

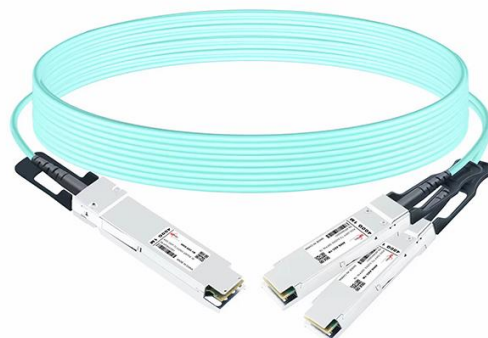


## Optico Group Co., Limited

Address: No.9, Bldg 5, Changfeng Industrial Park, Dongkeng Community, Guangming District, Shenzhen, China  
Tel: 0755-33532578 Fax: 0755-36697385

## Features

- 400Gb/s to 2x200Gb/s data rate
- 8x 50Gb/s PAM4 modulation
- Single 3.3V power supply
- Max 4.5W power dissipation each QSFP56 end
- Max 8W power dissipation OSFP end
- Compliant to CMIS V5.2
- Operating case temp Commercial: 0°C to +70 °C
- Hot pluggable
- RoHS compliant



## Applications

- 400Gb/s systems
- Other optical links

## Order Information

Table 1-Order Information

| Part No.        | Bit Rate (Gbps) | Laser (nm) | Distance | Fiber Type | DDMI | Connector | Temp <sup>note1</sup> |
|-----------------|-----------------|------------|----------|------------|------|-----------|-----------------------|
| 400G-OAOC-A2-Xm | 8x50            | 850        | 1~30m    | MMF        | YES  | N/A       | 0°C~+70°C             |
| X: 1M~30M       |                 |            |          |            |      |           |                       |

Note: 1 Case Temperature

## Absolute Maximum Ratings

Table2- Absolute Maximum Ratings

| Parameter           | Symbol           | Min. | Typical | Max. | Unit | Notes |
|---------------------|------------------|------|---------|------|------|-------|
| Supply Voltage      | V <sub>CC3</sub> | -0.5 | -       | +3.6 | V    |       |
| Storage Temperature | T <sub>s</sub>   | -10  | -       | +75  | °C   |       |
| Operating Humidity  | RH               | +5   | -       | +85  | %    | 1     |

Note: 1 No condensation

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## Recommended Operating Conditions

**Table 3- Recommended operating Conditions**

| Parameter                                         | Symbol             | Min. | Typical | Max. | Unit | Notes |
|---------------------------------------------------|--------------------|------|---------|------|------|-------|
| Operating Case Temperature                        | T <sub>C</sub>     | 0    | -       | +70  | °C   |       |
| Power Supply Voltage                              | V <sub>CC</sub>    | 3.14 | 3.3     | 3.47 | V    |       |
| Power dissipation<br>(400G retiming on all lanes) | Pd <sub>400G</sub> | -    | -       | 8    | W    | 1     |
| Power dissipation<br>(200G retiming on all lanes) | Pd <sub>200G</sub> | -    | -       | 4.5  | W    | 1     |

Note: 1 Per terminal

## Electrical Characteristics

**Table 4- Electrical Characteristics**

| Parameter                                | Symbol                  | Unit | Min               | Typ | Max    | Notes |
|------------------------------------------|-------------------------|------|-------------------|-----|--------|-------|
| <b>Transmitter</b>                       |                         |      |                   |     |        |       |
| Signaling rate (each lane)               | SR                      | GBd  | 26.5625 ± 100 ppm |     |        |       |
| Differential data input voltage per lane | V <sub>in,pp,diff</sub> | mV   | -                 | -   | 900    |       |
| Differential termination mismatch        | -                       | %    | -                 | -   | 10     |       |
| Single-ended voltage tolerance range     | -                       | V    | -0.4              | -   | 3.3    |       |
| DC common mode voltage                   | -                       | mV   | -350              | -   | 2850   |       |
| <b>Receiver</b>                          |                         |      |                   |     |        |       |
| Signaling rate (each lane)               | SR                      | GBd  | 26.5625 ± 100 ppm |     |        |       |
| Differential output voltage              | -                       | mV   | -                 | -   | 900    |       |
| Differential termination mismatch        | -                       | %    | -                 | -   | 10     |       |
| Transition time (min, 20% to 80%)        | -                       | ps   | 9.5               | -   | -      |       |
| DC common mode voltage                   | -                       | mV   | -350              | -   | 2850   |       |
| Error Bit Rate                           | BER                     | -    | -                 | -   | 2.4E-4 | Note1 |

Note: 1 PRBS31Q@26.5625Gbd PAM4



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## **Recommended Interface Circuit**



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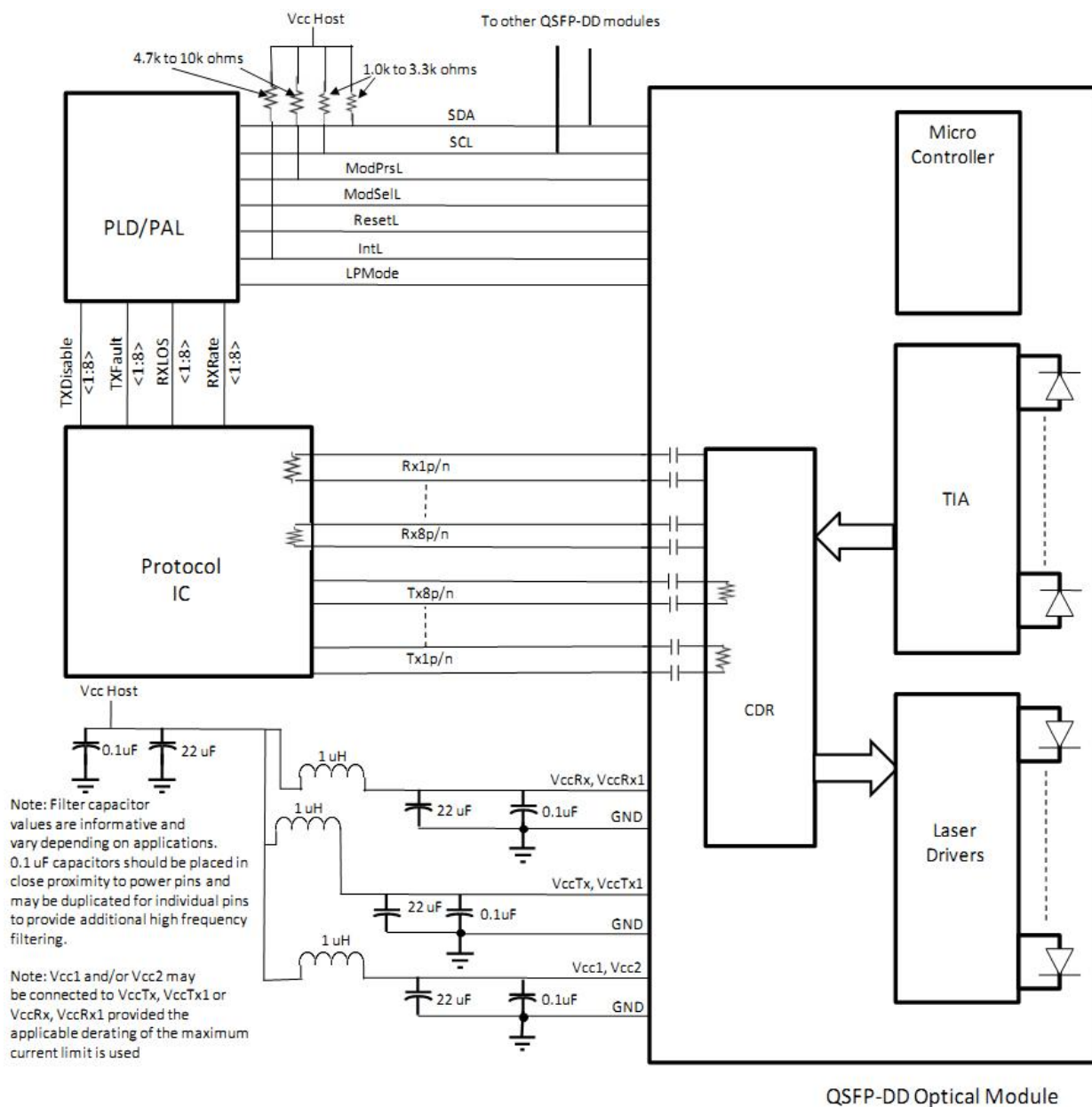


Figure 1, Recommended Interface Circuit



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## Pin arrangement

### OSFP end

Top Side (viewed from top)

|    |          |  |
|----|----------|--|
| 60 | GND      |  |
| 59 | TX1p     |  |
| 58 | TX1n     |  |
| 57 | GND      |  |
| 56 | TX3p     |  |
| 55 | TX3n     |  |
| 54 | GND      |  |
| 53 | TX5p     |  |
| 52 | TX5n     |  |
| 51 | GND      |  |
| 50 | TX7p     |  |
| 49 | TX7n     |  |
| 48 | GND      |  |
| 47 | SDA      |  |
| 46 | VCC      |  |
| 45 | VCC      |  |
| 44 | INT/RSTn |  |
| 43 | GND      |  |
| 42 | RX8n     |  |
| 41 | RX8p     |  |
| 40 | GND      |  |
| 39 | RX6n     |  |
| 38 | RX6p     |  |
| 37 | GND      |  |
| 36 | RX4n     |  |
| 35 | RX4p     |  |
| 34 | GND      |  |
| 33 | RX2n     |  |
| 32 | RX2p     |  |
| 31 | GND      |  |

Bottom Side (viewed from bottom)

|  |           |    |
|--|-----------|----|
|  | GND       | 1  |
|  | TX2p      | 2  |
|  | TX2n      | 3  |
|  | GND       | 4  |
|  | TX4p      | 5  |
|  | TX4n      | 6  |
|  | GND       | 7  |
|  | TX6p      | 8  |
|  | TX6n      | 9  |
|  | GND       | 10 |
|  | TX8p      | 11 |
|  | TX8n      | 12 |
|  | GND       | 13 |
|  | SCL       | 14 |
|  | VCC       | 15 |
|  | VCC       | 16 |
|  | LPWn/PRSn | 17 |
|  | GND       | 18 |
|  | RX7n      | 19 |
|  | RX7p      | 20 |
|  | GND       | 21 |
|  | RX5n      | 22 |
|  | RX5p      | 23 |
|  | GND       | 24 |
|  | RX3n      | 25 |
|  | RX3p      | 26 |
|  | GND       | 27 |
|  | RX1n      | 28 |
|  | RX1p      | 29 |
|  | GND       | 30 |

----- Module Card Edge -----

Figure 2, Pin View for OSFP

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**Table 5-Pin Function Definitions for OSFP**

| Pin# | Symbol    | Description                     | Logic       | Direction       | Plug Sequence | Notes                                    |
|------|-----------|---------------------------------|-------------|-----------------|---------------|------------------------------------------|
| 1    | GND       | Ground                          |             |                 | 1             |                                          |
| 2    | TX2p      | Transmitter Data Non-Inverted   | CML-I       | Input from Host | 3             |                                          |
| 3    | TX2n      | Transmitter Data Inverted       | CML-I       | Input from Host | 3             |                                          |
| 4    | GND       | Ground                          |             |                 | 1             |                                          |
| 5    | TX4p      | Transmitter Data Non-Inverted   | CML-I       | Input from Host | 3             |                                          |
| 6    | TX4n      | Transmitter Data Inverted       | CML-I       | Input from Host | 3             |                                          |
| 7    | GND       | Ground                          |             |                 | 1             |                                          |
| 8    | TX6p      | Transmitter Data Non-Inverted   | CML-I       | Input from Host | 3             |                                          |
| 9    | TX6n      | Transmitter Data Inverted       | CML-I       | Input from Host | 3             |                                          |
| 10   | GND       | Ground                          |             |                 | 1             |                                          |
| 11   | TX8p      | Transmitter Data Non-Inverted   | CML-I       | Input from Host | 3             |                                          |
| 12   | TX8n      | Transmitter Data Inverted       | CML-I       | Input from Host | 3             |                                          |
| 13   | GND       | Ground                          |             |                 | 1             |                                          |
| 14   | SCL       | 2-wire Serial interface clock   | LVC MOS-I/O | Bi-directional  | 3             | Open-Drain with pull-up resistor on Host |
| 15   | VCC       | +3.3V Power                     |             | Power from Host | 2             |                                          |
| 16   | VCC       | +3.3V Power                     |             | Power from Host | 2             |                                          |
| 17   | LPWn/PRSn | Low-Power Mode / Module Present | Multi-Level | Bi-directional  | 3             | See pin description for required circuit |
| 18   | GND       | Ground                          |             |                 | 1             |                                          |
| 19   | RX7n      | Receiver Data Inverted          | CML-O       | Output to Host  | 3             |                                          |
| 20   | RX7p      | Receiver Data Non-Inverted      | CML-O       | Output to Host  | 3             |                                          |
| 21   | GND       | Ground                          |             |                 | 1             |                                          |
| 22   | RX5n      | Receiver Data Inverted          | CML-O       | Output to Host  | 3             |                                          |
| 23   | RX5p      | Receiver Data Non-Inverted      | CML-O       | Output to Host  | 3             |                                          |
| 24   | GND       | Ground                          |             |                 | 1             |                                          |
| 25   | RX3n      | Receiver Data Inverted          | CML-O       | Output to Host  | 3             |                                          |
| 26   | RX3p      | Receiver Data Non-Inverted      | CML-O       | Output to Host  | 3             |                                          |
| 27   | GND       | Ground                          |             |                 | 1             |                                          |
| 28   | RX1n      | Receiver Data Inverted          | CML-O       | Output to Host  | 3             |                                          |
| 29   | RX1p      | Receiver Data Non-Inverted      | CML-O       | Output to Host  | 3             |                                          |
| 30   | GND       | Ground                          |             |                 | 1             |                                          |



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| Pin# | Symbol   | Description                     | Logic       | Direction       | Plug Sequence | Notes                                    |
|------|----------|---------------------------------|-------------|-----------------|---------------|------------------------------------------|
| 31   | GND      | Ground                          |             |                 | 1             |                                          |
| 32   | RX2p     | Receiver Data Non-Inverted      | CML-O       | Output to Host  | 3             |                                          |
| 33   | RX2n     | Receiver Data Inverted          | CML-O       | Output to Host  | 3             |                                          |
| 34   | GND      | Ground                          |             |                 | 1             |                                          |
| 35   | RX4p     | Receiver Data Non-Inverted      | CML-O       | Output to Host  | 3             |                                          |
| 36   | RX4n     | Receiver Data Inverted          | CML-O       | Output to Host  | 3             |                                          |
| 37   | GND      | Ground                          |             |                 | 1             |                                          |
| 38   | RX6p     | Receiver Data Non-Inverted      | CML-O       | Output to Host  | 3             |                                          |
| 39   | RX6n     | Receiver Data Inverted          | CML-O       | Output to Host  | 3             |                                          |
| 40   | GND      | Ground                          |             |                 | 1             |                                          |
| 41   | RX8p     | Receiver Data Non-Inverted      | CML-O       | Output to Host  | 3             |                                          |
| 42   | RX8n     | Receiver Data Inverted          | CML-O       | Output to Host  | 3             |                                          |
| 43   | GND      | Ground                          |             |                 | 1             |                                          |
| 44   | INT/RSTn | Module Interrupt / Module Reset | Multi-Level | Bi-directional  | 3             | See pin description for required circuit |
| 45   | VCC      | +3.3V Power                     |             | Power from Host | 2             |                                          |
| 46   | VCC      | +3.3V Power                     |             | Power from Host | 2             |                                          |
| 47   | SDA      | 2-wire Serial interface data    | LVC MOS-I/O | Bi-directional  | 3             | Open-Drain with pull-up resistor on Host |
| 48   | GND      | Ground                          |             |                 | 1             |                                          |
| 49   | TX7n     | Transmitter Data Inverted       | CML-I       | Input from Host | 3             |                                          |
| 50   | TX7p     | Transmitter Data Non-Inverted   | CML-I       | Input from Host | 3             |                                          |
| 51   | GND      | Ground                          |             |                 | 1             |                                          |
| 52   | TX5n     | Transmitter Data Inverted       | CML-I       | Input from Host | 3             |                                          |
| 53   | TX5p     | Transmitter Data Non-Inverted   | CML-I       | Input from Host | 3             |                                          |
| 54   | GND      | Ground                          |             |                 | 1             |                                          |
| 55   | TX3n     | Transmitter Data Inverted       | CML-I       | Input from Host | 3             |                                          |
| 56   | TX3p     | Transmitter Data Non-Inverted   | CML-I       | Input from Host | 3             |                                          |
| 57   | GND      | Ground                          |             |                 | 1             |                                          |
| 58   | TX1n     | Transmitter Data Inverted       | CML-I       | Input from Host | 3             |                                          |
| 59   | TX1p     | Transmitter Data Non-Inverted   | CML-I       | Input from Host | 3             |                                          |
| 60   | GND      | Ground                          |             |                 | 1             |                                          |



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## QSFP56 end

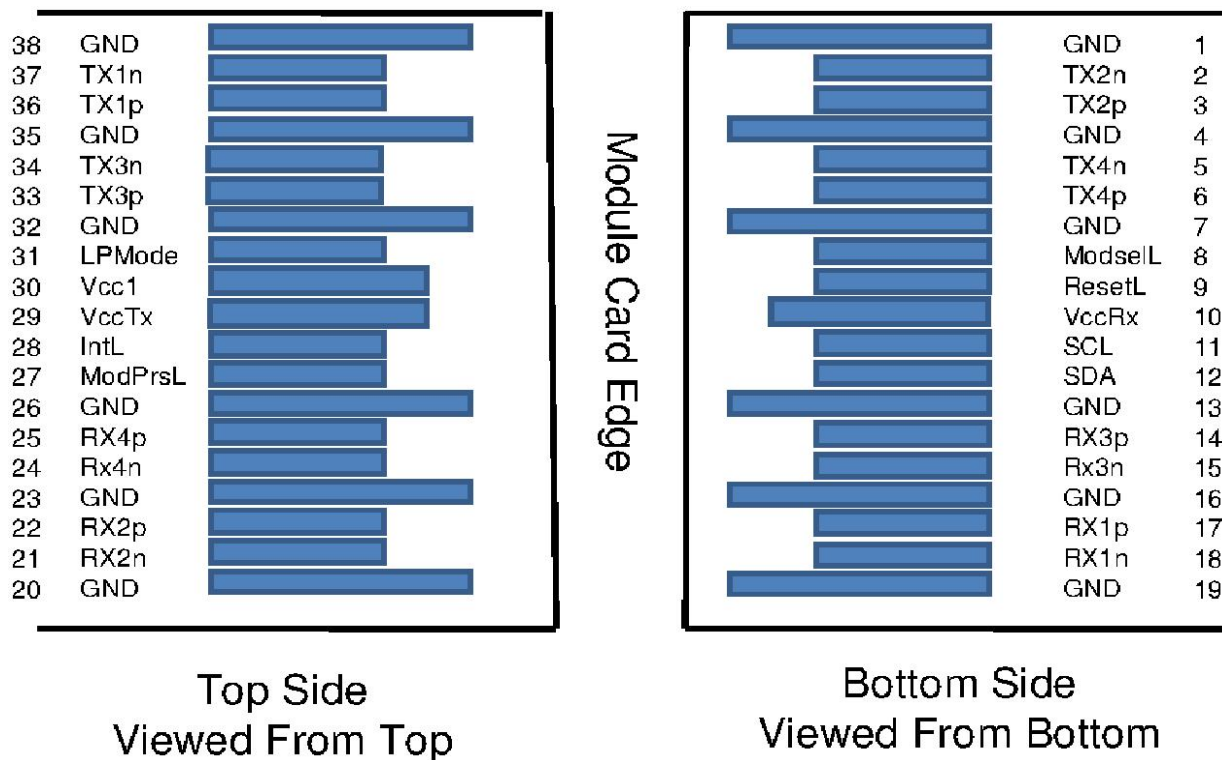


Figure 3, Pin View for QSFP56

Table 6-Pin Function Definitions for QSFP56

| Pin | Symbol  | Name/Description                    | Notes |
|-----|---------|-------------------------------------|-------|
| 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                       |       |
| 9   | ResetL  | Module Reset                        |       |
| 10  | Vcc Rx  | +3.3V Power Supply Receiver         |       |
| 11  | SCL     | 2-wire serial interface clock       |       |
| 12  | SDA     | 2-wire serial interface data        |       |

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|    |         |                                     |   |
|----|---------|-------------------------------------|---|
| 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       |   |
| 25 | Rx4p    | Receiver Non-Inverted Data Output   |   |
| 26 | GND     | Ground                              | 1 |
| 27 | ModPrsL | Module Present                      |   |
| 28 | IntL    | Interrupt                           |   |
| 29 | Vcc Tx  | +3.3V Power supply transmitter      |   |
| 30 | Vcc1    | +3.3V Power supply                  |   |
| 31 | LPMode  | Low Power Mode                      |   |
| 32 | GND     | Ground                              | 1 |
| 33 | Tx3p    | Transmitter Non-Inverted Data Input |   |
| 34 | Tx3n    | Transmitter Inverted Data Input     |   |
| 35 | GND     | Ground                              | 1 |
| 36 | Tx1p    | Transmitter Non-Inverted Data Input |   |
| 37 | Tx1n    | Transmitter Inverted Data Input     |   |
| 38 | GND     | Ground                              | 1 |

**Note: 1. Circuit ground is internally isolated from chassis ground.**

## Monitoring Specification

400G OSFP end Compatible with CMIS rev 5.2;

200G QSFP56 end Compatible with SFF-8636.

## Mechanical

**OSFP end**

**Unit mm**



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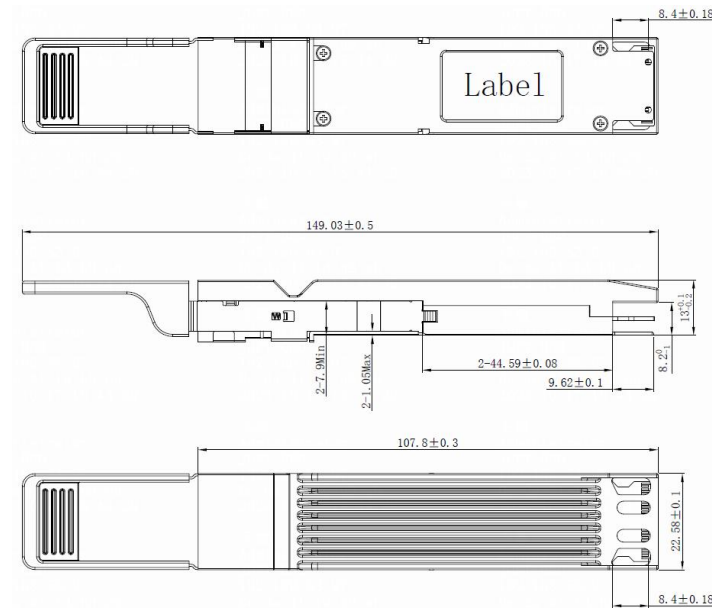
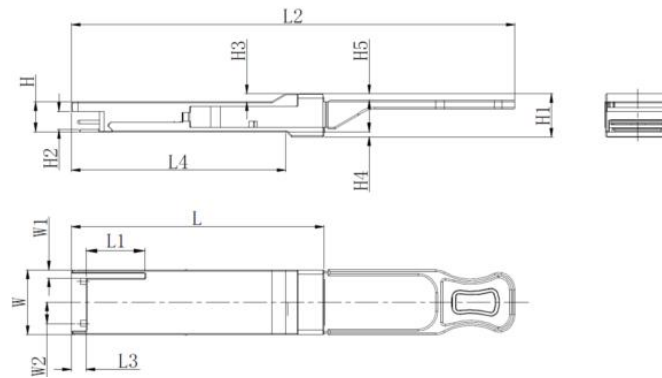


Figure 4, Mechanical Diagram for OSFP

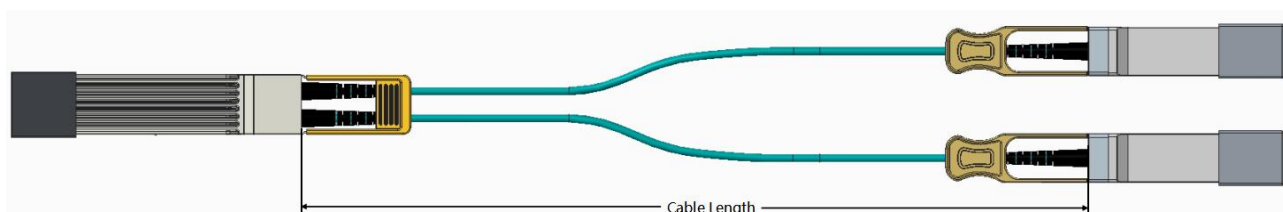
## QSFP56 end



## Unit mm

|      | L    | L1   | L2  | L3   | L4   | W     | W1  | W2  | H   | H1   | H2   | H3  | H4  | H5  | H6   |
|------|------|------|-----|------|------|-------|-----|-----|-----|------|------|-----|-----|-----|------|
| Max  | 72.2 | -    | 128 | 4.35 | 61.4 | 18.45 | -   | 6.2 | 8.6 | 12.4 | 5.35 | 2.5 | 1.6 | 2.0 | -    |
| Type | 72.0 | -    | -   | 4.20 | 61.2 | 18.35 | -   | -   | 8.5 | 12.2 | 5.2  | 2.3 | 1.5 | 1.8 | 6.55 |
| Min  | 68.8 | 16.5 | 124 | 4.05 | 61.0 | 18.25 | 2.2 | 5.8 | 8.4 | 12.0 | 5.05 | 2.1 | 1.3 | 1.6 | -    |

Figure 5, Mechanical Diagram for QSFP56



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**Figure 6, Mechanical Diagram of Cable****Table 7- Cable Length**

| Parameter           | Value                                     | Units |
|---------------------|-------------------------------------------|-------|
| Diameter            | $3 \pm 0.2$                               | mm    |
| Minimum bend radius | 30                                        | mm    |
| Length tolerance    | 1 m $\leq$ length $\leq$ 4.5 m: +15 / -0  | cm    |
|                     | 5 m $\leq$ length $\leq$ 14.5 m: +30 / -0 | cm    |
|                     | Length $\geq$ 15.0 m: +2% / -0            | m     |
| Cable color         | Aqua                                      |       |

**Table 8- Breakout Cable Nominal Length**

| Total Length<br>X (Unit: m) | Breakout Point Measured from OSFP<br>LQ (Unit: m) | Breakout Point Measured from QSFP56<br>LS (Unit: m) |
|-----------------------------|---------------------------------------------------|-----------------------------------------------------|
| 1                           | 0.3                                               | 0.7                                                 |
| 2                           | 0.6                                               | 1.4                                                 |
| 3                           | 1                                                 | 2                                                   |
| 5                           | 2                                                 | 3                                                   |
| 7                           | 4                                                 | 3                                                   |
| 10                          | 7                                                 | 3                                                   |
| 15                          | 12                                                | 3                                                   |
| 20                          | 17                                                | 3                                                   |
| 25                          | 22                                                | 3                                                   |
| 30                          | 27                                                | 3                                                   |

**Table 9: Connectivity Schematic**

| 400Gb/s Side | 200Gb/s Side  |
|--------------|---------------|
|              | <b>Port 1</b> |
| TX1          | RX1           |
| RX1          | TX1           |
| TX2          | RX2           |
| RX2          | TX2           |
| TX3          | RX3           |
| RX3          | TX3           |
| TX4          | RX4           |
| RX4          | TX4           |
|              | <b>Port 2</b> |
| TX5          | RX1           |
| RX5          | TX1           |
| TX6          | RX2           |
| RX6          | TX2           |

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|     |     |
|-----|-----|
| TX7 | RX3 |
| RX7 | TX3 |
| TX8 | RX4 |
| RX8 | TX4 |

**Warnings**

**Handling Precautions:** This device is susceptible to damage as a result of electrostatic discharge (ESD).

A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

**Laser Safety:** Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.