

# 10G BIDI XFP 1330nm-TX/1270nm-RX 40km Transceiver

XFP-10G-BX40D-LL



## Application

- 10GBASE-ER/EW Ethernet
- SONET OC-192/SDH STM-64
- 1200-SM-LL-L 10G Fibre Channel

## Standards

- IEEE 802.3ae 10GBASE-ER
- XFP MSA

## Features

- Support 9.95Gb/s to 11.3Gb/s bit rates
- Hot Pluggable XFP footprint
- Single LC for Bi-directional Transmission
- Maximum link length of 40km
- Single 3.3V voltage supply
- Uncooled 1330nm CWDM DFB Laser
- Power dissipation < 3.5W
- No Reference Clock required
- Built-in digital diagnostic functions
- Temperature range 0° C to 70° C
- Very low EMI and excellent ESD protection
- RoHS Compliant

## Description

Longline Bi-directional 10Gb/s (XFP) transceivers are compliant with the current XFP Multi-Source Agreement (MSA) Specification. They comply with 10-Gigabit Ethernet 10GBASE-ER/EW per IEEE 802.3ae, SONET OC-192 /SDH STM-64 and 10G Fibre Channel 1200-SM-LL-L. Digital diagnostics functions are available via a 2-wire serial interface, as specified in the XFP MSA.

## Products Specifications

### I. Absolute Maximum Ratings

| Parameter                 | Symbol   | Min. | Max. | Unit |
|---------------------------|----------|------|------|------|
| Storage Temperature Range | $T_{ST}$ | -40  | 85   | °C   |
| Supply Voltage            | $V_{CC}$ | -0.5 | 4.0  | V    |

### II. Recommended Operating Conditions

| Parameter                   | Symbol   | Min. | Typical | Max.       | Unit |
|-----------------------------|----------|------|---------|------------|------|
| Operating Temperature Range | $T_C$    | 0    |         | 70         | °C   |
| Power Supply Voltage        | $V_{CC}$ | 3.13 | 3.3     | 3.45       | V    |
| Bit Rate                    | BR       | 9.95 |         | 11.3       | Gb/s |
| Bit Error Rate              | BER      |      |         | $10^{-12}$ |      |
| Max. Supported Link Length  | L        |      |         | 40         | km   |

### III. Optical Characteristics

| Parameter                               | Symbol          | Min.                                      | Typical     | Max. | Unit | Notes |
|---|-----------------|---|-------------|------|------|-------|
| <b>Transmitter</b>                      |                 |   |             |      |      |       |
| Data Rate                               | B               | 9.95                                      |             | 11.3 | Gbps |       |
| Average Optical Power                   | $P_{max}$       | 0   |             | 5    | dBm  | 1     |
| Center Wavelength                       | $\lambda$       | 1320                                      | 1330        | 1340 | nm   |       |
| Spectral Width                          | $\Delta\lambda$ |   |             | 1    | nm   |       |
| Side Mode Suppression Ratio             | $SMSR_{min}$    | 30  |             |      | dB   |       |
| Average Launch Power of OFF Transmitter | $P_{OFF}$       |   |             | -30  | dBm  |       |
| Extinction Ratio                        | ER              | 6   |             |      | dB   |       |
| Rise/Fall Time (20%~80%)                | $T_r/T_f$       |   |             | 50   | ps   |       |
| Tx Jitter                               | $T_{xj}$        | Compliant with each standard requirements |             |      |      |       |
| Optical Eye Mask                        |                 |   | IEEE802.3ae |      |      | 2     |
| <b>Receiver</b>                         |                 |   |             |      |      |       |
| Data Rate                               | BR              | 9.95                                      |             | 11.3 | Gbps |       |
| Center Wavelength                       | $\lambda_C$     | 1260                                      | 1270        | 1280 | nm   |       |
| Receiver Sensitivity                    | $R_{SEN}$       |   |             | -15  | dBm  | 2     |
| Maximum Input Power                     | $P_{MAX}$       | 0   |             |      | dBm  | 2     |
| Receiver Reflectance                    | $R_{rx}$        |   |             | -27  | dB   |       |

| Parameter      | Symbol           | Min.             | Typical | Max. | Unit | Notes |
|----------------|------------------|------------------|---------|------|------|-------|
| LOS            | Optical Assert   | LOS <sub>A</sub> | -30     |      |      | dBm   |
|                | Optical Dessert  | LOS <sub>D</sub> |         | -16  |      | dBm   |
| LOS Hysteresis | LOS <sub>H</sub> | 0.5              |         | 5    | dB   |       |

#### Notes

1. The optical power is launched into SMF.
2. Measured with a PRBS 2<sup>31</sup>-1 test pattern @10.3125Gbps BER<10<sup>-12</sup>.

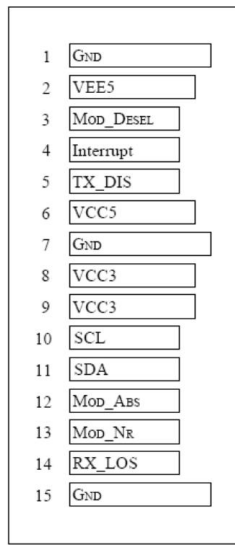
## IV. Electrical Characteristics

| Parameter                      | Symbol       | Min.           | Typical          | Max.         | Unit     | Notes |
|--------------------------------|--------------|----------------|------------------|--------------|----------|-------|
| Supply Voltage                 | $V_{CC}$     | 3.13           |                  | 3.45         | V        |       |
| Supply Current                 | $I_{CC}$     |                |                  | 500          | mA       |       |
| Module Total Power             | P            |                |                  | 3.5          | W        |       |
| <b>Transmitter</b>             |              |                |                  |              |          |       |
| Input Differential Impedance   | $R_{IN}$     |                | 100              |              | $\Omega$ | 1     |
| Differential Data Input Swing  | $V_{IN,pp}$  | 150            |                  | 820          | mV       |       |
| Transmit Disable Voltage       | $V_D$        | 2              |                  | $V_{CC}$     | V        |       |
| Transmit Enable Voltage        | $V_{EN}$     | $G_{ND}$       |                  | $G_{ND}+0.8$ | V        |       |
| Transmit Disable Assert Time   | $T_{off}$    |                |                  | 100          | ms       |       |
| Tx Enable Assert Time          | $T_{on}$     |                |                  | 100          | ms       |       |
| <b>Receiver</b>                |              |                |                  |              |          |       |
| Differential Data Output Swing | $V_{out,pp}$ | 300            | 500              | 850          | mV       |       |
| Output Rise Time               | $t_{RISE}$   |                |                  | 35           | ps       | 2     |
| Output Fall Time               | $t_{FALL}$   |                |                  | 35           | ps       | 2     |
| LOS Fault                      | $V_{LOSFT}$  | $V_{CC} - 0.5$ |                  | $V_{CCHOST}$ | V        | 3     |
| LOS Normal                     | $V_{LOSNR}$  | $G_{ND}$       |                  | $G_{ND}+0.5$ | V        | 3     |
| Power Supply Rejection         | PSR          |                | See Note 4 below |              |          | 4     |

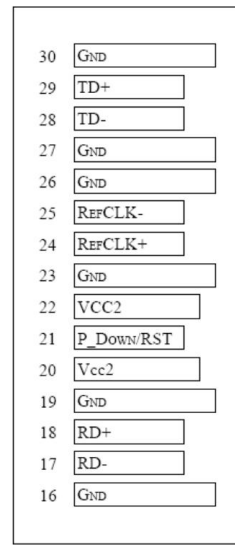
### Notes

1. After internal AC coupling.
2. 20 – 80 %
3. Loss of Signal is open collector to be pulled up with a 4.7k – 10kohm resistor to 3.15 – 3.6V. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
4. Per Section 2.7.1. in the XFP MSA Specification.

### V. Pin Description



Bottom of Board  
(As view through top of board)



Top of Board

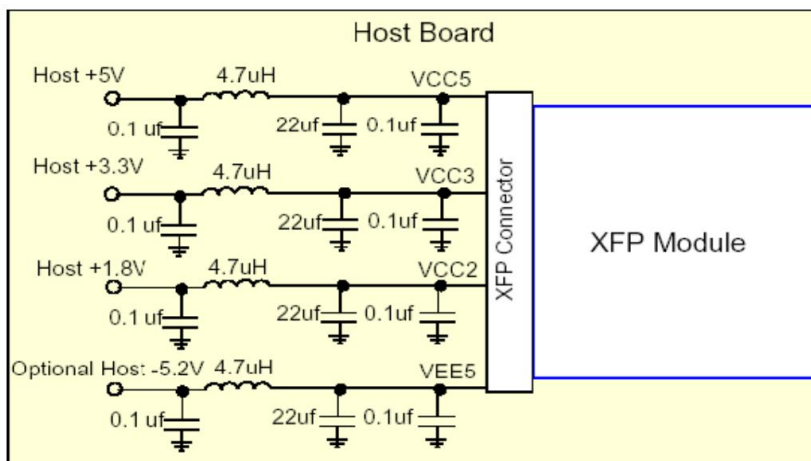
| Pin Number | Logic      | Symbol           | Name/Description   | Notes |
|------------|------------|------------------|--|-------|
| 1          |            | G <sub>ND</sub>  | Module Ground  | 1     |
| 2          |            | V <sub>EE5</sub> | Optional -5.2 Power Supply – Not required  |       |
| 3          | LVTTTL-I   | Mod-Desel        | Module De-select; When held low allows the module to respond to 2-wire serial interface commands                 |       |
| 4          | LVTTTL-O   | Interrupt        | Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire interface | 2     |
| 5          | LVTTTL-I   | TX_DIS           | Transmitter Disable; Transmitter laser source turned off   |       |
| 6          |            | V <sub>CC5</sub> | +5 Power Supply  |       |
| 7          |            | G <sub>ND</sub>  | Module Ground  | 1     |
| 8          |            | V <sub>CC3</sub> | +3.3V Power Supply   |       |
| 9          |            | V <sub>CC3</sub> | +3.3V Power Supply   |       |
| 10         | LVTTTL-I   | SCL              | Serial 2-wire interface clock  | 2     |
| 11         | LVTTTL-I/O | SDA              | Serial 2-wire interface data line  | 2     |
| 12         | LVTTTL-O   | Mod_Abs          | Module Absent; Indicates module is not present. Grounded in the module   | 2     |
| 13         | LVTTTL-O   | Mod_NR           | Module Not Ready   | 2     |
| 14         | LVTTTL-O   | RX_LOS           | Receiver Loss of Signal indicator  | 2     |
| 15         |            | G <sub>ND</sub>  | Module Ground  | 1     |

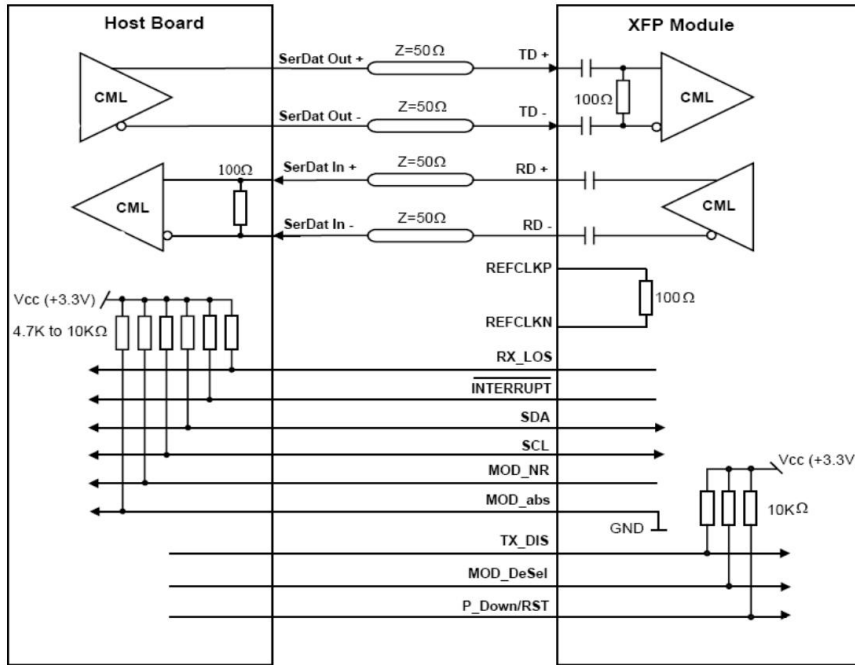
| Pin Number | Logic   | Symbol           | Name/Description  | Notes |
|------------|---------|------------------|---|-------|
| 16         |         | G <sub>ND</sub>  | Module Ground   | 1     |
| 17         | CML-O   | RD-              | Receiver inverted data output   |       |
| 18         | CML-O   | RD+              | Receiver non-inverted data output   |       |
| 19         |         | G <sub>ND</sub>  | Module Ground   | 1     |
| 20         |         | V <sub>CC2</sub> | +1.8V Power Supply – Not required   |       |
| 21         | LVTTL-I | P_Down/RST       | Power Down; When high, places the module in the low power stand-by mode and on the falling edge of P_Down initiates a module reset<br>Reset; The falling edge initiates a complete reset of the module including the 2-wire serial interface, equivalent to a power cycle |       |
| 22         |         | V <sub>CC2</sub> | +1.8V Power Supply – Not required   |       |
| 23         |         | G <sub>ND</sub>  | Module Ground   | 1     |
| 24         | PECL-I  | RefCLK+          | Reference Clock non-inverted input, AC coupled on the host board – Not required   | 3     |
| 25         | PECL-I  | RefCLK-          | Reference Clock inverted input, AC coupled on the host board –Not required  | 3     |
| 26         |         | G <sub>ND</sub>  | Module Ground   | 1     |
| 27         |         | G <sub>ND</sub>  | Module Ground   | 1     |
| 28         | CML-I   | TD-              | Transmitter inverted data input   |       |
| 29         | CML-I   | TD+              | Transmitter non-inverted data input   |       |
| 30         |         | G <sub>ND</sub>  | Module Ground   | 1     |

**Notes**

1. Module circuit ground is isolated from module chassis ground within the module.
2. Open collector; should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15V and 3.45V.
3. A Reference Clock input is not required.

**VI. Typical Application Circuit**





VII. Diagram Mechanical Drawing

