

OSFP-QDD-400GB-MX-PDAC1-5M-C

Mellanox® Compatible TAA 400GBase-CU OSFP to QSFP-DD Direct Attach Cable (Passive Twinax, 1.5m)

Features:

- OSFP Module Compliant to OSFP MSA
- QSFP-DD Module Compliant to QSFP-DD MSA
- Transmission Data Rate up to 53.125Gbps Per Channel
- Enable 400Gbps Transmission
- Built-In EEPROM Functions
- Operating Temperature Range: 0 to 70 Celsius
- RoHS Compliant and Lead-Free

**Applications:**

- 400GBase

Product Description

This is an Mellanox® compatible 400GBase-CU OSFP to QSFP-DD direct attach cable that operates over passive copper with a maximum reach of 1.5m (4.9ft). It has been programmed, uniquely serialized, and data-traffic and application tested to ensure it is 100% compliant and functional. This direct attach cable is TAA (Trade Agreements Act) compliant, and is built to comply with MSA (Multi-Source Agreement) standards. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

ProLabs' transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S.-made or designated country end products.")



Absolute Maximum Ratings

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|----------------------------|--------|------|------|------|------|
| Supply Voltage | Vcc | 3.13 | 3.3 | 3.47 | V |
| Storage Temperature | Tstg | -40 | | 85 | °C |
| Operating Case Temperature | Tc | 0 | | 70 | °C |
| Relative Humidity | RH | 5 | | 85 | % |
| Data Rate | | | 400 | | Gbps |

Electrical Specifications

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|-------------|--|------|-------|------|
| Resistance | Rcon | | | 3 | Ω |
| Insulation Resistance | Rins | | | 10 | MΩ |
| Raw Cable Impedance | Zca | 95 | 100 | 110 | Ω |
| Mated Connector Impedance | Zmated | 85 | 100 | 110 | Ω |
| Insertion Loss @13.28GHz | SDD21 | 8 | | 17.16 | dB |
| Return Loss | SDD11/22 | Return_loss(f) $\geq \begin{cases} 16.5-2f & 0.05 \leq f < 4.1 \\ 10.66-14\log_{10}(f/5.5) & 4.1 \leq f \leq 19 \end{cases}$ | | | dB |
| Differential to Common-Mode Return Loss | SCD11/22 | Return_loss(f) $\geq \begin{cases} 22-(20/25.78)f & 0.01 \leq f < 12.89 \\ 15-(6/25.78)f & 12.89 \leq f \leq 19 \end{cases}$ | | | dB |
| Differential to Common-Mode Conversion Loss | SCD21-SDD21 | Conversion_loss(f) - IL(f) $\geq \begin{cases} 10 & 0.01 \leq f < 12.89 \\ 27-(29/22)f & 12.89 \leq f < 15.7 \\ 6.3 & 15.7 \leq f \leq 19 \end{cases}$ | | | dB |
| Minimum COM | COM | 3 | | | dB |

Physical Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|-----------------|-----------------------------------|------|------|------|------|
| Length | L | | 1.5 | | M |
| Wire Gauge | | | 30 | | AWG |
| Jacket Material | Plastic Braided Mesh, Silver Gray | | | | |

Pin Descriptions for OSFP

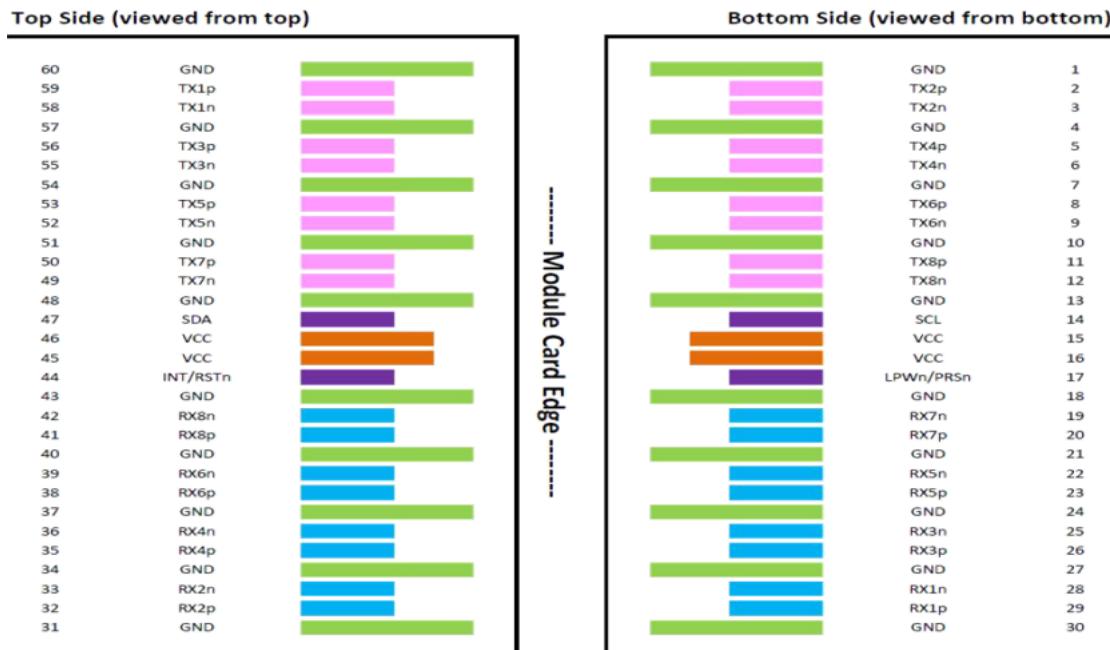
| Pin | Symbol | Name/Description | Logic | Plug Sequence | Direction | Notes |
|-----|-----------|--------------------------------|-------------|---------------|-----------------|-------|
| 1 | GND | Module Ground. | | 1 | | |
| 2 | Tx2+ | Transmitter Data Non-Inverted. | CML-I | 3 | Input from Host | |
| 3 | Tx2- | Transmitter Data Inverted. | CML-I | 3 | Input from Host | |
| 4 | GND | Module Ground. | | 1 | | |
| 5 | Tx4+ | Transmitter Data Non-Inverted. | CML-I | 3 | Input from Host | |
| 6 | Tx4- | Transmitter Data Inverted. | CML-I | 3 | Input from Host | |
| 7 | GND | Module Ground. | | 1 | | |
| 8 | Tx6+ | Transmitter Data Non-Inverted. | CML-I | 3 | Input from Host | |
| 9 | Tx6- | Transmitter Data Inverted. | CML-I | 3 | Input from Host | |
| 10 | GND | Module Ground. | | 1 | | |
| 11 | Tx8+ | Transmitter Data Non-Inverted. | CML-I | 3 | Input from Host | |
| 12 | Tx8- | Transmitter Data Inverted. | CML-I | 3 | Input from Host | |
| 13 | GND | Module Ground. | | 1 | | |
| 14 | SCL | 2-Wire Serial Interface Clock. | LVCMOS-I/O | 3 | Bi-Directional | 1 |
| 15 | Vcc | +3.3V Power. | | 2 | Power from Host | |
| 16 | Vcc | +3.3V Power. | | 2 | Power from Host | |
| 17 | LPWn/PRSn | Low-Power Mode/Module Present. | Multi-Level | 3 | Bi-Directional | 2 |
| 18 | GND | Module Ground. | | 1 | | |
| 19 | Rx7- | Receiver Data Inverted. | CML-O | 3 | Output to Host | |
| 20 | Rx7+ | Receiver Data Non-Inverted. | CML-O | 3 | Output to Host | |
| 21 | GND | Module Ground. | | 1 | | |
| 22 | Rx5- | Receiver Data Inverted. | CML-O | 3 | Output to Host | |
| 23 | Rx5+ | Receiver Data Non-Inverted. | CML-O | 3 | Output to Host | |
| 24 | GND | Module Ground. | | 1 | | |
| 25 | Rx3- | Receiver Data Inverted. | CML-O | 3 | Output to Host | |
| 26 | Rx3+ | Receiver Data Non-Inverted. | CML-O | 3 | Output to Host | |
| 27 | GND | Module Ground. | | 1 | | |
| 28 | Rx1- | Receiver Data Inverted. | CML-O | 3 | Output to Host | |
| 29 | Rx1+ | Receiver Data Non-Inverted. | CML-O | 3 | Output to Host | |
| 30 | GND | Module Ground. | | 1 | | |
| 31 | GND | Module Ground. | | 1 | | |
| 32 | Rx2+ | Receiver Data Non-Inverted. | CML-O | 3 | Output to Host | |
| 33 | Rx2- | Receiver Data Inverted. | CML-O | 3 | Output to Host | |
| 34 | GND | Module Ground. | | 1 | | |
| 35 | Rx4+ | Receiver Data Non-Inverted. | CML-O | 3 | Output to Host | |
| 36 | Rx4- | Receiver Data Inverted. | CML-O | 3 | Output to Host | |
| 37 | GND | Module Ground. | | 1 | | |
| 38 | Rx6+ | Receiver Data Non-Inverted. | CML-O | 3 | Output to Host | |
| 39 | Rx6- | Receiver Data Inverted. | CML-O | 3 | Output to Host | |
| 40 | GND | Module Ground. | | 1 | | |

| | | | | | | |
|----|----------|--------------------------------|-------------|---|-----------------|---|
| 41 | Rx8+ | Receiver Data Non-Inverted. | CML-O | 3 | Output to Host | |
| 42 | Rx8- | Receiver Data Inverted. | CML-O | 3 | Output to Host | |
| 43 | GND | Module Ground. | | 1 | | |
| 44 | INT/RSTn | Module Interrupt/Module Reset. | Multi-Level | 3 | Bi-Directional | 2 |
| 45 | Vcc | +3.3V Power. | | 2 | Power from Host | |
| 46 | Vcc | +3.3V Power. | | 2 | Power from Host | |
| 47 | SDA | 2-Wire Serial Interface Data. | LVCMS-I/O | 3 | Bi-Directional | 1 |
| 48 | GND | Module Ground. | | 1 | | |
| 49 | Tx7- | Transmitter Data Inverted. | CML-I | 3 | Input from Host | |
| 50 | Tx7+ | Transmitter Data Non-Inverted. | CML-I | 3 | Input from Host | |
| 51 | GND | Module Ground. | | 1 | | |
| 52 | Tx5- | Transmitter Data Inverted. | CML-I | 3 | Input from Host | |
| 53 | Tx5+ | Transmitter Data Non-Inverted. | CML-I | 3 | Input from Host | |
| 54 | GND | Module Ground. | | 1 | | |
| 55 | Tx3- | Transmitter Data Inverted. | CML-I | 3 | Input from Host | |
| 56 | Tx3+ | Transmitter Data Non-Inverted. | CML-I | 3 | Input from Host | |
| 57 | GND | Module Ground. | | 1 | | |
| 58 | Tx1- | Transmitter Data Inverted. | CML-I | 3 | Input from Host | |
| 59 | Tx1+ | Transmitter Data Non-Inverted. | CML-I | 3 | Input from Host | |
| 60 | GND | Module Ground. | | 1 | | |

Notes:

1. Open-drain with pull-up resistor on the host.
2. See pin assignments below for the required circuit.

Electrical Pin-Out Details - OSFP



Pin Descriptions for QSFP-DD

| Pin | Logic | Symbol | Name/Description | Plug Sequence | Notes |
|-----|------------|---------------|--------------------------------------|---------------|-------|
| 1 | | GND | Module Ground. | 1B | 1 |
| 2 | CML-I | Tx2- | Transmitter Inverted Data Input. | 3B | |
| 3 | CML-I | Tx2+ | Transmitter Non-Inverted Data Input. | 3B | |
| 4 | | GND | Module Ground. | 1B | 1 |
| 5 | CML-I | Tx4- | Transmitter Inverted Data Input. | 3B | |
| 6 | CML-I | Tx4+ | Transmitter Non-Inverted Data Input. | 3B | |
| 7 | | GND | Module Ground. | 1B | 1 |
| 8 | LVTTL-I | ModSelL | Module Select. | 3B | |
| 9 | LVTTL-I | ResetL | Module Reset. | 3B | |
| 10 | | VccRx | +3.3V Receiver Power Supply. | 2B | 2 |
| 11 | LVCMOS-I/O | SCL | 2-Wire Serial Interface Clock. | 3B | |
| 12 | LVCMOS-I/O | SDA | 2-Wire Serial Interface Data. | 3B | |
| 13 | | GND | Module Ground. | 1B | 1 |
| 14 | CML-O | Rx3+ | Receiver Non-Inverted Data Output. | 3B | |
| 15 | CML-O | Rx3- | Receiver Inverted Data Output. | 3B | |
| 16 | | GND | Module Ground. | 1B | 1 |
| 17 | CML-O | Rx1+ | Receiver Non-Inverted Data Output. | 3B | |
| 18 | CML-O | Rx1- | Receiver Inverted Data Output. | 3B | |
| 19 | | GND | Module Ground. | 1B | 1 |
| 20 | | GND | Module Ground. | 1B | 1 |
| 21 | CML-O | Rx2- | Receiver Inverted Data Output. | 3B | |
| 22 | CML-O | Rx2+ | Receiver Non-Inverted Data Output. | 3B | |
| 23 | | GND | Module Ground. | 1B | 1 |
| 24 | CML-O | Rx4- | Receiver Inverted Data Output. | 3B | |
| 25 | CML-O | Rx4+ | Receiver Non-Inverted Data Output. | 3B | |
| 26 | | GND | Module Ground. | 1B | 1 |
| 27 | LVTTL-O | ModPrsL | Module Present. | 3B | |
| 28 | LVTTL-O | IntL/RxLOS | Interrupt/Optional RxLOS. | 3B | |
| 29 | | VccTx | +3.3V Transmitter Power Supply. | 2B | 2 |
| 30 | | Vcc1 | +3.3V Power Supply. | 2B | 2 |
| 31 | LVTTL-I | LPMode/Tx_Dis | Low-Power Mode/Optional Tx_Disable. | 3B | |
| 32 | | GND | Module Ground. | 1B | 1 |
| 33 | CML-I | Tx3+ | Transmitter Non-Inverted Data Input. | 3B | |
| 34 | CML-I | Tx3- | Transmitter Inverted Data Input. | 3B | |
| 35 | | GND | Module Ground. | 1B | 1 |
| 36 | CML-I | Tx1+ | Transmitter Non-Inverted Data Input. | 3B | |
| 37 | CML-I | Tx1- | Transmitter Inverted Data Input. | 3B | |
| 38 | | GND | Module Ground. | 1B | 1 |
| 39 | | GND | Module Ground. | 1A | 1 |
| 40 | CML-I | Tx6- | Transmitter Inverted Data Input. | 3A | |

| | | | | | |
|-----------|--------------|------------|--|----|---|
| 41 | CML-I | Tx6+ | Transmitter Non-Inverted Data Input. | 3A | |
| 42 | | GND | Module Ground. | 1A | 1 |
| 43 | CML-I | Tx8- | Transmitter Inverted Data Input. | 3A | |
| 44 | CML-I | Tx8+ | Transmitter Non-Inverted Data Input. | 3A | |
| 45 | | GND | Module Ground. | 1A | 1 |
| 46 | LVCMOS/CML-I | P/VS4 | Programmable/Vendor-Specific 4. | 3A | 5 |
| 47 | LVCMOS/CML-I | P/VS1 | Programmable/Vendor-Specific 1. | 3A | 5 |
| 48 | | VccRx1 | +3.3V Receiver Power Supply. | 2A | 2 |
| 49 | LVCMOS/CML-O | P/VS2 | Programmable/Vendor-Specific 2. | 3A | 5 |
| 50 | LVCMOS/CML-O | P/VS3 | Programmable/Vendor-Specific 3. | 3A | 5 |
| 51 | | GND | Module Ground. | 1A | 1 |
| 52 | CML-O | Rx7+ | Receiver Non-Inverted Data Output. | 3A | |
| 53 | CML-O | Rx7- | Receiver Inverted Data Output. | 3A | |
| 54 | | GND | Module Ground. | 1A | 1 |
| 55 | CML-O | Rx5+ | Receiver Non-Inverted Data Output. | 3A | |
| 56 | CML-O | Rx5- | Receiver Inverted Data Output. | 3A | |
| 57 | | GND | Module Ground. | 1A | 1 |
| 58 | | GND | Module Ground. | 1A | 1 |
| 59 | CML-O | Rx6- | Receiver Inverted Data Output. | 3A | |
| 60 | CML-O | Rx6+ | Receiver Non-Inverted Data Output. | 3A | |
| 61 | | GND | Module Ground. | 1A | 1 |
| 62 | CML-O | Rx8- | Receiver Inverted Data Output. | 3A | |
| 63 | CML-O | Rx8+ | Receiver Non-Inverted Data Output. | 3A | |
| 64 | | GND | Module Ground. | 1A | 1 |
| 65 | | NC | Not Connected. | 3A | 3 |
| 66 | | Reserved | For Future Use. | 3A | 3 |
| 67 | | VccTx1 | +3.3V Power Supply. | 2A | 2 |
| 68 | | Vcc2 | +3.3V Power Supply. | 2A | 2 |
| 69 | LVCMOS-I | ePPS/Clock | 1PPS PTP Clock or Reference Clock Input. | 3A | 6 |
| 70 | | GND | Module Ground. | 1A | 1 |
| 71 | CML-I | Tx7+ | Transmitter Non-Inverted Data Input. | 3A | |
| 72 | CML-I | Tx7- | Transmitter Inverted Data Input. | 3A | |
| 73 | | GND | Module Ground. | 1A | 1 |
| 74 | CML-I | Tx5+ | Transmitter Non-Inverted Data Input. | 3A | |
| 75 | CML-I | Tx5- | Transmitter Inverted Data Input. | 3A | |
| 76 | | GND | Module Ground. | 1A | 1 |

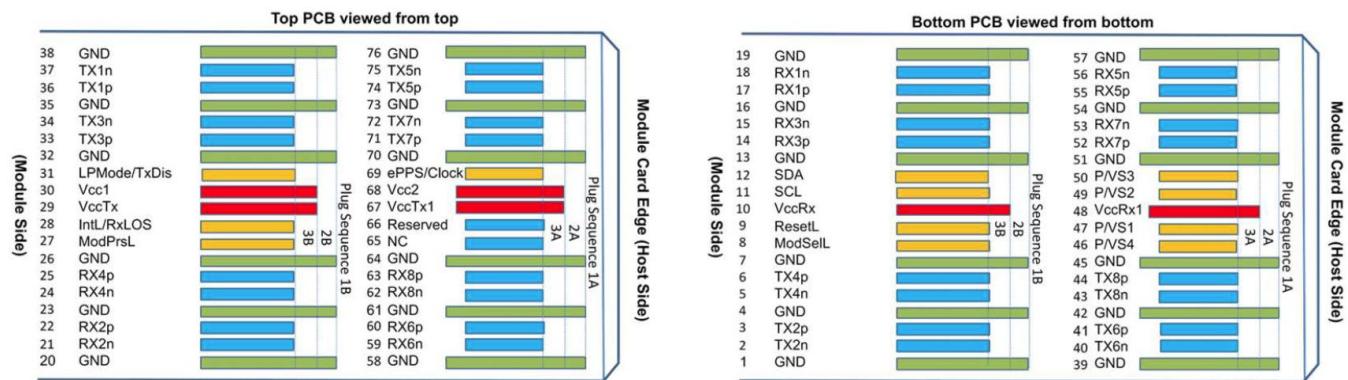
Notes:

1. QSFP-DD uses common ground (GND) for all signals and supply (power). All are common within the QSFP-DD module, and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal common ground plane.
2. VccRx, VccRx1, Vcc1, Vcc2, VccTx, and VccTx1 shall be applied concurrently. For power classes 4 and above the module differential loading of input voltage pads must not result in exceeding contact current limits.

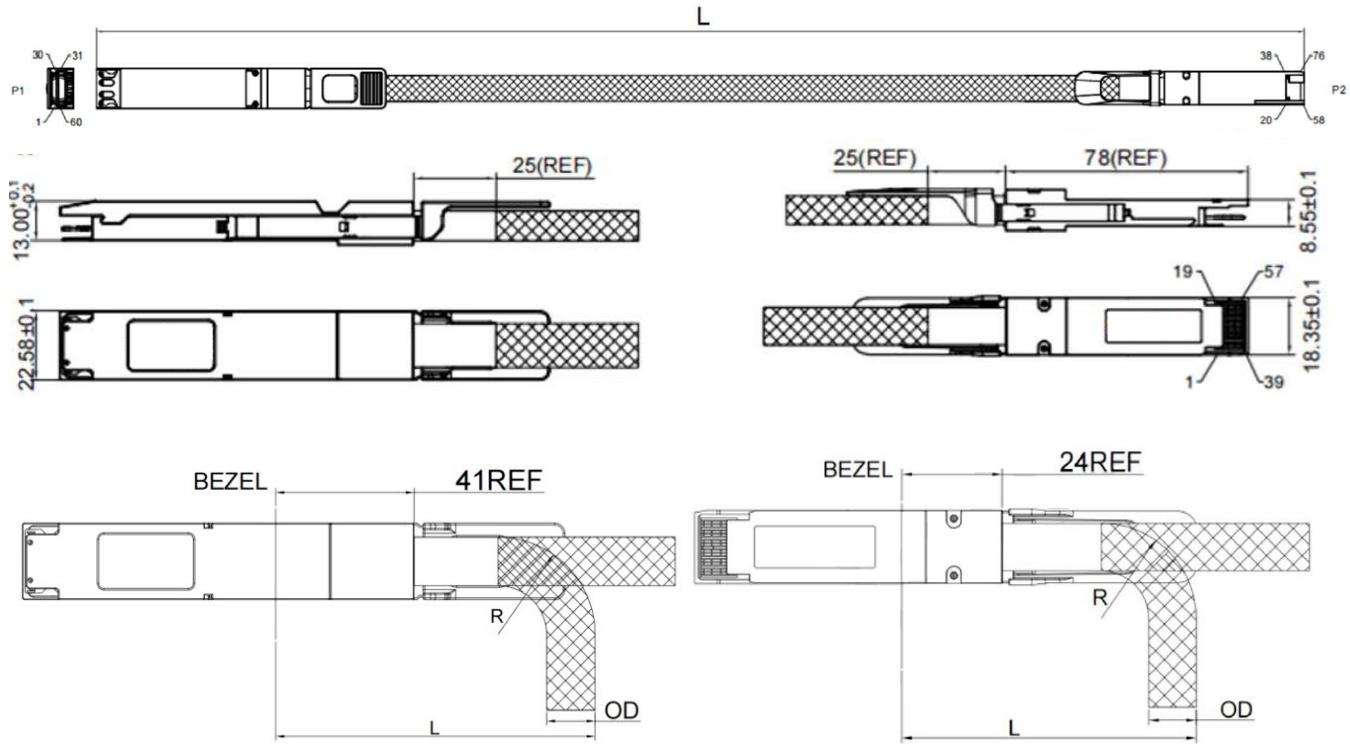
Each connector Vcc contact is rated for a maximum current of 1500mA.

3. Reserved and Not Connected pads recommended to be terminated with 10kΩ to ground on the host. Pad 65 (Not Connected) shall be left unconnected within the module.
4. Plug Sequence specifies the mating sequence of the host connector and module. The sequence is 1A, 2A, 3A, 1B, 2B, and 3B. Contact sequence A will make, then break contact with additional QSFP-DD pads. Sequence 1A, 1B will then occur simultaneously, followed by 2A, 2B, followed by 3A, 3B.
5. Full definitions of the P/V_Sx signals are currently under development. On new designs not used, P/V_Sx signals are recommended to be terminated on the host with 10kΩ.
6. ePPS/Clock, if not used, is recommended to be terminated with 50Ω to ground on the host.

Electrical Pin-Out Details – QSFP-DD



Mechanical Specifications



| OSFP | | | | QSFP-DD | | | |
|-------|-------|--------------------|-------------------------|---------|-------|--------------------|-------------------------|
| Gauge | OD | Bend Radius "R" | Min. Bend Radius "L" | Gauge | OD | Bend Radius "R" | Min. Bend Radius "L" |
| 30AWG | 9.5MM | 19MM | 70MM | 30AWG | 9.5MM | 19MM | 64MM |

About ProLabs

Our extensive experience comes as standard. For over 20 years ProLabs has delivered optical connectivity solutions that give our customers freedom and choice through our ability to provide seamless interoperability. At the heart of our company is the ability to provide state-of-the-art optical transport and connectivity solutions that are compatible with more than 100 optical switching and transport platforms.

A Complete Portfolio of Network Solutions

ProLabs is focused on innovations in optical transport and connectivity. The combination of our knowledge of optics and networking equipment enables ProLabs to be your single source for optical transport and connectivity solutions from 100Mb to 1.6T while providing innovative solutions that increase network efficiency. We provide the optical connectivity expertise that is compatible with and enhances your switching and transport equipment.

The Trusted Partner

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure compatible products, and immediate answers to your questions. With Engineering and Manufacturing offices in the U.K. and U.S. augmented by field offices throughout the U.S., U.K. and Asia, ProLabs is able to be our customers best advocate 24 hours a day.



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