

## 100FRRF1000-C

Intel® 100FRRF1000 Compatible TAA Compliant 100GBase-AOC QSFP28 Omni-Path Architecture Active Optical Cable (850nm, MMF, 100m)

### Features:

- QSFP28 MSA compliant
- Four independent full-duplex channels
- Supports 103.1Gbps aggregate bit rate
- Operating case temperature: 0 to 70 Celsius
- 4x25G electrical interface (OIF CEI-28G-VSR)
- Single 3.3V power supply
- Maximum power consumption 2.5W each terminal
- RoHS Compliant and Lead Free



### Applications:

- 100GBase Ethernet
- InfiniBand EDR

### Product Description

This is an Intel® 100FRRF1000 compatible 100GBase-AOC QSFP28 Omni-Path Architecture active optical cable that operates over multi-mode fiber with a maximum reach of 100.0m (328.1ft). At a wavelength of 850nm, it has been programmed, uniquely serialized, and data-traffic and application tested to ensure it is 100% compliant and functional. This active optical 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."



## General Specifications

| Parameter                          | Symbol | Min. | Typ. | Max. | Unit |
|------------------------------------|--------|------|------|------|------|
| Storage Temperature                | Tstg   | -40  |      | 85   | °C   |
| Operating Case Temperature         | Tc     | 0    |      | 70   |      |
| Power Supply Voltage               | Vcc    | -0.5 |      | 3.6  | V    |
| Relative Humidity (Non-Condensing) | RH     | 0    |      | 85   | %    |

## Electrical Characteristics

| Parameter   | Test Point | Min.                                | Typ.     | Max.                           | Unit | Notes   |
|---|------------|-------------------------------------|----------|--------------------------------|------|---------|
| Power Consumption   |            |                                     |          | 2.5                            | W    | 1       |
| Supply Current  | Icc        |                                     |          | 757                            | mA   | 1       |
| Power Supply Voltage  | Vcc        | 3.135                               | 3.3      | 3.465                          | V    |         |
| Data Rate Per Lane  |            |                                     | 25.78125 |                                | Gbps |         |
| Data Rate Accuracy  |            | -100                                |          | 100                            | ppm  |         |
| Control Input Voltage - High  |            | 2                                   |          | Vcc                            | V    |         |
| Control Input Voltage - Low   |            | 0                                   |          | 0.8                            | V    |         |
| <b>Transmitter (Per Lane)</b>   |            |                                     |          |                                |      |         |
| Overload Differential Voltage   | TP1a       | 900                                 |          |                                | mV   |         |
| Common-Mode Voltage (Vcm)   | TP1        | -350                                |          | 2825                           | mV   | 2       |
| Differential Termination Resistance Mismatch                                      | TP1        |                                     |          | 10                             | %    | At 1MHz |
| Differential Return Loss (SDD11)  | TP1        |                                     |          | See CEI-28G0VSR Equation 13-19 | dB   |         |
| Common-Mode to Differential Conversion and Differential to Common-Mode Conversion | TP1        |                                     |          | See CEI-28G-VSR Equation 13-20 | dB   |         |
| Stressed Input Test   | TP1a       | See CEI-28G-VSR Section 13.3.11.2.1 |          |                                |      |         |
| <b>Receiver (Per Lane)</b>  |            |                                     |          |                                |      |         |
| Differential Voltage (Pk-Pk)  | TP4        |                                     |          | 900                            | mV   |         |
| Common-Mode Voltage (Vcm)   | TP4        | -350                                |          | 2850                           | mV   | 2       |
| Common-Mode Noise (RMS)   | TP4        |                                     |          | 17.5                           | mV   |         |
| Differential Termination Resistance Mismatch                                      | TP4        |                                     |          | 10                             | %    | At 1MHz |

|   |     |      |  |                                |    |   |
|---|-----|------|--|--------------------------------|----|---|
| Differential Return Loss (SDD22)  | TP4 |      |  | See CEI-28G-VSR Equation 13-19 | dB |   |
| Common-Mode to Differential Conversion and Differential to Common-Mode Conversion (SCC22) | TP4 |      |  | -2                             | dB | 3 |
| Transition Time (20-80%)  | TP4 | 9.5  |  |                                | ps |   |
| Vertical Eye Closure (VEC)  | TP4 |      |  | 5.5                            | dB |   |
| Eye Width at 10 <sup>-15</sup> Probability (EW15)   | TP4 | 0.57 |  |                                | UI |   |
| Eye Height at 10 <sup>-15</sup> Probability (EH15)  | TP4 | 0.57 |  |                                | UI |   |

**Notes:**

1. Per terminal.
2. Vcm is generated by the host. Specification includes the effects of ground offset voltage.
3. From 250MHz to 30GHz.

**Pin Descriptions**

| Pin | Logic       | Symbol  | Name/Description                     | Notes |
|-----|-------------|---------|--------------------------------------|-------|
| 1   |             | GND     | Module Ground.                       | 1     |
| 2   | CML-I       | Tx2-    | Transmitter Inverted Data Input.     |       |
| 3   | CML-I       | Tx2+    | Transmitter Non-Inverted Data Input. |       |
| 4   |             | GND     | Module Ground.                       | 1     |
| 5   | CML-I       | Tx4-    | Transmitter Inverted Data Input.     |       |
| 6   | CML-I       | Tx4+    | Transmitter Non-Inverted Data Input. |       |
| 7   |             | GND     | Module Ground.                       | 1     |
| 8   | LVTTTL-I    | ModSelL | Module Select.                       | 2     |
| 9   | LVTTTL-I    | ResetL  | Module Reset.                        | 2     |
| 10  |             | VccRx   | +3.3V Receiver Power Supply.         |       |
| 11  | LVC MOS-I   | SCL     | 2-Wire Serial Interface Clock.       | 2     |
| 12  | LVC MOS-I/O | SDA     | 2-Wire Serial Interface Data.        | 2     |
| 13  |             | GND     | Module Ground.                       | 1     |
| 14  | CML-O       | Rx3+    | Receiver Non-Inverted Data Output.   |       |
| 15  | CML-O       | Rx3-    | Receiver Inverted Data Output.       |       |
| 16  |             | GND     | Module Ground.                       | 1     |
| 17  | CML-O       | Rx1+    | Receiver Non-Inverted Data Output.   |       |
| 18  | CML-O       | Rx1-    | Receiver Inverted Data Output.       |       |
| 19  |             | GND     | Module Ground.                       | 1     |
| 20  |             | GND     | Module Ground.                       | 1     |

|    |          |         |   |   |
|----|----------|---------|---|---|
| 21 | CML-O    | Rx2-    | Receiver Inverted Data Output.                          |   |
| 22 | CML-O    | Rx2+    | Receiver Non-Inverted Data Output.                      |   |
| 23 |          | GND     | Module Ground.  | 1 |
| 24 | CML-O    | Rx4-    | Receiver Inverted Data Output.                          |   |
| 25 | CML-O    | Rx4+    | Receiver Non-Inverted Data Output.                      |   |
| 26 |          | GND     | Module Ground.  | 1 |
| 27 | LVTTTL-O | ModPrsL | Module Present. Internally pulled down to the GND.      |   |
| 28 | LVTTTL-O | IntL    | Interrupt output should be pulled up on the host board. | 2 |
| 29 |          | VccTx   | +3.3V Transmitter Power Supply.                         |   |
| 30 |          | Vcc1    | +3.3V Power Supply.                                     |   |
| 31 | LVTTTL-I | LPMODE  | Low-Power Mode.   | 2 |
| 32 |          | GND     | Module Ground.  | 1 |
| 33 | CML-I    | Tx3+    | Transmitter Non-Inverted Data Input.                    |   |
| 34 | CML-I    | Tx3-    | Transmitter Inverted Data Input.                        |   |
| 35 |          | GND     | Module Ground.  | 1 |
| 36 | CML-I    | Tx1+    | Transmitter Non-Inverted Data Input.                    |   |
| 37 | CML-I    | Tx1-    | Transmitter Inverted Data Input.                        |   |
| 38 |          | GND     | Module Ground.  | 1 |

**Notes:**

1. The module circuit ground is isolated from the module chassis ground within the module.
2. Open collector. Should be pulled up with 4.7kΩ to 10kΩ on the host board to a voltage between 3.15V and 3.6V.

**Electrical Pin-Out Details**



### Recommended Power Supply Filter



### Block Diagram



# Mechanical Specifications



## 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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