---------|-------|----------|------|
| Operating Case Temperature           | Topc    | 0     | 70       | degC |
| Storage Temperature                  | Tst     | -40   | 85       | degC |
| Relative Humidity (non-condensation) | RS      | 35    | 60       | %    |
| Supply Voltage                       | Vcc3    | 3.135 | 3.465    | V    |
| Voltage on LVTTTL Input              | Vilvttl | -0.3  | Vcc3+0.2 | V    |
| Power Supply Current                 | Icc3    | -     | 15       | mA   |
| Total Power Consumption              | Pd      | -     | 0.05     | W    |

### Notes:

Stress or conditions exceed the above range may cause permanent damage to the device.

This is a stress rating only and functional operation of the device at these or any other conditions above those listed in the operational sections of this specification is not applied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## Pin Definition

| Pin | Logic    | Symbol  | Name/Description                         |
|-----|----------|---------|------------------------------------------|
| 1   | -        | GND     | Ground                                   |
| 2   | CML-I    | Tx2n    | Transmitter Inverted Data Input          |
| 3   | CML-I    | Tx2p    | Transmitter Non-Inverted Data Input      |
| 4   | -        | GND     | Ground                                   |
| 5   | CML-I    | Tx4n    | Transmitter Inverted Data Input          |
| 6   | CML-I    | Tx4p    | Transmitter Non-Inverted Data Input      |
| 7   | -        | GND     | Ground                                   |
| 8   | LVTTTL-I | ModSelL | Module Select                            |
| 9   | LVTTTL-I | ResetL  | Module Reset                             |
| 10  | -        | Vcc Rx  | +3.3V Power supply receiver              |
| 11  | LVC MOS- | SCL     | 2-wire serial interface clock            |
|     | I/O      |         |                                          |
| 12  | LVC MOS- | SDA     | 2-wire serial interface data             |
|     | I/O      |         |                                          |
| 13  | -        | GND     | Ground                                   |
| 14  | CML-O    | Rx3p    | Receiver Non-Inverted Data Output        |
| 15  | CML-O    | Rx3n    | Receiver Inverted Data Output            |
| 16  | -        | GND     | Ground                                   |
| 17  | CML-O    | Rx1p    | Receiver Non-Inverted Data Output        |
| 18  | CML-O    | Rx1n    | Transmitter Inverted DATA in. AC Coupled |
| 19  | -        | GND     | Ground                                   |
| 20  | -        | GND     | Ground                                   |
| 21  | CML-O    | Rx2n    | Receiver Inverted Data Output            |
| 22  | CML-O    | Rx2p    | Receiver Non-Inverted Data Output        |

|    |         |         |                                     |
|----|---------|---------|-------------------------------------|
| 23 | -       | GND     | Ground                              |
| 24 | CML-O   | Rx4n    | Receiver Inverted Data Output       |
| 25 | CML-O   | Rx4p    | Receiver Non-Inverted Data Output   |
| 26 | -       | GND     | Ground                              |
| 27 | LVTTL-O | ModPrsL | Module Present                      |
| 28 | LVTTL-O | IntL    | Interrupt                           |
| 29 | -       | Vcc Tx  | +3.3V Power supply transmitter      |
| 30 | -       | Vcc1    | +3.3V Power Supply                  |
| 31 | LVTTL-I | LPMODE  | Low Power Mode                      |
| 32 | -       | GND     | Ground                              |
| 33 | CML-I   | Tx3p    | Transmitter Non-Inverted Data Input |
| 34 | CML-I   | Tx3n    | Transmitter Inverted Data Input     |
| 35 | -       | GND     | Ground                              |
| 36 | CML-I   | Tx1p    | Transmitter Non-Inverted Data Input |
| 37 | CML-I   | Tx1n    | Transmitter Inverted Data Input     |
| 38 | -       | GND     | Ground                              |

## High Speed Characteristics

| Parameter                                   | Symbol         | Min.   | Typical | Max.  | Unit     | Notes                |
|---------------------------------------------|----------------|--------|---------|-------|----------|----------------------|
| Differential Impedance                      | TDR            | 90     | 100     | 110   | $\Omega$ | -                    |
| Insertion Loss                              | SDD21          | -16.06 | -       | -     | dB       | At 13.28 GHz         |
| Differential Input Return Loss              | SDD11<br>SDD22 | -      | -       | See 1 | dB       | At 0.05 to 4.1 GHz   |
|                                             |                | -      | -       | See 2 |          | At 4.1 to 19 GHz     |
| Common Mode Output Return Loss              | SCC11          | -      | -       | -2    | dB       | At 0.2 to 19 GHz     |
| Differential to Common-mode Return Loss     | SCD11<br>SCD22 | -      | -       | See 3 | dB       | At 0.01 to 12.89 GHz |
|                                             |                | -      | -       | See 4 |          | At 12.89 to 19 GHz   |
| Differential to Common-mode Conversion Loss | SCD21-IL       | -      | -       | -10   | dB       | At 0.01 to 12.89 GHz |
|                                             |                | -      | -       | See 5 |          | At 12.89 to 15.7 GHz |
|                                             |                | -      | -       | -6.3  |          | At 15.7 to 19 GHz    |

### Notes:

[1] Reflection Coefficient given by equation  $SDD11(dB) < -16.5 + 2 \times \sqrt{f}$ , with f in GHz

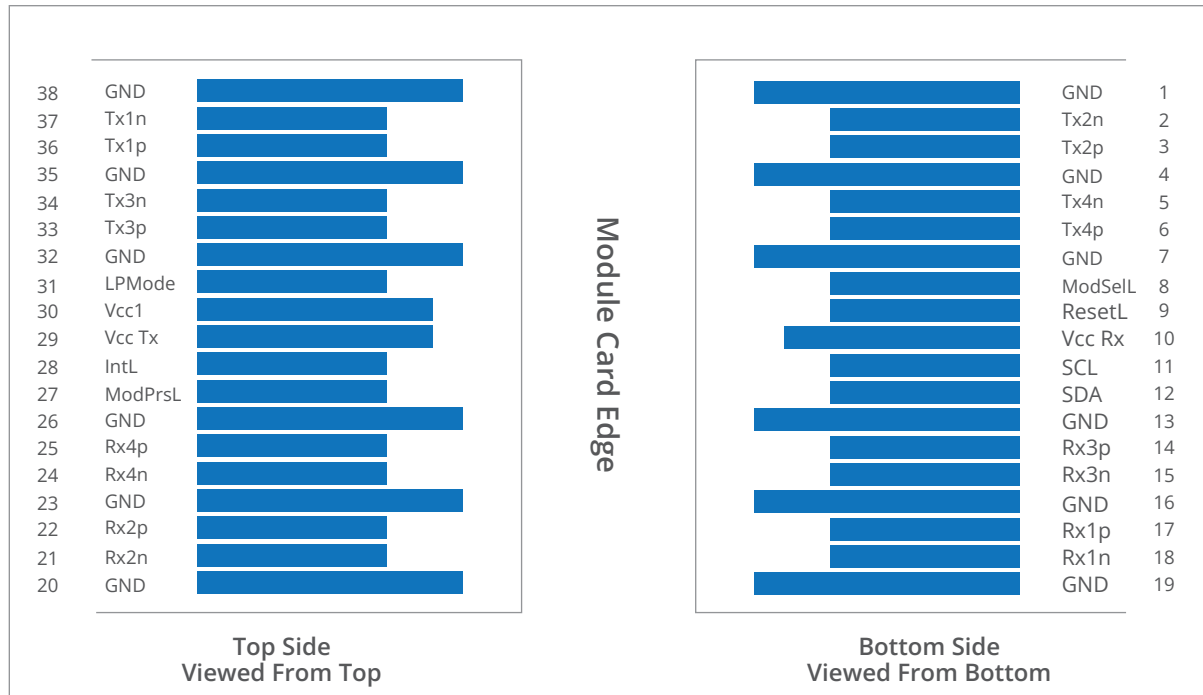
[2] Reflection Coefficient given by equation  $SDD11(dB) < -10.66 + 14 \times \log_{10}(f/5.5)$ , with f in GHz

[3] Reflection Coefficient given by equation  $SCD11(dB) < -22 + (20/25.78) \times f$ , with f in GHz

[4] Reflection Coefficient given by equation  $SCD11(dB) < -15 + (6/25.78) \times f$ , with f in GHz

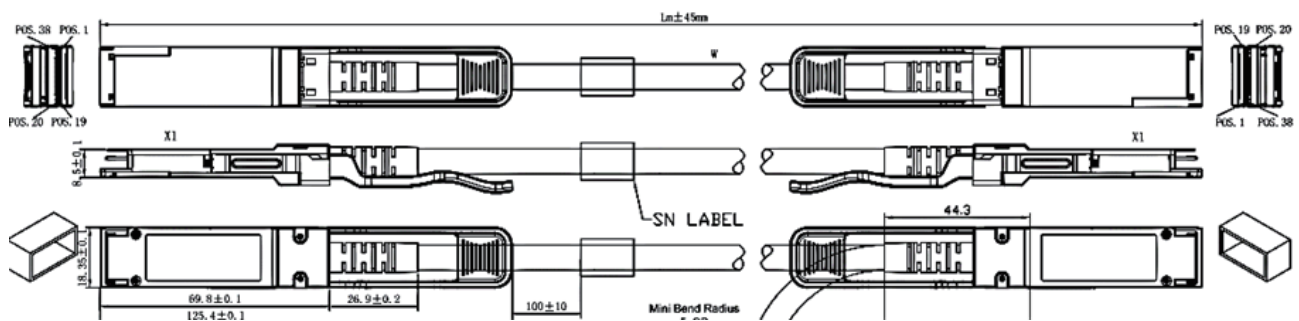
[5] Reflection Coefficient given by equation  $SCD21(dB) < -27 + (29/22) \times f$ , with f in GHz

## Pin definition



## Mechanical Dimensions

The connector is compatible with the SFF-8436 specification.



| Length (m) | Cable AWG |
|------------|-----------|
| 1          | 30        |
| 3          | 30        |
| 5          | 26        |
| 7          | 26        |

# Regulatory Compliance

| Feature                                              | Test Method                                                 | Performance                                                                     |
|------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------------------------------------------|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD-883C Method 3015.7                                  | Class 1 (>2000 Volts)                                                           |
| Electromagnetic Interference (EMI)                   | FCC Class B                                                 | Compliant with Standards                                                        |
|                                                      | CENELEC EN55022 Class B                                     |                                                                                 |
|                                                      | CISPR22 ITE Class B                                         |                                                                                 |
| RF Immunity (RFI)                                    | IEC61000-4-3                                                | Typically Show no Measurable Effect from a 10V/m Field Swept from 80 to 1000MHz |
| RoHS Compliance                                      | RoHS Directive 2011/65/EU and it's Amendment Directives 6/6 | RoHS 6/6 compliant                                                              |