

## TSD8S-85G-XXXX Active Optical Cables

Multi-Mode 80G (2x40GBASE SR4) QSFP-DD to 8X10G BASE SR SFP+ Active Optical Cable, With Diagnostic Monitoring

### Features

- 8-channel full-duplex active optical cable
- Data rate 10.3125 Gbps per lane
- Compliant to the QSFP-DD MSA/SFP+ MSA and CMIS/SFF-8472
- VCSEL Array Transmitter and PIN Array Receiver
- Low Power Dissipation: QSFP-DD <4W; SFP+ <1W
- RoHS compliant

### Applications

- 2x40GBASE SR4 Ethernet
- 10GBASE SR Ethernet

### Product Description

The TSD8S-85G-XXXX is a 8-Channel, Pluggable, Parallel, Fiber-Optic 80G QSFP-DD to 8X10G SFP+ AOC. This transceiver is a high performance module for short-range multi-lane data communication and interconnect applications. It integrates 8 data lanes in each direction with 80Gbps bandwidth.

These modules are designed to operate over multimode fiber systems using a nominal wavelength of 850nm. The electrical interface uses a 76@QSFP-DD and 20@SFP+ contact edge type connector.

### Absolute Maximum Ratings

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 | Tca    | 0    | -       | 70   | °C   |
| Data Rate Per Lane         | DR     | -    | 10.3125 | -    | 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               | R <sub>in</sub> | 90              | 100     | 110                  | Ω    |
| Differential Input Voltage swing, per lane | V <sub>in</sub> | 300             | -       | 1100                 | mV   |
| Transmit Disable Voltage                   | V <sub>D</sub>  | 2.0             | -       | VCC+0.3              | V    |
| Transmit Enable Voltage                    | V <sub>en</sub> | V <sub>ee</sub> | -       | V <sub>ee</sub> +0.8 | V    |

## Receiver Specifications

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

### Notes:

1. BER=10E-12; PRBS 2<sup>31</sup>-1@10.3125Gbps. Pre-FEC

## Transceiver Electrical Pad Layout (QSFP-DD end)

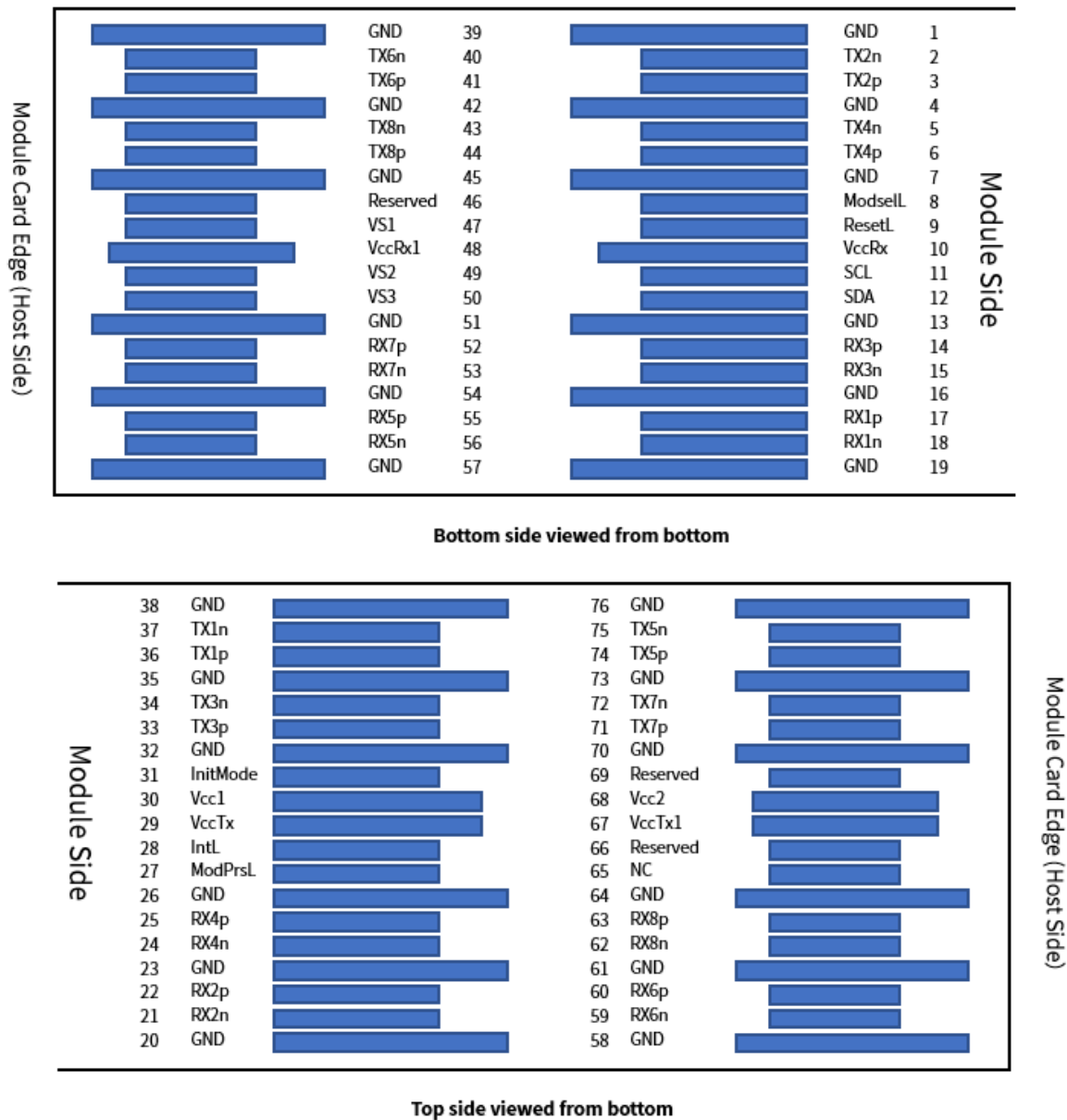


Figure 1 – QSFP-DD Compliant 76-pin connector (per QSFP-DD MSA)

## Pin Definition (QSFP-DD end)

| Pin | Symbol | Name/Description                    |
|-----|--------|-------------------------------------|
| 1   | GND    | Module Ground                       |
| 2   | Tx2-   | Transmitter inverted data input     |
| 3   | Tx2+   | Transmitter non-inverted data input |
| 4   | GND    | Module Ground                       |
| 5   | Tx4-   | Transmitter inverted data input     |
| 6   | Tx4+   | Transmitter non-inverted data input |

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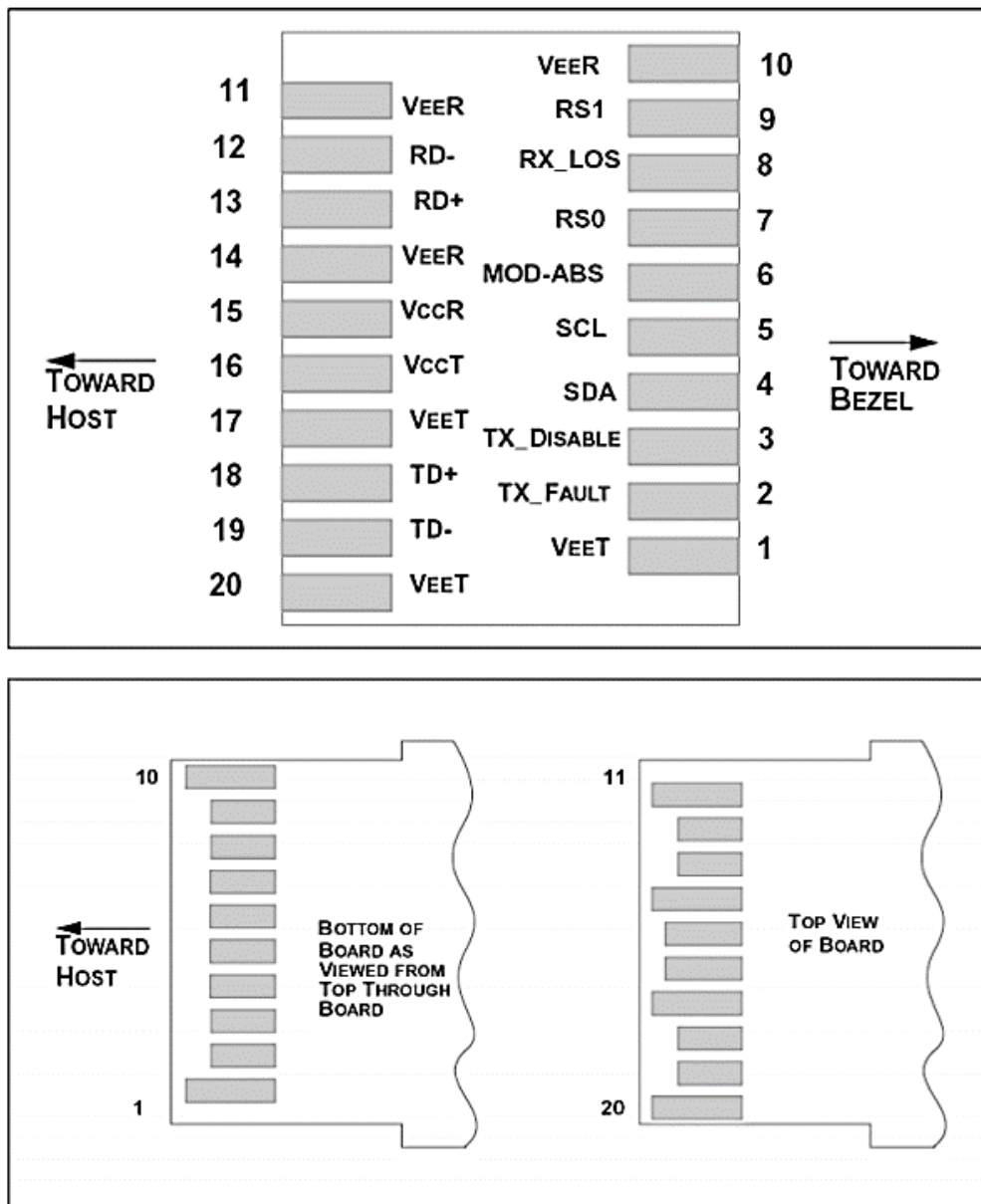


|    |                   |                                                                       |
|----|-------------------|-----------------------------------------------------------------------|
| 7  | GND               | Module Ground                                                         |
| 8  | MODSEIL           | Module Select                                                         |
| 9  | ResetL            | Module Reset                                                          |
| 10 | VCCR <sub>x</sub> | +3.3V Receiver Power Supply                                           |
| 11 | SCL               | 2-wire Serial interface clock                                         |
| 12 | sda               | 2-wire Serial interface data                                          |
| 13 | GND               | Module Ground                                                         |
| 14 | RX3+              | Receiver non-inverted data output                                     |
| 15 | RX3-              | Receiver inverted data output                                         |
| 16 | GND               | Module Ground                                                         |
| 17 | RX1+              | Receiver non-inverted data output                                     |
| 18 | RX1-              | Receiver inverted data output                                         |
| 19 | GND               | Module Ground                                                         |
| 20 | GND               | Module Ground                                                         |
| 21 | RX2-              | Receiver inverted data output                                         |
| 22 | RX2+              | Receiver inverted data output                                         |
| 23 | GND               | Module Ground                                                         |
| 24 | RX4-              | Receiver inverted data output                                         |
| 25 | RX4+              | Receiver non-inverted data output                                     |
| 26 | GND               | Module Ground                                                         |
| 27 | ModPrsL           | Module Present, internal pulled down to GND                           |
| 28 | IntL              | Interrupt output, should be pulled up on host board                   |
| 29 | VCCT <sub>x</sub> | +3.3V Transmitter Power Supply                                        |
| 30 | VCC1              | +3.3V Power Supply                                                    |
| 31 | InitMode          | Initialization mode; In legacy QSFP applications, the InitMode pad is |
| 32 | GND               | Module Ground                                                         |
| 33 | Tx3+              | Transmitter non-inverted data input                                   |
| 34 | Tx3-              | Transmitter inverted data input                                       |
| 35 | GND               | Module Ground                                                         |
| 36 | Tx1+              | Transmitter non-inverted data input                                   |
| 37 | Tx1-              | Transmitter inverted data input                                       |
| 38 | GND               | Module Ground                                                         |
| 39 | GND               | Module Ground                                                         |
| 40 | Tx6-              | Transmitter inverted data input                                       |
| 41 | Tx6+              | Transmitter non-inverted data input                                   |
| 42 | GND               | Module Ground                                                         |
| 43 | Tx8-              | Transmitter inverted data input                                       |
| 44 | Tx8+              | Transmitter non-inverted data input                                   |
| 45 | GND               | Module Ground                                                         |
| 46 | Reserved          | For future use                                                        |
| 47 | VS1               | Module Vender Specific 1                                              |

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|    |          |                                     |
|----|----------|-------------------------------------|
| 48 | VCCRx1   | +3.3V Power Supply                  |
| 49 | VS2      | Module Vender Specific 2            |
| 50 | VS3      | Module Vender Specific 3            |
| 51 | GND      | Module Ground                       |
| 52 | RX7+     | Receiver non-inverted data output   |
| 53 | RX7-     | Receiver inverted data output       |
| 54 | GND      | Module Ground                       |
| 55 | RX5+     | Receiver non-inverted data output   |
| 56 | RX5-     | Receiver inverted data output       |
| 57 | GND      | Module Ground                       |
| 58 | GND      | Module Ground                       |
| 59 | RX6-     | Receiver inverted data output       |
| 60 | RX6+     | Receiver inverted data output       |
| 61 | GND      | Module Ground                       |
| 62 | RX8-     | Receiver inverted data output       |
| 63 | RX8+     | Receiver non-inverted data output   |
| 64 | GND      | Module Ground                       |
| 65 | NC       | NO Connect                          |
| 66 | Reserved | For future use                      |
| 67 | VCCTx1   | +3.3V Power Supply                  |
| 68 | VCC2     | +3.3V Power Supply                  |
| 69 | Reserved | For future use                      |
| 70 | GND      | Module Ground                       |
| 71 | Tx7+     | Transmitter non-inverted data input |
| 72 | Tx7-     | Transmitter inverted data input     |
| 73 | GND      | Module Ground                       |
| 74 | Tx5+     | Transmitter non-inverted data input |
| 75 | Tx5-     | Transmitter inverted data input     |
| 76 | GND      | Module Ground                       |

## Transceiver Electrical Pad Layout (SFP+ end)

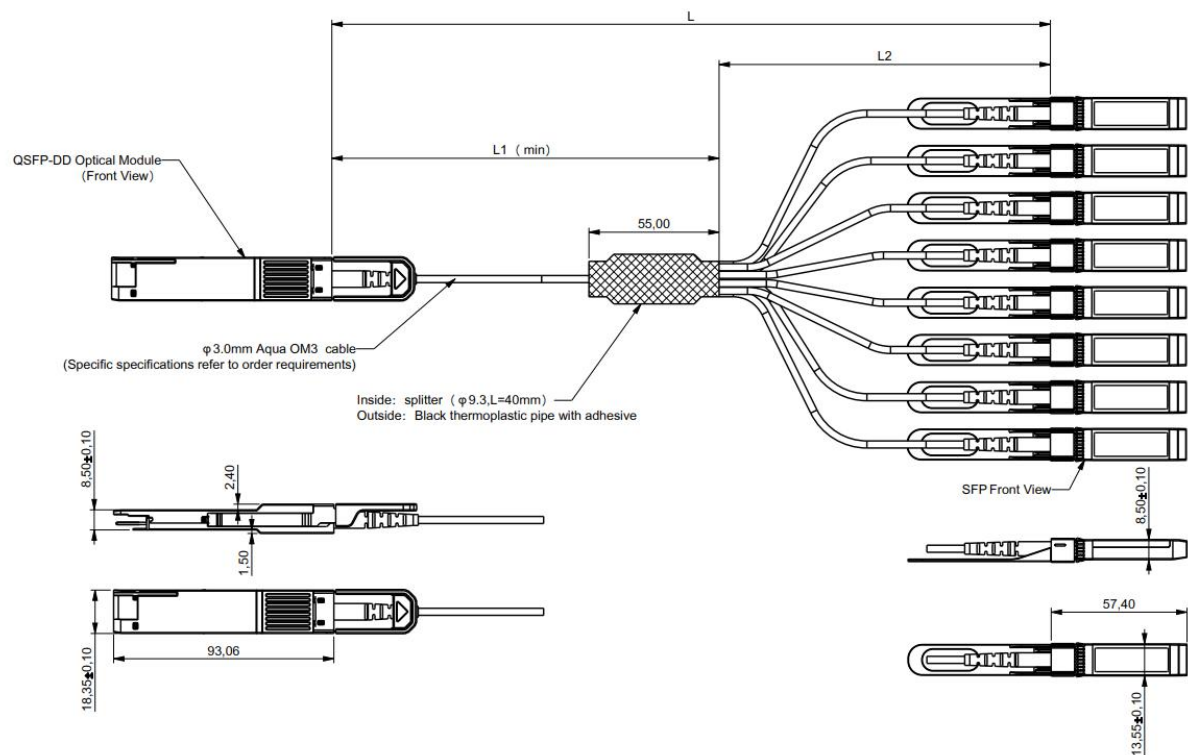


## Pin Definitions (SFP+ end)

| Pin | Symbol     | Name/Description                                                       |
|-----|------------|------------------------------------------------------------------------|
| 1   | VeeT       | Transmitter Signal Ground                                              |
| 2   | TX_FAULT   | Transmitter Fault (LVTTTL-O) – Not used. Grounded inside the module    |
| 3   | TX_DISABLE | Transmitter Disable (LVTTTL-I) – High or open disables the transmitter |
| 4   | SDA        | Two Wire Serial Interface Data Line (LVCMOS – I/O)                     |
| 5   | SCL        | Two Wire Serial Interface Clock Line (LVCMOS – I/O)                    |
| 6   | MOD_ABS    | Module Absent (Output), connected to VeeT or VeeR in the module        |
| 7   | RS0        | Rate Select 0 - Not used, Presents high input impedance.               |

|    |        |                                                          |
|----|--------|----------------------------------------------------------|
| 8  | RX_LOS | Receiver Loss of Signal (LVTTTL-O)                       |
| 9  | RS1    | Rate Select 1 - Not used, Presents high input impedance. |
| 10 | VeeR   | Receiver Signal Ground                                   |
| 11 | VeeR   | Receiver Signal Ground                                   |
| 12 | RD-    | Receiver Data Out Inverted (CML-O)                       |
| 13 | RD+    | Receiver Data Out (CML-O)                                |
| 14 | VeeR   | Receiver Signal Ground                                   |
| 15 | VccR   | Receiver Power + 3.3 V                                   |
| 16 | VccT   | Transmitter Power + 3.3 V                                |
| 17 | VeeT   | Transmitter Signal Ground                                |
| 18 | TD+    | Transmitter Data In (CML-I)                              |
| 19 | TD-    | Transmitter Data In Inverted (CML-I)                     |
| 20 | VeeT   | Transmitter Signal Ground                                |

## Mechanical



Length comparison table

| L   | L1   | L2   | Notes                                                                                       |
|-----|------|------|---------------------------------------------------------------------------------------------|
| 1m  | 30cm | 70cm | The tolerance for branches is +7/-0cm;<br>The length between different branches is +1/-0cm; |
| 2m  | 60cm | 1.4m |                                                                                             |
| 3m  | 1m   | 2m   |                                                                                             |
| ≥5m | L-3m | 3m   |                                                                                             |

↩

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        |

## Ordering Information

| Part Number                                    | Product Description                       |
|------------------------------------------------|-------------------------------------------|
| TSD8S-85G-XXXC                                 | 80G QSFP-DD to 8x10G SFP+ AOC 0°C ~ +70°C |
| XXX :001~100,1~300 Length in meters on OM3 MMF |                                           |

## Important Notice

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