

## TSQ4S-85J-XXXD/TSQ4S-85J-XXXU Active Optical Cables

Multi-Mode 100G BASE SR4 QSFP28 TO 4X25G BASE SR SFP28 Active Optical Cable, With Diagnostic Monitoring

### Features

- 4-channel full-duplex active optical cable
- Data rate up to 25.78125 Gbps per lane
- Compliant to the QSFP28 MSA /SFP28 MSA
- VCSEL Array Transmitter and PIN Array Receiver
- Low Power Dissipation: QSFP28 <2.2W; SFP28 <0.8W

### Applications

- 100GBASE SR4 Ethernet
- 25GBASE SR Ethernet

### Product Description

The TSQ4S-85J-XXXD/TSQ4S-85J-XXXU is a 4-Channel, Pluggable, Parallel, Fiber-Optic 100G QSFP28 to 4X25G SFP28 AOC. This transceiver is a high performance module for short-range multi-lane data communication and interconnect applications. It integrates 4 data lanes in each direction with 100Gbps bandwidth.

These modules are designed to operate over multimode fiber systems using a nominal wavelength of 850nm. The electrical interface uses a 38@QSFP28 and 20@SFP 28 contact edge type connector.

### Absolute Maximum Rating

These values represent the damage threshold of the module. Stress in excess of any of the individual Absolute Maximum Ratings can cause immediate catastrophic damage to the module even if all other parameters are within Recommended Operating Conditions.

| Parameters           | Symbol | Min. | Max. | Unit |
|----------------------|--------|------|------|------|
| Power Supply Voltage | VCC    | -0.5 | +3.6 | V    |
| Storage Temperature  | Tc     | -40  | +85  | °C   |
| Relative Humidity    | RH     | 0    | 85   | %    |

## Recommended Operating Environment

Recommended Operating Environment specifies parameters for which the electrical and optical characteristics hold unless otherwise noted.

| Parameter                               | Symbol | Min  | Typical  | Max  | Unit |
|-----------------------------------------|--------|------|----------|------|------|
| Supply Voltage                          | VCC    | 3.15 | 3.30     | 3.45 | V    |
| Case Operating Temperature (Standard)   | Tca    | 0    | -        | 70   | °C   |
| Case Operating Temperature (Industrial) | Tca    | -40  | -        | 85   | °C   |
| Data Rate Per Lane                      | DR     | -    | 25.78125 | -    | Gbps |
| Fiber Bend Radius                       | Rb     | 3    | -        | -    | cm   |

### Notes:

1. Supply current is shared between VCCTX and VCCR<sub>X</sub>.
2. In-rush is defined as current level above steady state current requirements.

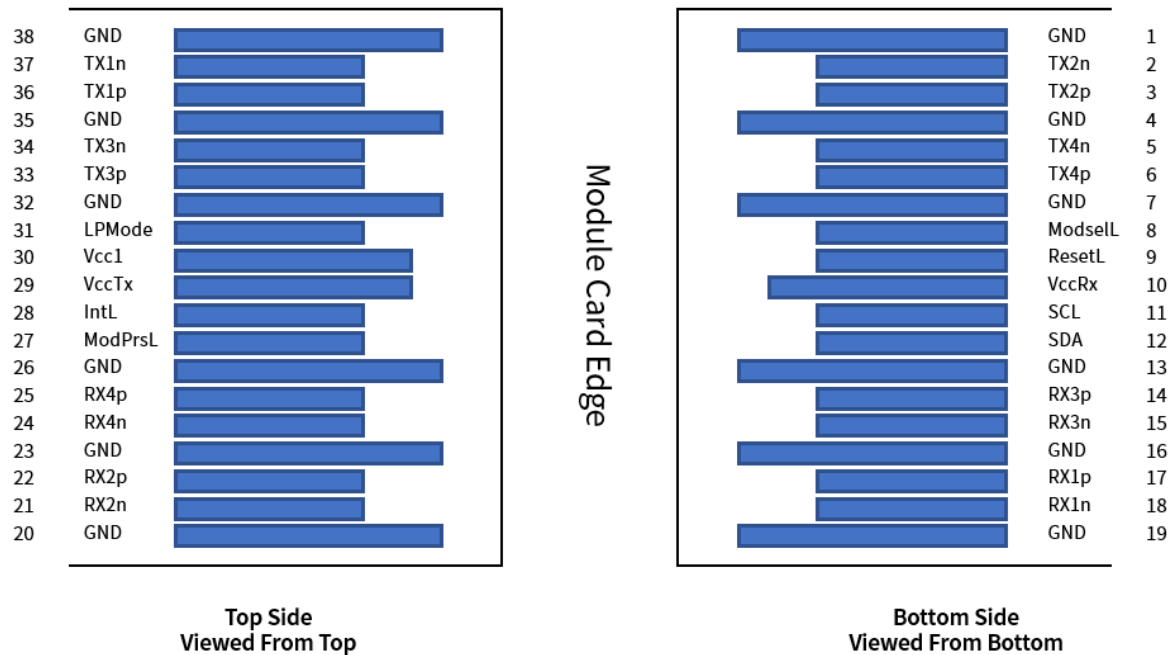
## Transmitter Specifications

| Parameter                                  | Symbol | Min | Typical | Max     | Unit |
|--------------------------------------------|--------|-----|---------|---------|------|
| Input differential impedance               | Rin    | 90  | 100     | 110     | Ω    |
| Differential Input Voltage swing, per lane | Vin    | 300 | -       | 1100    | mV   |
| Transmit Disable Voltage                   | VD     | 2.0 | -       | VCC+0.3 | V    |
| Transmit Enable Voltage                    | Ven    | Vee | -       | Vee+0.8 | V    |

## Receiver Specifications

| Parameter                           | Symbol | Min | Typical | Max               | Unit |
|-------------------------------------|--------|-----|---------|-------------------|------|
| Differential Output Swing, per lane | Vout   | 300 | -       | 900               | mV   |
| Bit Error Rate                      | BER    | -   | -       | 10 <sup>-12</sup> | -    |
| Output Differential Impedance       | Rout   | 90  | 100     | 110               | Ω    |
| Loss of Signal –Asserted            | -      | 2.0 | -       | VCC+0.3           | V    |
| Loss of Signal –Negated             | -      | Vee | -       | Vee+0.8           | V    |

## Transceiver Electrical Pad Layout (QSFP28 end)

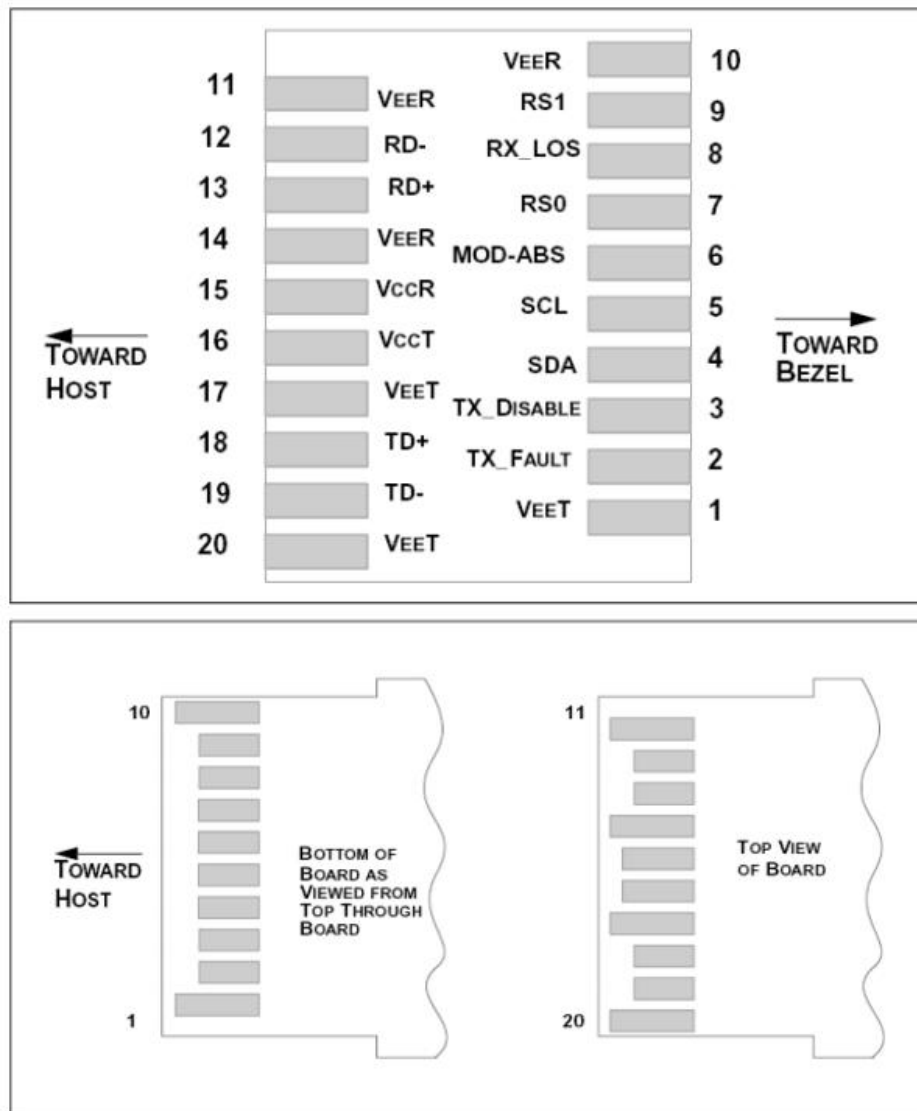


## Pin Definition (QSFP28 end)

| Pin | Symbol  | Name/Description                    |
|-----|---------|-------------------------------------|
| 1   | GND     | Ground                              |
| 2   | Tx2n    | Transmitter Inverted Data Input     |
| 3   | Tx2p    | Transmitter Non-Inverted Data Input |
| 4   | GND     | Ground                              |
| 5   | Tx4n    | Transmitter Inverted Data Input     |
| 6   | Tx4p    | Transmitter Non-Inverted Data Input |
| 7   | GND     | Ground                              |
| 8   | ModSelL | Module Select                       |
| 9   | ResetL  | Module Reset                        |
| 10  | Vcc Rx  | +3.3 V Power supply receiver        |
| 11  | SCL     | 2-wire serial interface clock       |
| 12  | SDA     | 2-wire serial interface data        |
| 13  | GND     | Ground                              |
| 14  | Rx3p    | Receiver Non-Inverted Data Output   |
| 15  | Rx3n    | Receiver Inverted Data Output       |
| 16  | GND     | Ground                              |
| 17  | Rx1p    | Receiver Non-Inverted Data Output   |
| 18  | Rx1n    | Receiver Inverted Data Output       |
| 19  | GND     | Ground                              |

|    |         |                                     |
|----|---------|-------------------------------------|
| 20 | GND     | Ground                              |
| 21 | Rx2n    | Receiver Inverted Data Output       |
| 22 | Rx2p    | Receiver Non-Inverted Data Output   |
| 23 | GND     | Ground                              |
| 24 | Rx4n    | Receiver Inverted Data Output       |
| 25 | Rx4p    | Receiver Non-Inverted Data Output   |
| 26 | GND     | Ground                              |
| 27 | ModPrsL | Module Present                      |
| 28 | IntL    | Interrupt                           |
| 29 | VCC Tx  | +3.3 V Power supply transmitter     |
| 30 | VCC1    | +3.3 V Power Supply                 |
| 31 | LPMode  | Low Power Mode                      |
| 32 | GND     | Ground                              |
| 33 | Tx3p    | Transmitter Non-Inverted Data Input |
| 34 | Tx3n    | Transmitter Inverted Data Input     |
| 35 | GND     | Ground                              |
| 36 | Tx1p    | Transmitter Non-Inverted Data Input |
| 37 | Tx1n    | Transmitter Inverted Data Input     |
| 38 | GND     | Ground                              |

## Transceiver Electrical Pad Layout (SFP28 end)



## Pin Definition (SFP28 end)

| Pin | Symbol   | Name/Description                                              |
|-----|----------|---------------------------------------------------------------|
| 1   | VEET     | Transmitter Ground                                            |
| 2   | Tx_FAULT | Transmitter Fault                                             |
| 3   | Tx_DIS   | Transmitter Disable. Laser output disabled on high or open    |
| 4   | SDA      | 2-wire Serial Interface Data Line                             |
| 5   | SCL      | 2-wire Serial Interface Clock Line                            |
| 6   | MOD_ABS  | Module Absent. Grounded within the module                     |
| 7   | RS0      | Rate Select 0                                                 |
| 8   | RX_LOS   | Loss of Signal indication. Logic 0 indicates normal operation |
| 9   | RS1      | Rate Select 1                                                 |
| 10  | VEER     | Receiver Ground                                               |

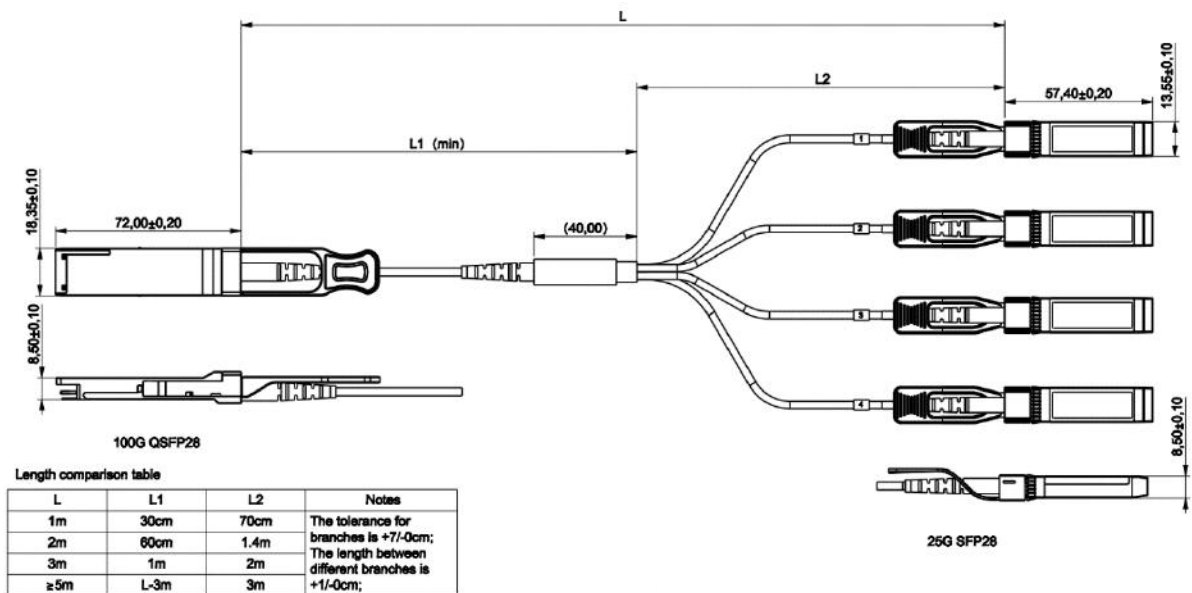
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|    |      |                                          |
|----|------|------------------------------------------|
| 11 | VEER | Receiver Ground                          |
| 12 | RD-  | Receiver Inverted DATA out. AC Coupled   |
| 13 | RD+  | Receiver DATA out. AC Coupled            |
| 14 | VEER | Receiver Ground                          |
| 15 | VCCR | Receiver Power Supply                    |
| 16 | VCCT | Transmitter Power Supply                 |
| 17 | VEET | Transmitter Ground                       |
| 18 | TD+  | Transmitter DATA in. AC Coupled          |
| 19 | TD-  | Transmitter Inverted DATA in. AC Coupled |
| 20 | VEET | Transmitter Ground                       |

## Mechanical



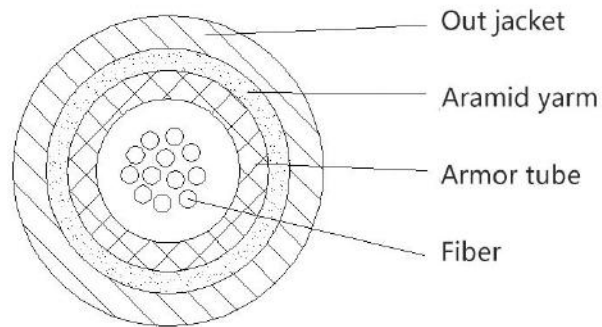
### AOC product bagging circle size:

| L              | Disc fiber diameter (mm)                   |
|----------------|--------------------------------------------|
| 1m ≤ L ≤ 5m    | 110 ≤ Inner diameter, outer diameter ≤ 160 |
| 5m < L ≤ 7m    | 110 ≤ Inner diameter, outer diameter ≤ 170 |
| 7m < L ≤ 30m   | 110 ≤ Inner diameter, outer diameter ≤ 180 |
| 30m < L ≤ 50m  | 110 ≤ Inner diameter, outer diameter ≤ 210 |
| 50m < L ≤ 100m | 110 ≤ Inner diameter, outer diameter ≤ 250 |

### Length tolerance table:

| L             | Tolerance (mm) |
|---------------|----------------|
| L ≤ 1 M       | +70/-0         |
| 1 M < L < 7 M | +100/-0        |
| L ≥ 7 M       | +2% L/-0       |

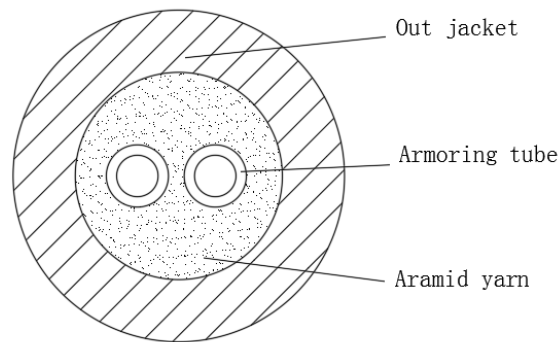
### Cable Structure (QSFP28 end)



### Cable Technical Parameters (QSFP28 end)

| Parameter                     | Symbol                    | Typical                                                                         |
|-------------------------------|---------------------------|---------------------------------------------------------------------------------|
| Model                         |                           | GJFKV                                                                           |
| Fiber                         | Count                     | 2~12                                                                            |
|                               | Color                     | Blue, orange, green, brown, gray, white, red, black, yellow, purple, pink, aqua |
| Cable                         | OD (mm)                   | $3.0 \pm 0.1$                                                                   |
|                               | Material                  | PVC-OFNP                                                                        |
| Armored tube                  | OD (mm)                   | $1.8 \pm 0.1$                                                                   |
|                               | ID (mm)                   | $1.2 \pm 0.1$                                                                   |
| Max.tensile Strength(N)       | Short-term                | 150                                                                             |
|                               | Long-term                 | 80                                                                              |
| Min.Bending Radius(mm)        | Dynamic                   | 20D                                                                             |
|                               | Static                    | 10D                                                                             |
| Max.Crush Resistance(N/100mm) | Short-term                | 3000                                                                            |
|                               | Long-term                 | 1000                                                                            |
| Strength Members              |                           | Aramid yarn                                                                     |
| Temperature range             | Storage or transportation | -20~70°C                                                                        |
|                               | Operation                 | -20~60°C                                                                        |
|                               | Installation              | -20~60°C                                                                        |

## Cable Structure (SFP28 end)



## Cable Technical Parameters (SFP28 end)

| Parameter                     | Symbol                    | Typical                      |
|-------------------------------|---------------------------|------------------------------|
| Armored tube                  | OD(mm)                    | 0.9±0.1                      |
|                               | ID(mm)                    | 0.5±0.1                      |
|                               | Material                  | Stainless steel spiral armor |
| Out jacket                    | OD(mm)                    | 3.0±0.1                      |
|                               | Material                  | PVC/LSZH                     |
| Nominal weight(kg/km)         |                           | 13                           |
| Max.tensile Strength(N)       | Short-term                | 100                          |
|                               | Long-term                 | 50                           |
| Max.Crush Resistance(N/100mm) | Short-term                | 3000                         |
|                               | Long-term                 | 1000                         |
| Color                         |                           | According to contract        |
| Strength Members              |                           | Aramid yarn                  |
| Environmental Protection      |                           | RoHS COMPLIANT               |
| Temperature range             | Storage or transportation | -20~70°C                     |
|                               | Operation                 | -20~60°C                     |
|                               | Installation              | -20~60°C                     |

## Ordering Information

| Part Number    | Product Description                                  |
|----------------|------------------------------------------------------|
| TSQ4S-85J-XXXD | 100G QSFP28 TO 4x25G SFP28 Armored AOC 0°C ~ +70°C   |
| TSQ4S-85J-XXXU | 100G QSFP28 TO 4x25G SFP28 Armored AOC -40°C ~ +85°C |

XXX :001~070,1~70 Length in meters on OM3 MMF

XXX :001~100,1~100 Length in meters on OM4 MMF

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