

## Product Features

- Compliant to industrial standard SFF-8436 QSFP+ active optical modules
- Compliant to the IEEE802.3ba(40GBASE-SR4)
- Automatic power down while broken cable is detected to improve eye safety
- High speed / high density: support up to 4X10 Gb/s bi-directional operation
- Low power consumption : less than 1.5W
- Reliable VCSEL and PIN photonic devices
- I2C standard management interface
- Excellent high speed signal integrity
- Operating temperature Options
  - (Commercial) 0°C to +70°C
- RoHS6 Compliant



## Applications

- 10G/40G Ethernet
- Proprietary high speed, high density data
- High performance computing, server and data storage.

## Descriptions

LX497x is a 40Gb/s, hot pluggable active optical cable for Infiniband and Ethernet data transmission. It provides parallel interconnects: 4 transmitting / 4 receiving data lanes and supports distance up to 100 meters.

LX497x is composed of multi-channel optical transceivers in both ends and multimode fiber cable in between. This integrated optical module solution removes the complicated optical fiber interface and brings friendly and intuitive electrical-to-electrical interface to users.

LX497x is designed to meet the requirements of high speed, high density and low power consumption for applications in today's data centers.

## Ordering Information

**Table 1. Ordering Information**

| Part Number | Reach | Temp      | RoHS      |
|-------------|-------|-----------|-----------|
| LX4971CDR   | 1m    | 0 ~ 70 °C | Compliant |
| LX4972CDR   | 2m    | 0 ~ 70 °C | Compliant |
| LX4973CDR   | 3m    | 0 ~ 70 °C | Compliant |
| LX4974CDR   | 5m    | 0 ~ 70 °C | Compliant |
| LX4974CDL   | 7m    | 0 ~ 70 °C | Compliant |
| LX4975CDR   | 10m   | 0 ~ 70 °C | Compliant |

|           |      |           |           |
|-----------|------|-----------|-----------|
| LX4976CDR | 20m  | 0 ~ 70 °C | Compliant |
| LX4977CDR | 30m  | 0 ~ 70 °C | Compliant |
| LX4978CDR | 50m  | 0 ~ 70 °C | Compliant |
| LX4979CDR | 100m | 0 ~ 70 °C | Compliant |

## Pin Description

Table 2. Pin Description

| Pin | Name    | Function/Description                             | Notes |
|-----|---------|--|-------|
| 1   | GND     | Transmitter Ground (Common with Receiver Ground) | 1     |
| 2   | Tx2-    | Transmitter Inverted Data Input                  |       |
| 3   | Tx2+    | Transmitter Non-Inverted Data output             |       |
| 4   | GND     | Transmitter Ground (Common with Receiver Ground) | 1     |
| 5   | Tx4-    | Transmitter Inverted Data Input                  |       |
| 6   | Tx4+    | Transmitter Non-Inverted Data output             |       |
| 7   | GND     | Transmitter Ground (Common with Receiver Ground) | 1     |
| 8   | ModSelL | Module Select                                    | 2     |
| 9   | ResetL  | Module Reset                                     | 2     |
| 10  | VccRx   | 3.3V Power Supply Receiver                       |       |
| 11  | SCL     | 2-Wire serial Interface Clock                    | 2     |
| 12  | SDA     | 2-Wire serial Interface Data                     | 2     |
| 13  | GND     | Transmitter Ground (Common with Receiver Ground) | 1     |
| 14  | Rx3+    | Receiver Non-Inverted Data Output                |       |
| 15  | Rx3-    | Receiver Inverted Data Output                    |       |
| 16  | GND     | Transmitter Ground (Common with Receiver Ground) | 1     |
| 17  | Rx1+    | Receiver Non-Inverted Data Output                |       |
| 18  | Rx1-    | Receiver Inverted Data Output                    |       |
| 19  | GND     | Transmitter Ground (Common with Receiver Ground) | 1     |
| 20  | GND     | Transmitter Ground (Common with Receiver Ground) | 1     |
| 21  | Rx2-    | Receiver Inverted Data Output                    |       |
| 22  | Rx2+    | Receiver Non-Inverted Data Output                |       |
| 23  | GND     | Transmitter Ground (Common with Receiver Ground) | 1     |
| 24  | Rx4-    | Receiver Inverted Data Output                    | 1     |
| 25  | Rx4+    | Receiver Non-Inverted Data Output                |       |
| 26  | GND     | Transmitter Ground (Common with Receiver Ground) | 1     |
| 27  | ModPrsl | Module Present                                   |       |
| 28  | IntL    | Interrupt  | 2     |
| 29  | VccTx   | 3.3V power supply transmitter                    |       |
| 30  | Vcc1    | 3.3V power supply                                |       |
| 31  | LPMode  | Low Power Mode                                   | 2     |
| 32  | GND     | Transmitter Ground (Common with Receiver Ground) | 1     |
| 33  | Tx3+    | Transmitter Non-Inverted Data Input              |       |

|    |      |  |   |
|----|------|--|---|
| 34 | Tx3- | Transmitter Inverted Data Output                 |   |
| 35 | GND  | Transmitter Ground (Common with Receiver Ground) | 1 |
| 36 | Tx1+ | Transmitter Non-Inverted Data Input              |   |
| 37 | Tx1- | Transmitter Inverted Data Output                 |   |
| 38 | GND  | Transmitter Ground (Common with Receiver Ground) | 1 |

**Notes:**

1. The module signal grounds are isolated from the module case.
2. This is an open collector/drain output that on the host board requires a 4.7KΩ to 10KΩ pull-up resistor to VccHost.

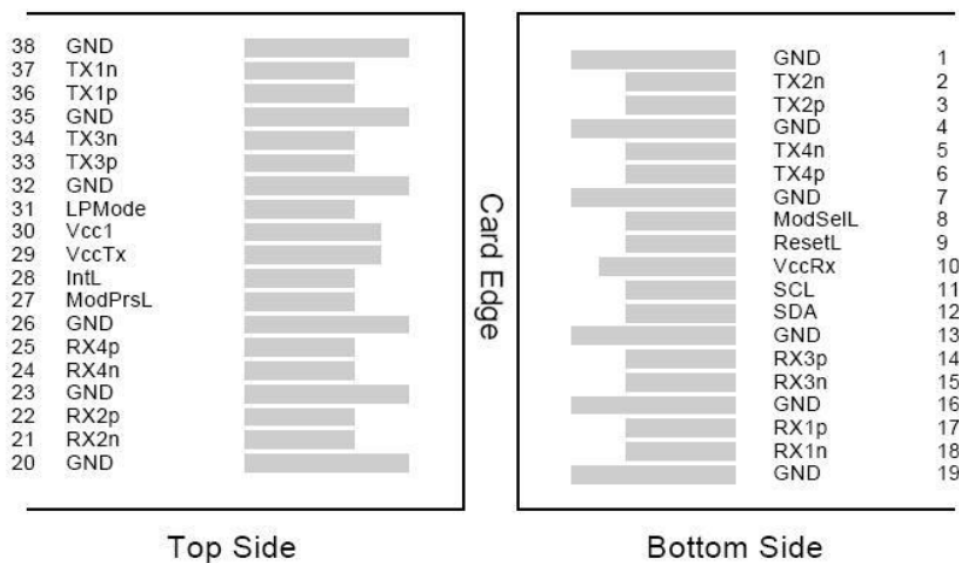


Figure 1. Host PCB QSFP+ pad assignment top view

## Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

**Table 3. Absolute Maximum Ratings**

| Parameter           | Symbol          | Minimum | Maximum | Unit |
|---------------------|-----------------|---------|---------|------|
| Storage Temperature | T <sub>S</sub>  | -40     | 85      | °C   |
| Relative Humidity   | RH              | 5       | 85      | %    |
| Supply Voltage      | V <sub>CC</sub> | 0       | 3.6     | V    |

## Recommended Operating Conditions

**Table 4. Recommended Operating Conditions**

| Parameter                         | Symbol   | Min   | Typ    | Max   | Unit |
|-----------------------------------|----------|-------|--------|-------|------|
| Operating Case Temperature LX497x | $T_C$    | 0     | 25     | 70    | °C   |
| Supply Voltage                    | $V_{CC}$ | 3.135 | 3.3    | 3.465 | V    |
| Data Rate per Channel             | -        | -     | 4*10.3 | -     | Gb/s |

## Transceiver Electrical Characteristics

**Table 5. Transceiver Electrical Characteristics**

| Parameter           | Symbol   | Minimum | Typical | Maximum | Unit | Notes |
|---------------------|----------|---------|---------|---------|------|-------|
| Supply Current      | $I_{CC}$ | -       | -       | 400     | mA   | -     |
| Power Dissipation   | $P_D$    | -       | -       | 1500    | mW   | -     |
| Clock Rate-I2C      | f        | -       | -       | 400     | kHz  | 3     |
| Module Turn-on time | -        | -       | -       | 2000    | ms   | 4     |

**Notes:**

1. For all control input pins: LPMode,Reset and ModSelL.
2. For all status output pins: ModPrsL,IntL.
3. For management interface.
4. Time from module power-on / insertion/ ResetL deassert to module full functional.

## Transmitter Optical Characteristics

**Table 6. Transmitter Optical Characteristics**

| Parameter                              | Symbol       | Minimum | Typical | Maximum | Unit     | Notes |
|--|--------------|---------|---------|---------|----------|-------|
| Reference Differential Input Impedance | $Z_d$        | -       | 100     | -       | $\Omega$ | 1     |
| Optical Return Loss Tolerance          |              |         |         | 12      | dB       |       |
| Differential Data Input Swing          | $V_{in\_pp}$ | 180     | -       | 1200    | mV       | -     |
| Differential Data Input Threshold      |              |         | 50      |         | mV       | 2     |

**Notes:**

1. AC coupled inside AOC module.
2. Input swing to trigger TX-squelch.

## Receiver Optical Characteristics

**Table 7. Receiver Optical Characteristics**

| Parameter                              | Symbol        | Minimum | Typical | Maximum | Unit     | Notes |
|--|---------------|---------|---------|---------|----------|-------|
| Reference Differential Input Impedance | $Z_d$         | -       | 100     | -       | $\Omega$ | 1     |
| Differential Data Output Swing         | $V_{out\_pp}$ | 0       | -       | 800     | mV       |       |

|   |   |     |        |     |      |   |
|---|---|-----|--------|-----|------|---|
|   | - | 0   | -      | -   | %    | 2 |
| Pre-emphasis Pulse Amplitude Percentage       | - | 10  | -      | -   | %    |   |
|   | - | 20  | -      | -   | %    |   |
|   | - | 40  | -      | -   | %    |   |
| Pre-emphasis Pulse Duration                   | - | -   | 30     | -   | ps   |   |
| Signal Speed                                  | - | -   | 4*10.3 | -   | Gb/s | - |
| Differential Data Output Swing                | - | 150 | -      | 850 | mV   | - |
| Differential Data Output Swing When Squelched | - | -   | -      | 50  | mV   | - |
| Rise / Fall Time (20% ~80%)                   | - | 24  | -      | -   | ps   | - |

**Notes:**

1. AC coupled inside AOC module.
2. User selectable. Percentage is the ratio of pre-emphasis amplitude to output swing. Users could change by writing to page 3 address 237, default value is "10"

### Recommended Application Interface Circuit

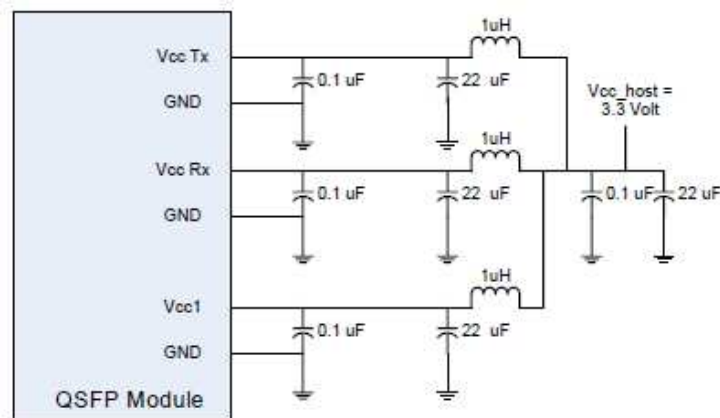
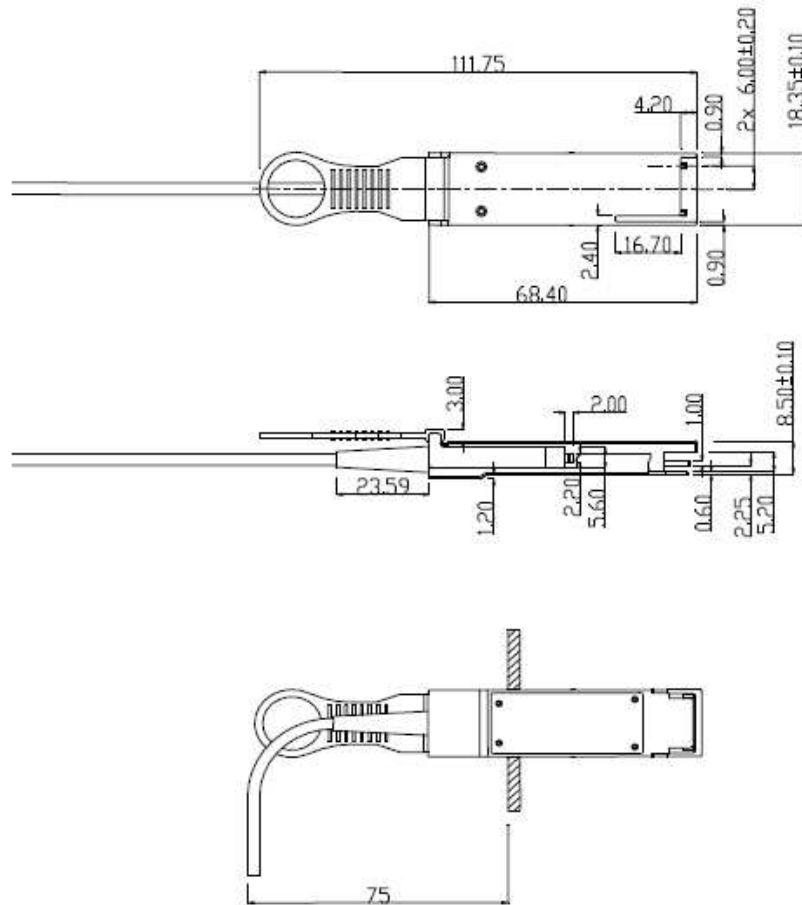


Figure 4. Recommended Host Board Power Supply Filter Network

### Mechanical specifications

| Parameter                              | Symbol | Minimum    | Typical | Maximum    | Unit | Notes |
|--|--------|------------|---------|------------|------|-------|
| AOC cable length (L <=5m)              | L      | L-0.06     | L       | L+0.06     | M    | -     |
| AOC cable length (L > 5m)              | L      | L-(L*1.1%) | L       | L+(L*1.1%) | M    | -     |
| Module Retention                       | -      | 90         | -       | 170        | N    | -     |
| Module Insertion                       | -      | 0          | -       | 18         | N    | -     |
| Module Extraction                      | -      | 0          | -       | 25         | N    | -     |
| Cable Pull Strength – Apply Load at 0° | -      | 44         | -       | -          | N    | -     |

|   |   |    |   |   |        |   |
|---|---|----|---|---|--------|---|
| Cable Pull Strength – Apply Load at 90° | - | 33 | - | - | N      | - |
| Clearance Out of IO Bezel               | - | 75 | - | - | nm     | - |
| Cable Bending Radius                    | - | 3  | - | - | cm     | - |
| Insertion / Removal Cycles              | - | 50 | - | - | cycles | - |



Clearance 75mm Is Required.

Cable Type: Low Smoke Zero Halogen

Figure 5. Outline Drawing

## For More Information

### Linktel Technologies Co., Ltd

[sales@linkteltech.com](mailto:sales@linkteltech.com)

<http://www.linkteltech.com>

### Linktel China

E12, No.52 Liufang Road, East-Lake Hi-tech Development Zone, Wuhan, China

Tel: +86 27 8792 9298

### Linktel USA

1601 McCarthy Blvd #9, Milpitas, CA 95035, USA

[linktelus@linkteltech.com](mailto:linktelus@linkteltech.com)

Tel: +1 408 807 0482