



# PARALIGHT Active Optical Cable Assemblies

## PARALIGHT ACTIVE OPTICAL CABLE ASSEMBLIES FOR HIGH SPEED INTERCONNECTS

### Product Facts

- 4 transmit and 4 receive channels at up to 5 Gb/s per channel)
- 10 Gb/s available end of 2008
- Industry standard (SFF-8470) electrical connector (aka InfiniBand 4X, IB 4X, CX4, Fibre Channel)
- Internally terminated optics — no optical connector to clean
- Differential data I/O per InfiniBand version 1.2.1
- Asynchronous, internally AC coupled inputs and outputs
- Passively cooled design — low thermal resistance heat path from chip to connector shell
- Low power consumption — under 1 watt per end
- Small diameter cable (2.9 mm)
- Light weight
- Tight bend radius

Fibre Channel is a trademark of the Fibre Channel Industry Association.

INFINIBAND is a trademark of the InfiniBand Trade Association.

XAUI is a trademark of the 10Gigabit Ethernet Alliance XAUI Interoperability Group.

Tyco Electronics' PARALIGHT active optical cable assemblies use state-of-the-art technology to provide cost effective high data throughput interconnects. The cables incorporate E/O and O/E conversion built into the connector shell to yield a dramatic improvement in PCB real estate utilization.

Using 850 nm VCSELS, it can be operated from 2.5 Gb/s to 5 Gb/s per channel with 10 Gb/s per channel available end of 2008. At 5 Gb/s this provides aggregate throughput of 20 Gb/s in each direction. At 10 Gb/s this provides aggregate throughput of 40 Gb/s in each direction. They are available in lengths up to 100 meters using 50 micron fiber. Longer lengths available upon request. The EOE circuitry is designed for use with 8B/10B encoded data streams, such as InfiniBand, Fibre Channel, and XAUI.

3.3 Volt power is supplied through a pin (G8) dedicated for this purpose as described in InfiniBand Specification Version 1.2.1. Pin G7 is the voltage sense pin and is tied internally to ground through a 5K ohm resistor.

**Technical Document  
Product Specification**  
108-2330

### FOR MORE INFORMATION

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## APPLICATIONS

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- High Performance Computing Clusters
- Supercomputers
- High End Servers
- Mass Storage
- Metro Network Switch/Cross Connect
- High End Carrier Class Routers
- DDR InfiniBand Applications (QDR available end of 2008)
- Other 2.5–5.0 Gb/s Applications  
(e.g. 10 Gb Fibre Channel or 10 Gig Ethernet XAUI on ports providing InfiniBand pinout 3.3 V power)

## ELECTRICAL/OPTICAL

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- 20 Gb/s bidirectional —  
40 Gb/s future offering (end of 2008)
- Compatible with SDR and DDR (InfiniBand) standards (QDR available end of 2008)
- Low power consumption — under 1 watt per end

## MECHANICAL/ENVIRONMENTAL

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- Up to 150 meters — longer lengths available upon request
- 25 mm bend radius
- Operating temperature 0°C to 60°C
- Storage Temperature -25°C to 70°C
- 4 channels each direction

## MATERIALS

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- OFNR/CSA-FT-6 (plenum) cable
- OFN-LS (LSZH rated) cable

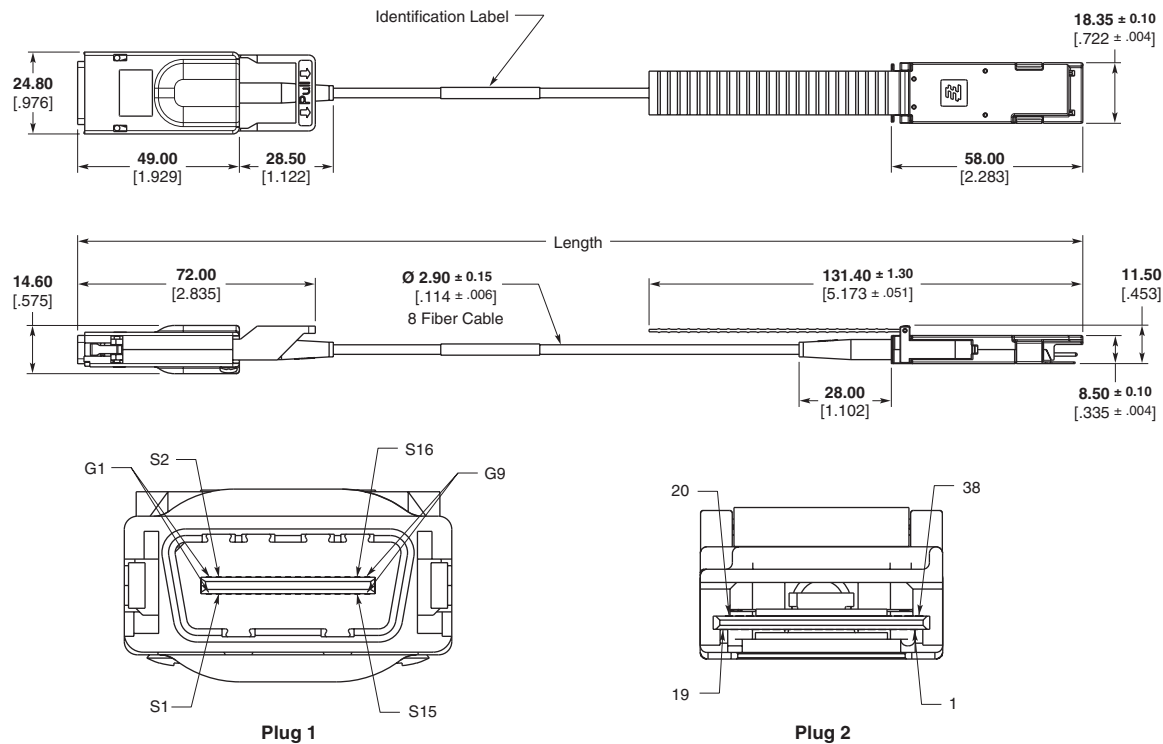
Fibre Channel is a trademark of the Fibre Channel Industry Association.

INFINIBAND is a trademark of the InfiniBand Trade Association.

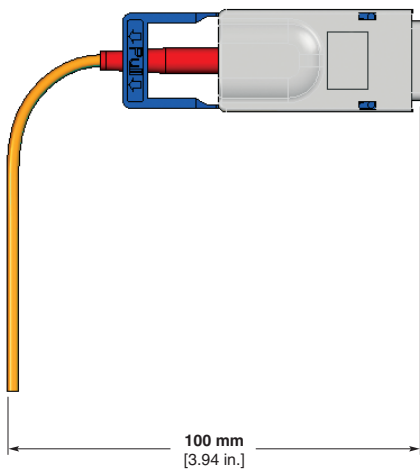
XAUI is a trademark of the 10Gigabit Ethernet Alliance XAUI Interoperability Group.

PRODUCT DIMENSIONS

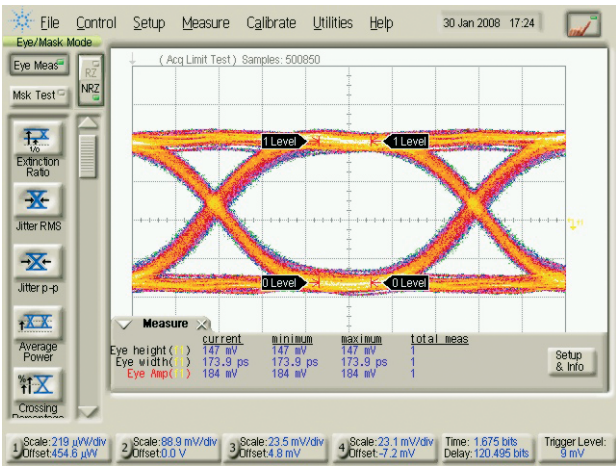
IB 4X to QSFP



FRONT PANEL DOOR CLEARANCE



TYPICAL 5 Gb/s EYE DIAGRAM (PRBS2^7-1 WITH CROSSTALK)



## PART NUMBERS

| Length<br>(meters) | Cable Type | InfiniBand 4X***<br>Part Numbers | InfiniBand 4X to QSFP<br>Part Numbers | QSFP to QSFP<br>Part Numbers |
|--------------------|------------|----------------------------------|---------------------------------------|------------------------------|
| 2                  | OFNP**     | 1985427-9                        | 1985554-9                             | 1985861-9                    |
|                    | LSZH*      | 1984462-9                        | 2064158-9                             | 2064159-9                    |
| 3                  | OFNP**     | 1985427-1                        | 1985554-1                             | 1985861-1                    |
|                    | LSZH*      | 1984462-1                        | 2064158-1                             | 2064159-1                    |
| 5                  | OFNP**     | 1985427-2                        | 1985554-2                             | 1985861-2                    |
|                    | LSZH*      | 1984462-2                        | 2064158-2                             | 2064159-2                    |
| 10                 | OFNP**     | 1985427-3                        | 1985554-3                             | 1985861-3                    |
|                    | LSZH*      | 1984462-3                        | 2064158-3                             | 2064159-3                    |
| 15                 | OFNP**     | 1-1985427-0                      | 1-1985554-0                           | 1-1985861-0                  |
|                    | LSZH*      | 1-1984462-0                      | 1-2064158-0                           | 1-2064159-0                  |
| 20                 | OFNP**     | 1985427-4                        | 1985554-4                             | 1985861-4                    |
|                    | LSZH*      | 1984462-4                        | 2064158-4                             | 2064159-4                    |
| 30                 | OFNP**     | 1985427-5                        | 1985554-5                             | 1985861-5                    |
|                    | LSZH*      | 1984462-5                        | 2064158-5                             | 2064159-5                    |
| 40                 | OFNP**     | 1985427-6                        | 1985554-6                             | 1985861-6                    |
|                    | LSZH*      | 1984462-6                        | 2064158-6                             | 2064159-6                    |
| 50                 | OFNP**     | 1985427-7                        | 1985554-7                             | 1985861-7                    |
|                    | LSZH*      | 1984462-7                        | 2064158-7                             | 2064159-7                    |
| 100                | OFNP**     | 1985427-8                        | 1985554-8                             | 1985861-8                    |
|                    | LSZH*      | 1984462-8                        | 2064158-8                             | 2064159-8                    |

\*LSZH = Low Smoke Zero Halogen

\*\*OFNP = Optical Fiber Nonconductive Plenum

\*\*\*Also known as CX4 and SFF-8470

**Note:** Longer lengths available upon request.

**Note:** All part numbers are RoHS compliant.

## GENERAL SPECIFICATIONS

| Symbol | Parameter                  | Min. | Typical | Max. | Unit | Notes |
|--------|----------------------------|------|---------|------|------|-------|
|        | Data Rate/Channel          | 2.5  | —       | 5    | Gb/s | 1     |
| Tc     | Operating Case Temperature | 5    | —       | 75   | °C   |       |
| Vcc    | Supply Voltage             | 3.13 | 3.3     | 3.47 | V    |       |
|        | Total Power Dissipation    | —    | 0.8     | 1.0  | W    | 2     |
|        | Fiber Core Diameter        | —    | 50      | —    | μm   |       |

1. Test pattern PRBS 2E7-1

2. Per End.

## TRANSMITTER ELECTRICAL SPECIFICATIONS

| Symbol    | Parameter                    | Min. | Typical | Max. | Unit | Notes |
|-----------|------------------------------|------|---------|------|------|-------|
|           | Input Common Mode            | 0    | —       | Vcc  | V    | 1     |
| V_diff_IN | Differential data swing      | 650  | —       | 1600 | mVpp |       |
| Rin       | Differential Input Impedance | 80   | 100     | 120  | Ω    |       |

1. Internally AC coupled.

## RECEIVER ELECTRICAL SPECIFICATIONS

| Symbol     | Parameter                      | Min. | Typical | Max. | Unit | Notes |
|------------|--------------------------------|------|---------|------|------|-------|
|            | Output Common Mode             | —    | —       | —    | V    | 1     |
| V_diff_OUT | Differential data swing        | 90   | 300     | 1600 | mVpp |       |
| Rout       | Differential Output Impedance  | —    | 100     | —    | Ω    |       |
|            | Output Rise/Fall Time (20-80%) | —    | —       | 120  | ps   |       |
| TJ         | Total Jitter (p-p)             | —    | —       | .4   | UI   | 2     |
| ΔT ch-ch   | Skew                           | —    | —       | 100  | ps   |       |

1. Internally AC Coupled.

2. Total jitter is specified at a BER of 10<sup>-12</sup> using PRBS 2<sup>17</sup>-1.

## ENGINEERING NOTES

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## ENGINEERING NOTES

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## MECHANICAL

| Symbol | Parameter    | Value | Unit   | Notes |
|--------|--------------|-------|--------|-------|
|        | Side load    | 75    | N      |       |
|        | Tensile Load | 75    | N      |       |
|        | Durability   | 250   | cycles |       |

## REGULATORY INFORMATION

| Symbol | Parameter                                          | Compliance                                            |
|--------|----------------------------------------------------|-------------------------------------------------------|
|        | Preliminary Eye Safety Classification <sup>1</sup> | Not Applicable                                        |
|        | Electrostatic Discharge (ESD), human body          | JESD22-A114D, Class 2 (2000 volts), human body model. |

1. Optical energy contained with cable. **CAUTION:** Do not cut optical cable. Viewing the cut fiber ends, especially with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) may pose an eye hazard.

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- Ability to browse RoHS Compliant Products in our on-line catalog
- Downloadable Technical Data Customer Information Presentation
- More detailed information regarding the definitions used above
- So whatever your questions when it comes to RoHS, we have the answers at [www.tycoelectronics.com/leadfree](http://www.tycoelectronics.com/leadfree)

**RoHS**  
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