

### 10G-SFPP-LR-1610-C

Brocade® (Formerly) 10G-SFPP-LR-CW61 Compatible TAA 10GBase-CWDM SFP+ Transceiver (SMF, 1610nm, 10km, LC, DOM)

#### Features:

- Single 3.3V Power Supply Voltage
- CWDM DFB Laser Transmitter
- Compliant with IEEE 802.3ae 10GBASE-LR/LW
- Up to 10.7Gbps Bi-Directional Data Links
- Single-Mode Fiber
- Hot-Pluggable
- Duplex LC Connector
- Operating Temperature: 0 to 70 Celsius
- RoHS Compliant and Lead-Free
- Excellent ESD Protection
- RoHS Compliant and Lead Free



#### Applications:

- 10x Gigabit Ethernet over CWDM
- 8x/10x Fibre Channel
- Access, Metro and Enterprise
- Mobile Fronthaul CPRI/OBSAI

#### Product Description

This Brocade® (Formerly) 10G-SFPP-LR-CW61 compatible SFP+ transceiver provides 10GBase-CWDM throughput up to 10km over single-mode fiber (SMF) using a wavelength of 1610nm via an LC connector. The listed reach has been determined using a link budget calculation and tested in a standard environment. Actual link distances achieved will be dependent upon the deployed environment. Our transceiver is built to meet or exceed OEM specifications and is guaranteed to be 100% compatible with Brocade® (Formerly). It has been programmed, uniquely serialized, and tested for data-traffic and application to ensure that it will initialize and perform identically. All of our transceivers comply with Multi-Source Agreement (MSA) standards to provide seamless network integration. Additional product features include Digital Optical Monitoring (DOM) support which allows access to real-time operating parameters. 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.")



### CWDM Available Wavelengths

| Wavelengths | Min.   | Typ. | Max.   |
|-------------|--------|------|--------|
| 27          | 1264.5 | 1271 | 1277.5 |
| 29          | 1284.5 | 1291 | 1297.5 |
| 31          | 1304.5 | 1311 | 1317.5 |
| 33          | 1324.5 | 1331 | 1337.5 |
| 35          | 1344.5 | 1351 | 1357.5 |
| 37          | 1364.5 | 1371 | 1377.5 |
| 39          | 1384.5 | 1391 | 1397.5 |
| 41          | 1404.5 | 1411 | 1417.5 |
| 43          | 1424.5 | 1431 | 1437.5 |
| 45          | 1444.5 | 1451 | 1457.5 |
| 47          | 1464.5 | 1471 | 1477.5 |
| 49          | 1484.5 | 1491 | 1497.5 |
| 51          | 1504.5 | 1511 | 1517.5 |
| 53          | 1524.5 | 1531 | 1537.5 |
| 55          | 1544.5 | 1551 | 1557.5 |
| 57          | 1564.5 | 1571 | 1577.5 |
| 59          | 1584.5 | 1591 | 1597.5 |
| 61          | 1604.5 | 1611 | 1617.5 |

### Absolute Maximum Ratings

| Parameter                  | Symbol | Min. | Typ.    | Max.              | Unit | Notes |
|----------------------------|--------|------|---------|-------------------|------|-------|
| Maximum Supply Voltage     | Vcc    | -0.5 |         | 4.0               | V    | 1     |
| Storage Temperature        | Tstg   | -40  |         | 90                | °C   | 2     |
| Operating Case Temperature | Tc     | 0    |         | 70                | °C   | 3     |
| Maximum Bitrate            | BER    |      |         | 10 <sup>-12</sup> |      |       |
| Data Rate                  | DR     |      | 10.3125 |                   | Gbps | 4     |

#### Notes:

1. For the electrical power interface.
2. Ambient temperature.
3. Case temperature.

## Electrical Characteristics

| Parameter                      | Symbol                         | Min.            | Typ. | Max.                 | Unit | Notes |
|--------------------------------|--------------------------------|-----------------|------|----------------------|------|-------|
| Power Supply Voltage           | V <sub>cc</sub>                | 3.14            | 3.30 | 3.46                 | V    |       |
| Power Supply Current           | I <sub>cc</sub>                |                 | 200  | 310                  | mA   | 1     |
| Power Consumption              | PC                             |                 | 0.65 | 1.0                  | W    |       |
| Transmitter                    |                                |                 |      |                      |      |       |
| Differential Data Input Swing  | V <sub>IN,pp</sub>             | 180             |      | 700                  | mV   |       |
| Input Differential Impedance   | R <sub>IN</sub>                |                 | 100  |                      | Ω    |       |
| Transmit Disable Voltage       | V <sub>D</sub>                 | 2               |      | V <sub>cc</sub>      | V    |       |
| Transmit Enable Voltage        | V <sub>EN</sub>                | V <sub>ee</sub> |      | V <sub>ee</sub> +0.8 | V    |       |
| Receiver                       |                                |                 |      |                      |      |       |
| Differential Data Output Swing | V <sub>OUT,pp</sub>            | 300             |      | 850                  | mV   |       |
| Output Differential Impedance  | T <sub>r</sub> /T <sub>f</sub> | 28              |      |                      | ps   |       |
| LOS Assert                     | V <sub>LOSA</sub>              | 2               |      | Host_V <sub>cc</sub> | V    |       |
| LOS De-Assert                  | V <sub>LOSD</sub>              | V <sub>ee</sub> |      | V <sub>ee</sub> +0.5 | V    |       |

### Notes:

1. For the electrical power interface.

## Optical Characteristics

| Parameter                       | Symbol             | Min.  | Typ. | Max.  | Unit  | Notes |
|---------------------------------|--------------------|-------|------|-------|-------|-------|
| <b>Transmitter</b>              |                    |       |      |       |       |       |
| Optical Power (Average)         | P <sub>TX</sub>    | 2     |      | 7     | dBm   | 1     |
| Transmitter Dispersion Penalty  | TDP                |       |      | 5     | dB    |       |
| Optical Extinction Ratio        | ER                 | 3.5   |      |       | dB    |       |
| Optical Wavelength              | λ <sub>C</sub>     | λ-6.5 | λ    | λ+6.5 | nm    |       |
| Side-Mode Suppression Ratio     | SMSR               | 30    |      |       | dB    |       |
| Relative Intensity Noise        | RIN                |       |      | -128  | dB/Hz |       |
| Launch Power of Off Transmitter | P <sub>off</sub>   |       |      | -30   | dBm   | 1     |
| <b>Receiver</b>                 |                    |       |      |       |       |       |
| Receiver Sensitivity @10.3Gbps  | R <sub>X_SEN</sub> |       |      | -14.4 | dBm   | 2     |
| Receiver Overload               | P <sub>OL</sub>    | 2     |      |       | dBm   |       |
| Receiver Wavelength             | λ <sub>C</sub>     | 1260  |      | 1620  | nm    |       |
| Receiver Reflectance            | TR <sub>RX</sub>   |       |      | -12   | dB    |       |
| LOS Assert                      | LOSA               | -30   |      |       | dBm   |       |
| LOS De-Assert                   | LOSD               |       |      | -17   | dBm   |       |
| LOS Hysteresis                  | LOSH               | 0.5   |      |       | dB    |       |

### Notes:

1. Average.
2. Average. Measured with worst ER, BER<10<sup>-12</sup>, and 2<sup>31</sup>-1 PRBS.

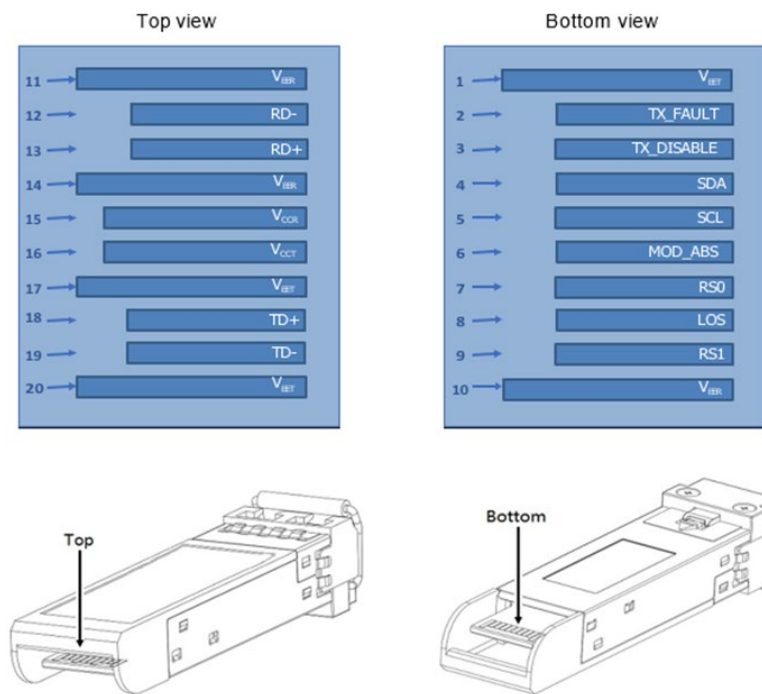
## Pin Descriptions

| Pin | Symbol     | Name/Description                                                 | Notes |
|-----|------------|------------------------------------------------------------------|-------|
| 1   | VeeT       | Transmitter Ground (Common with Receiver Ground).                | 1     |
| 2   | Tx_Fault   | Transmitter Fault.                                               | 2     |
| 3   | Tx_Disable | Transmitter Disable. Laser output disabled on “high” or “open.”  | 3     |
| 4   | SDA        | 2-Wire Serial Interface Data.                                    | 4     |
| 5   | SCL        | 2-Wire Serial Interface Clock.                                   | 4     |
| 6   | MOD_ABS    | Module Absent. Grounded within the module.                       | 4     |
| 7   | RS0        | No Connection Required.                                          |       |
| 8   | Rx_LOS     | Loss of Signal Indication. “Logic 0” indicates normal operation. | 5     |
| 9   | RS1        | No Connection Required.                                          | 1     |
| 10  | VeeR       | Receiver Ground (Common with Transmitter Ground).                | 1     |
| 11  | VeeR       | Receiver Ground (Common with Transmitter Ground).                | 1     |
| 12  | RD–        | Receiver Inverted Data Out. AC Coupled.                          |       |
| 13  | RD+        | Receiver Non-Inverted Data Out. AC Coupled.                      |       |
| 14  | VeeR       | Receiver Ground (Common with Transmitter Ground).                | 1     |
| 15  | VccR       | Receiver Power Supply.                                           |       |
| 16  | VccT       | Transmitter Power Supply.                                        |       |
| 17  | VeeT       | Transmitter Ground (Common with Receiver Ground).                | 1     |
| 18  | TD+        | Transmitter Non-Inverted Data In. AC Coupled.                    |       |
| 19  | TD–        | Transmitter Inverted Data In. AC Coupled.                        |       |
| 20  | VeeT       | Transmitter Ground (Common with Receiver Ground).                | 1     |

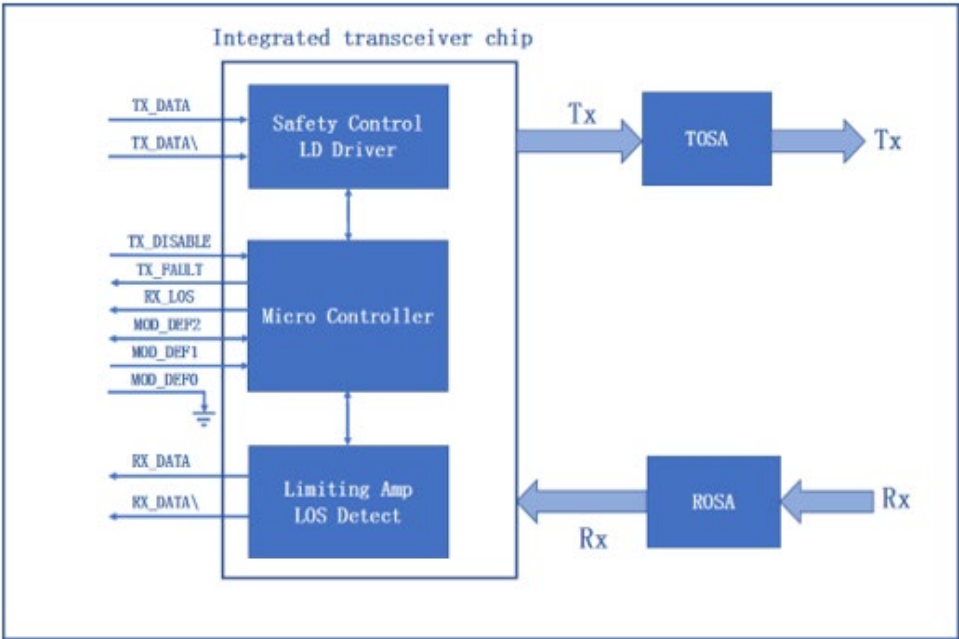
### Notes:

1. The circuit ground is isolated from the chassis ground.
2. Tx\_Fault is the open collector output and should be pulled up with 4.7kΩ to 10kΩ on the host board to a voltage between 2V and Vcc+0.3V.
3. Disabled: T<sub>DIS</sub>>2V or open, enabled: T<sub>DIS</sub><0.8V.
4. Should be pulled up with 4.7kΩ to 10kΩ on the host board to a voltage between 2V and Vcc+0.3V.
5. LOS is an open collector output and should be pulled up with 4.7kΩ to 10kΩ on the host board to a voltage between 2V and Vcc+ 0.3V. The “logic 0” indicates normal operation. “Logic 1” indicates that the receiver signal is lost.

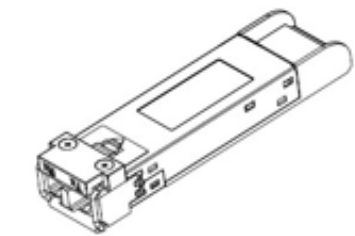
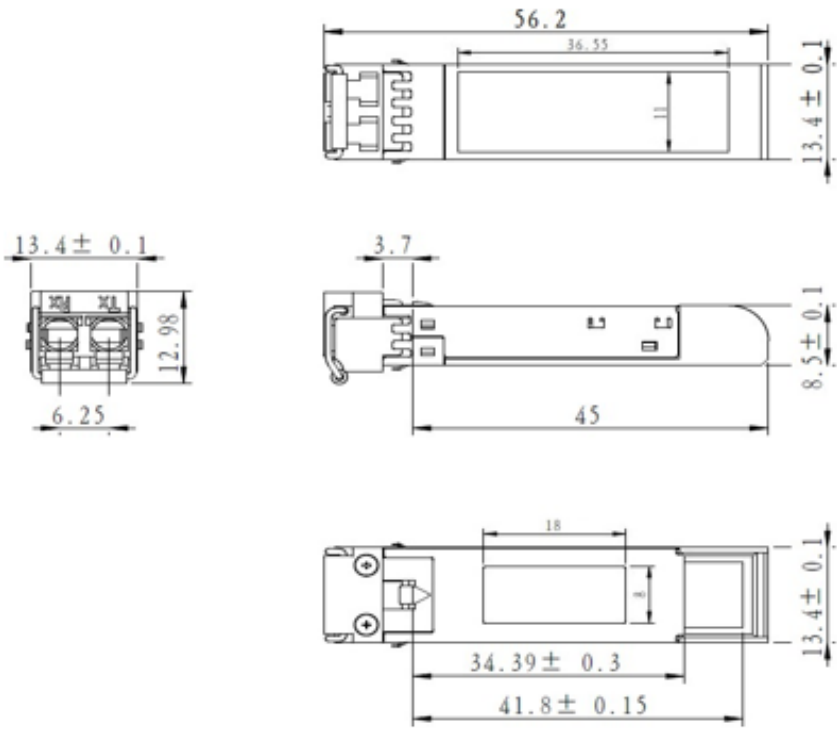
Electrical Pad Layout



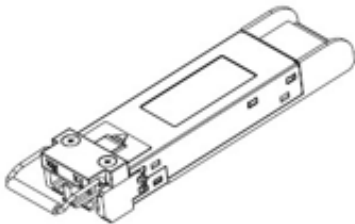
Block Diagram of Transceiver



Mechanical Specifications



LATCHED



UNLATCHED

## 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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