

160-9114-900-C

Ciena® 160-9114-900 Compatible TAA OTU4/100GBase-LR4 CFP Transceiver (SMF, 1310nm, 10km, LC, DOM)

Features:

- CFP MSA 1.4 Compliance
- Duplex LC Connector
- Commercial Temperature 0 to 70 Celsius
- Single-mode Fiber
- Hot Pluggable
- Excellent ESD Protection
- Metal with Lower EMI
- RoHS Compliant and Lead Free



Applications:

- 100GBase Ethernet
- Access and Enterprise

Product Description

This Ciena® 160-9114-900 compatible CFP transceiver provides 100GBase-LR4 throughput up to 10km over single-mode fiber (SMF) using a wavelength of 1310nm via an LC connector. It is guaranteed to be 100% compatible with the equivalent Ciena® transceiver. This easy to install, hot swappable transceiver has been programmed, uniquely serialized and data-traffic and application tested to ensure that it will initialize and perform identically. Digital optical monitoring (DOM) support is also present to allow access to real-time operating parameters. This transceiver is Trade Agreements Act (TAA) compliant. 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. | Max. | Unit |
|----------------------------------|--------|------|------|------|
| Storage Temperature | TS | -40 | +85 | °C |
| Power Supply Voltage | VCC | -0.5 | 3.6 | V |
| Operating Case Temperature Range | Tc | -10 | +75 | °C |
| Relative Humidity | Rh | 5 | 85 | % |

Electrical Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | |
|--------------------------------|----------|------|------|------|-------|---------|
| Power Supply Voltage | VCC | 3.2 | 3.3 | 3.4 | V | |
| Power Supply Current | Icc | | 4000 | | mA | |
| Transmitter | | | | | | |
| Differential data input swing | Vin | | | 1050 | mVp-p | |
| Input differential impedance | Zin | 80 | 100 | 120 | Ω | |
| Receiver | | | | | | |
| Differential data output swing | Vout, pp | 360 | | 770 | mVp-p | |
| Output differential impedance | Zo | 80 | 100 | 120 | Ω | |
| Output Rise/Fall Time | tr/tf | 24 | | | ps | 20%~80% |

1.2V MDIO Interface Specifications

| Parameter | Symbol | Min. | Typ. | Max | Unit | Notes |
|--------------------|--------------|------|------|-------|------|-------|
| Input Voltage | VIH | 0.84 | | 1.5 | V | |
| | VIL | -0.3 | | 0.36 | V | |
| Input Leak current | IIN | -100 | | 100 | uA | |
| Output Voltage | VOH | 1.0 | | 1.5 | V | |
| | VOL | -0.3 | | 0.2 | V | |
| Input Capacitance | CI | | | 10 | pF | |
| Input MDC Clock | fMDC | 0.1 | | 4 | MHz | |
| MDC Clock Period | TMDC | 250 | | 10000 | ns | |
| MDIO Hold Time | Thold | 10 | | | ns | |
| MDIO Setup Time | Tsetup | 10 | | | ns | |
| GLB_ALM | Tglb_alm_ass | | | 150 | ms | |
| | Tglb_alm_dea | | | 150 | ms | |

OTU4 411-9D1F Operation Optical Characteristics

| Parameter | Symbol | Min. | Typical | Max. | Unit | Notes |
|---|-------------------|-------------------|---------|---------|------|-------|
| Transmitter | | | | | | |
| Signaling Speed per Lane | BRAVE | | 27.95 | | Gbps | |
| Lane_0 Center Wavelength | λ_{C0} | 1294.53 | 1295.56 | 1296.59 | nm | |
| Lane_1 Center Wavelength | λ_{C1} | 1299.02 | 1300.05 | 1301.09 | nm | |
| Lane_2 Center Wavelength | λ_{C2} | 1303.54 | 1304.58 | 1305.63 | nm | |
| Lane_3 Center Wavelength | λ_{C3} | 1308.09 | 1309.14 | 1310.19 | nm | |
| Total Average Output Power | PO1 | - | | 8.9 | dBm | 1, 2 |
| Average Launch Power per Lane | Peach1 | -2.5 | | 2.9 | dBm | 2 |
| Side Mode Suppression Ratio | SMSR | 30 | | | dB | |
| Optical Return Loss Tolerance | | | | 20 | dB | |
| Extinction Ratio | ER ₁ | 7 | | | dB | 2 |
| Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3} | | G.959.1 Compliant | | | | 2 |
| TX Disable Assert Time | t _{off} | | | 100 | us | |
| Receiver | | | | | | |
| Signaling Speed per Lane | BRAVE | | 27.95 | | Gbps | |
| Lane_0 Center Wavelength | λ_{C0} | 1294.53 | 1295.56 | 1296.59 | nm | |
| Lane_1 Center Wavelength | λ_{C1} | 1299.02 | 1300.05 | 1301.09 | nm | |
| Lane_2 Center Wavelength | λ_{C2} | 1303.54 | 1304.58 | 1305.63 | nm | |
| Lane_3 Center Wavelength | λ_{C3} | 1308.09 | 1309.14 | 1310.19 | nm | |
| Average Receive Power per Lane | R _{pow1} | -8.8 | | 4 | dBm | 5 |
| Equivalent Sensitivity per Lane | P _{min1} | | | -10.3 | dBm | 7 |
| Receiver Overload per Lane | P _{max} | 5.5 | | | dBm | |
| Optical Return Loss | ORL | | | -26 | dB | |
| LOS Assert | LOSA | -21 | | | dBm | |
| LOS De-Assert | LOSD | | | -11 | dBm | |
| LOS Hysteresis | | 0.5 | | | dB | |

100GBASE-LR4 Operation Optical Characteristics

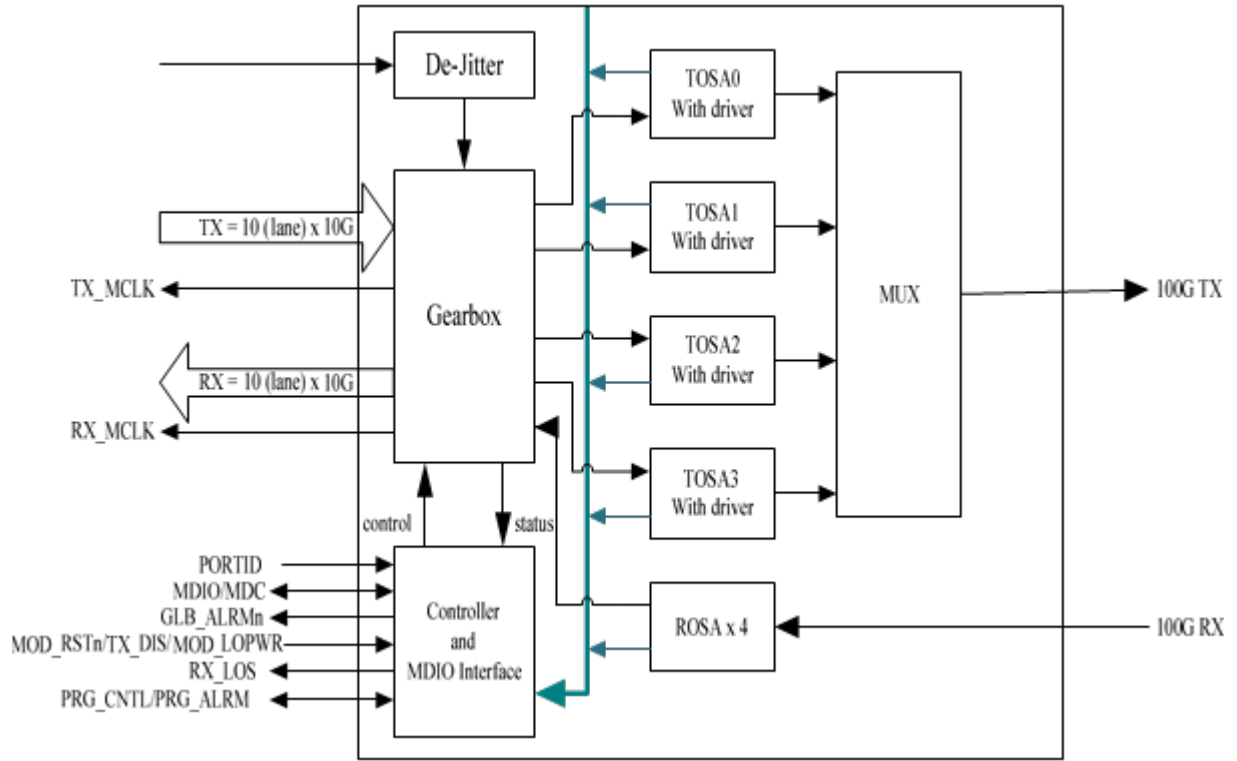
| Parameter | Symbol | Min. | Typical | Max. | Unit | Notes |
|---|--------------------|----------------------------|---------|---------|------|-------|
| Transmitter | | | | | | |
| Signaling Speed per Lane | BRAVE | | 25.78 | | Gbps | |
| Lane_0 Center Wavelength | λ_{C0} | 1294.53 | 1295.56 | 1296.59 | nm | |
| Lane_1 Center Wavelength | λ_{C1} | 1299.02 | 1300.05 | 1301.09 | nm | |
| Lane_2 Center Wavelength | λ_{C2} | 1303.54 | 1304.58 | 1305.63 | nm | |
| Lane_3 Center Wavelength | λ_{C3} | 1308.09 | 1309.14 | 1310.19 | nm | |
| Total Average Output Power | PO2 | - | | 10.5 | dBm | 1, 4 |
| Average Launch Power per Lane | P _{each2} | -4.3 | | 4.5 | dBm | 4 |
| Side Mode Suppression Ratio | SMSR | 30 | | | dB | |
| Optical Return Loss Tolerance | | | | 20 | dB | |
| Extinction Ratio | ER ₂ | 7 | | | dB | 4 |
| Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3} | | IEEE802.3ba-2010 Compliant | | | | 4 |
| TX Disable Assert Time | t _{off} | | | 100 | us | |
| Receiver | | | | | | |
| Signaling Speed per Lane | BRAVE | | 25.78 | | Gbps | |
| Lane_0 Center Wavelength | λ_{C0} | 1294.53 | 1295.56 | 1296.59 | nm | |
| Lane_1 Center Wavelength | λ_{C1} | 1299.02 | 1300.05 | 1301.09 | nm | |
| Lane_2 Center Wavelength | λ_{C2} | 1303.54 | 1304.58 | 1305.63 | nm | |
| Lane_3 Center Wavelength | λ_{C3} | 1308.09 | 1309.14 | 1310.19 | nm | |
| Average Receive Power per Lane | R _{pow2} | -10.6 | | 4.5 | dBm | 6 |
| Receive Sensitivity (OMA) per Lane | P _{min2} | | | -8.6 | dBm | 8 |
| Stressed Sensitivity (OMA) per lane | SRS | | | -6.8 | dBm | |
| Receiver Overload per Lane | P _{max} | 5.5 | | | dBm | |
| Optical Return Loss | ORL | | | -26 | dB | |
| LOS Assert | LOSA | -21 | | | dBm | |
| LOS De-Assert | LOSD | | | -11 | dBm | |
| LOS Hysteresis | | 0.5 | | | dB | |

Notes:

1. Output is coupled into a 9/125 μ m single-mode fiber.
2. Filtered, measured with a PRBS 2³¹-1 test pattern @27.95Gbps
3. High speed I/O, internally AC coupled.
4. Filtered, measured with a PRBS 2³¹-1 test pattern @25.78Gbps
5. CFP transceiver works in OTU4 4I1-9D1F mode.
6. CFP transceiver works in 100GBASE-LR4 mode.

7. Minimum average optical power measured at BER less than 1E-12, with a $2^{31}-1$ PRBS@27.95Gbps.
8. Minimum OMA optical power measured at BER less than 1E-12, with a $2^{31}-1$ PRBS@25.78Gbps.

Functional Description of Transceiver



Electrical Pad Layout



Pin Descriptions

Part A: Bottom Row Pin Function Definition

| Pin | Name | Function | Notes |
|-----|------------|----------------------------|--|
| 1 | 3.3V_GND | Ground | 3.3V Module Supply Ground, Internally connected to Signal Ground |
| 2 | 3.3V_GND | Ground | 3.3V Module Supply Ground, Internally connected to Signal Ground |
| 3 | 3.3V_GND | Ground | 3.3V Module Supply Ground, Internally connected to Signal Ground |
| 4 | 3.3V_GND | Ground | 3.3V Module Supply Ground, Internally connected to Signal Ground |
| 5 | 3.3V_GND | Ground | 3.3V Module Supply Ground, Internally connected to Signal Ground |
| 6 | 3.3V | 3.3V Module Supply Voltage | 3.3V ± 2.5% |
| 7 | 3.3V | 3.3V Module Supply Voltage | 3.3V ± 2.5% |
| 8 | 3.3V | 3.3V Module Supply Voltage | 3.3V ± 2.5% |
| 9 | 3.3V | 3.3V Module Supply Voltage | 3.3V ± 2.5% |
| 10 | 3.3V | 3.3V Module Supply Voltage | 3.3V ± 2.5% |
| 11 | 3.3V | 3.3V Module Supply Voltage | 3.3V ± 2.5% |
| 12 | 3.3V | 3.3V Module Supply Voltage | 3.3V ± 2.5% |
| 13 | 3.3V | 3.3V Module Supply Voltage | 3.3V ± 2.5% |
| 14 | 3.3V | 3.3V Module Supply Voltage | 3.3V ± 2.5% |
| 15 | 3.3V | 3.3V Module Supply Voltage | 3.3V ± 2.5% |
| 16 | 3.3V_GND | Ground | 3.3V Module Supply Ground, Internally connected to Signal Ground |
| 17 | 3.3V_GND | Ground | 3.3V Module Supply Ground, Internally connected to Signal Ground |
| 18 | 3.3V_GND | Ground | 3.3V Module Supply Ground, Internally connected to Signal Ground |
| 19 | 3.3V_GND | Ground | 3.3V Module Supply Ground, Internally connected to Signal Ground |
| 20 | 3.3V_GND | Ground | 3.3V Module Supply Ground, Internally connected to Signal Ground |
| 21 | VND_IO_A | I/O | Module Vendor I/O, NC |
| 22 | VND_IO_B | I/O | Module Vendor I/O, NC |
| 23 | GND | Ground | Signal Ground |
| 24 | (TX_MCLKn) | Tx Monitor Clock O | Tx Monitor Clock Output |
| 25 | (TX_MCLKp) | Tx Monitor Clock O | Tx Monitor Clock Output |
| 26 | GND | Ground | Signal Ground |
| 27 | VND_IO_C | I/O | Module Vendor I/O, must not connect at host board |
| 28 | VND_IO_D | I/O | Module Vendor I/O, must not connect at host board |
| 29 | VND_IO_E | I/O | Module Vendor I/O, must not connect at host board |
| 30 | PRG_CNTL1 | I | LVCOMS |
| 31 | PRG_CNTL2 | I | LVCOMS |
| 32 | PRG_CNTL3 | I | LVCOMS |
| 33 | PRG_ALARM1 | O | LVCOMS |
| 34 | PRG_ALARM2 | O | LVCOMS |
| 35 | PRG_ALARM3 | O | LVCOMS |
| 36 | TX_DIS | Transmitter Disable I | "1" or NC = transmitter disabled, "0" = transmitter enabled |
| 37 | MOD_LOPW R | Module Low Power Mode I | "1" or NC: module in low power (safe) mode, "0": power-on enabled |
| 38 | MOD_ABS | Module Absent O | "1" or NC: module absent, "0": module present |
| 39 | MOD_RSTn | Module Reset I | "0" resets the module, "1" or NC = module enabled |
| 40 | RX_LOS | Loss of Signal O | "1": low optical signal, "0": normal condition |

| | | | |
|----|-----------|----------------------------|---|
| 41 | GLB_ALRMn | Global Alarm O | "0": alarm condition in any MDIO Alarm register, "1": no alarm condition |
| 42 | PRTADR4 | 1.2V CMOS I | MDIO Physical Port address bit4 |
| 43 | PRTADR3 | 1.2V CMOS I | MDIO Physical Port address bit3 |
| 44 | PRTADR2 | 1.2V CMOS I | MDIO Physical Port address bit2 |
| 45 | PRTADR1 | 1.2V CMOS I | MDIO Physical Port address bit1 |
| 46 | PRTADR0 | 1.2V CMOS I | MDIO Physical Port address bit0 |
| 47 | MDIO | 1.2V CMOS I/O | Management Data I/O bi-directional data |
| 48 | MDC | 1.2V CMOS I | Management Data Clock |
| 49 | GND | Ground | Signal Ground |
| 50 | VND_IO_F | I/O | Module Vendor I/O, Not Connected Internally |
| 51 | VND_IO_G | I/O | Module Vendor I/O, Not Connected Internally |
| 52 | GND | Ground | Signal Ground |
| 53 | VND_IO_H | I/O | Module Vendor I/O, Not Connected Internally |
| 54 | VND_IO_J | I/O | Module Vendor I/O, Not Connected Internally |
| 55 | 3.3V_GND | Ground | 3.3V Module Supply Ground, Internally connected to Signal Ground |
| 56 | 3.3V_GND | Ground | 3.3V Module Supply Ground, Internally connected to Signal Ground |
| 57 | 3.3V_GND | Ground | 3.3V Module Supply Ground, Internally connected to Signal Ground |
| 58 | 3.3V_GND | Ground | 3.3V Module Supply Ground, Internally connected to Signal Ground |
| 59 | 3.3V_GND | Ground | 3.3V Module Supply Ground, Internally connected to Signal Ground |
| 60 | 3.3V | 3.3V Module Supply Voltage | 3.3V ± 2.5% |
| 61 | 3.3V | 3.3V Module Supply Voltage | 3.3V ± 2.5% |
| 62 | 3.3V | 3.3V Module Supply Voltage | 3.3V ± 2.5% |
| 63 | 3.3V | 3.3V Module Supply Voltage | 3.3V ± 2.5% |
| 64 | 3.3V | 3.3V Module Supply Voltage | 3.3V ± 2.5% |
| 65 | 3.3V | 3.3V Module Supply Voltage | 3.3V ± 2.5% |
| 66 | 3.3V | 3.3V Module Supply Voltage | 3.3V ± 2.5% |
| 67 | 3.3V | 3.3V Module Supply Voltage | 3.3V ± 2.5% |
| 68 | 3.3V | 3.3V Module Supply Voltage | 3.3V ± 2.5% |
| 69 | 3.3V | 3.3V Module Supply Voltage | 3.3V ± 2.5% |
| 70 | 3.3V_GND | Ground | 3.3V Module Supply Ground, Internally connected to Signal Ground |
| 71 | 3.3V_GND | Ground | 3.3V Module Supply Ground, Internally connected to Signal Ground |
| 72 | 3.3V_GND | Ground | 3.3V Module Supply Ground, Internally connected to Signal Ground |
| 73 | 3.3V_GND | Ground | 3.3V Module Supply Ground, Internally connected to Signal Ground |
| 74 | 3.3V_GND | Ground | 3.3V Module Supply Ground, Internally connected to Signal Ground |

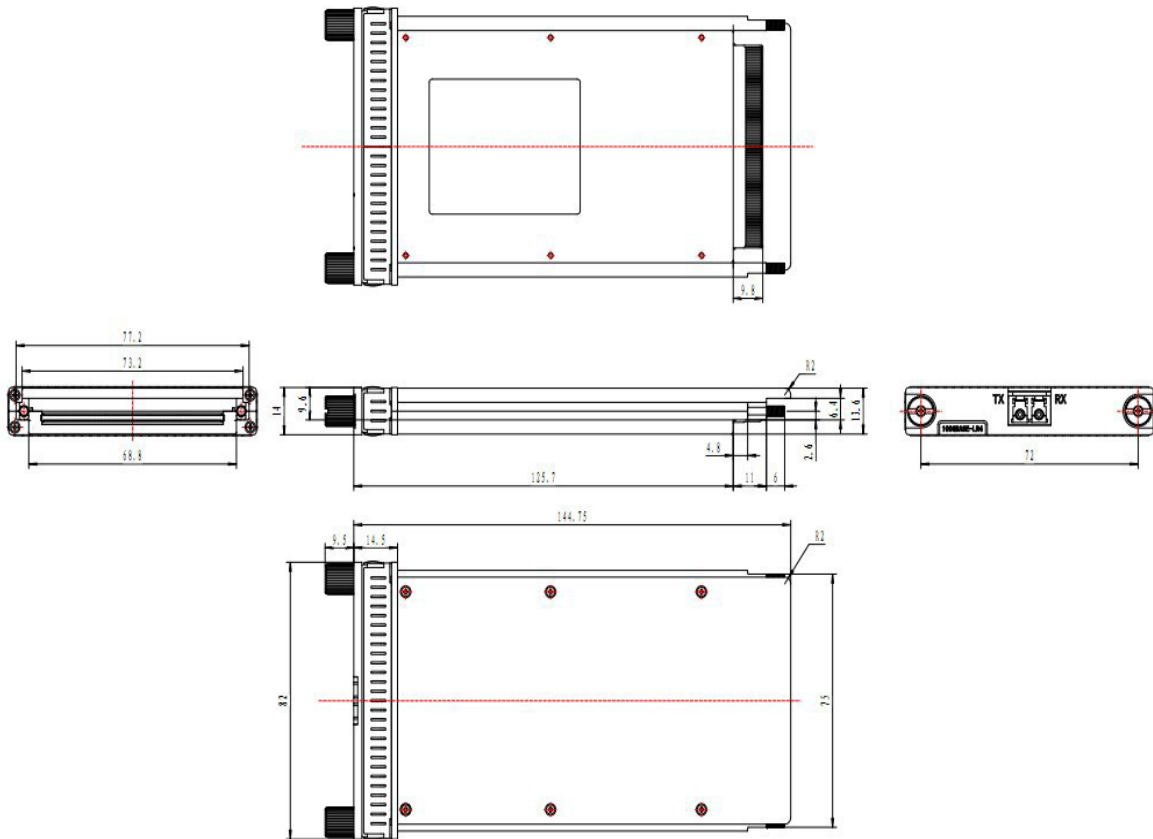
Part B: Top Row Pin Function Definition

| Pin | Name | Function | Notes |
|-----|---------|-------------------|--|
| 148 | GND | Ground | Signal Ground |
| 147 | REFCLKn | Reference Clock I | Reference Clock Input |
| 146 | REFCLKp | Ground | 3.3V Module Supply Ground, Internally connected to Signal Ground |
| 145 | GND | Ground | Signal Ground |
| 144 | N.C. | | Not Connected Internally |
| 143 | N.C. | | Not Connected Internally |
| 142 | GND | Ground | Signal Ground |
| 141 | TX9n | Lane 9 Tx Input I | |

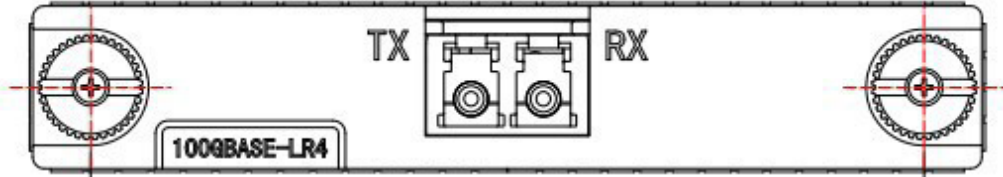
| | | | |
|-----|------|--------------------|--------------------------|
| 140 | TX9p | Lane 9 Tx Input I | |
| 139 | GND | Ground | Signal Ground |
| 138 | TX8n | Lane 8 Tx Input I | 3.3V ± 2.5% |
| 137 | TX8p | Lane 8 Tx Input I | 3.3V ± 2.5% |
| 136 | GND | Ground | Signal Ground |
| 135 | TX7n | Lane 7 Tx Input I | 3.3V ± 2.5% |
| 134 | TX7p | Lane 7 Tx Input I | 3.3V ± 2.5% |
| 133 | GND | Ground | Signal Ground |
| 132 | TX6n | Lane 6 Tx Input I | |
| 131 | TX6p | Lane 6 Tx Input I | |
| 130 | GND | Ground | Signal Ground |
| 129 | TX5n | Lane 5 Tx Input I | |
| 128 | TX5p | Lane 5 Tx Input I | |
| 127 | GND | Ground | Signal Ground |
| 126 | TX4n | Lane 4 Tx Input I | |
| 125 | TX4p | Lane 4 Tx Input I | |
| 124 | GND | Ground | Signal Ground |
| 123 | TX3n | Lane 3 Tx Input I | |
| 122 | TX3p | Lane 3 Tx Input I | |
| 121 | GND | Ground | Signal Ground |
| 120 | TX2n | Lane 2 Tx Input I | |
| 119 | TX2p | Lane 2 Tx Input I | |
| 118 | GND | Ground | Signal Ground |
| 117 | TX1n | Lane 1 Tx Input I | |
| 116 | TX1p | Lane 1 Tx Input I | |
| 115 | GND | Ground | Signal Ground |
| 114 | TX0n | Lane 0 Tx Input I | |
| 113 | TX0p | Lane 0 Tx Input I | |
| 112 | GND | Ground | Signal Ground |
| 111 | GND | Ground | Signal Ground |
| 110 | N.C. | | Not Connected Internally |
| 109 | N.C. | | Not Connected Internally |
| 108 | GND | Ground | Signal Ground |
| 107 | RX9n | Lane 9 Rx Output O | |
| 106 | RX9p | Lane 9 Rx Output O | |
| 105 | GND | Ground | Signal Ground |
| 104 | RX8n | Lane 8 Rx Output O | |
| 103 | RX8p | Lane 8 Rx Output O | |
| 102 | GND | Ground | Signal Ground |
| 101 | RX7n | Lane 7 Rx Output O | |
| 100 | RX7p | Lane 7 Rx Output O | |
| 99 | GND | Ground | Signal Ground |
| 98 | RX6n | Lane 6 Rx Output O | |
| 97 | RX6p | Lane 6 Rx Output O | |
| 96 | GND | Ground | Signal Ground |
| 95 | RX5n | Lane 5 Rx Output O | |
| 94 | RX5p | Lane 5 Rx Output O | |

| | | | |
|----|----------|--------------------|-------------------------|
| 93 | GND | Ground | Signal Ground |
| 92 | RX4n | Lane 4 Rx Output O | |
| 91 | RX4p | Lane 4 Rx Output O | |
| 90 | GND | Ground | Signal Ground |
| 89 | RX3n | Lane 3 Rx Output O | |
| 88 | RX3p | Lane 3 Rx Output O | |
| 87 | GND | Ground | Signal Ground |
| 86 | RX2n | Lane 2 Rx Output O | |
| 85 | RX2p | Lane 2 Rx Output O | |
| 84 | GND | Ground | Signal Ground |
| 83 | RX1n | Lane 1 Rx Output O | |
| 82 | RX1p | Lane 1 Rx Output O | |
| 81 | GND | Ground | Signal Ground |
| 80 | RX0n | Lane 0 Rx Output O | |
| 79 | RX0p | Lane 0 Rx Output O | |
| 78 | GND | Ground | Signal Ground |
| 77 | RX_MCLKn | Rx Monitor Clock O | Rx Monitor Clock Output |
| 76 | RX_MCLKp | Rx Monitor Clock O | Rx Monitor Clock Output |
| 75 | GND | Ground | Signal Ground |

Mechanical Specifications



Laser Emission



About ProLabs

Our experience comes as standard; for over 15 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 over 90 optical switching and transport platforms.

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 400G 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.

Trusted Partner

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure that you get immediate answers to your questions and compatible product when needed. 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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