

# 10 Gb/s, XFP LC Package, BIDI TX 1270/RX1330, TX 1330/RX1270 nm Single Mode, 10 – 60 km Distance



## Description

The bi-directional (BIDI) transceiver product is unique in that only one single fiber (single mode or multimode) is required to transmit and receive signals simultaneously. That means the total bandwidth capacity of an existing cable infrastructure can be doubled instantly. The typical design of a BIDI transceiver uses a 1270 nm LD to transmit and 1330 nm PD to receive, and vice versa for the matching one (1270 nm to receive and 1330 nm to transmit) at the other end to make a complete link.

OptixCom's transceivers are compliant with XFP Multi-Source Agreement (MSA) INF-8077i. The BIDI transceivers utilize advanced filter optics to separate the two wavelength with more than 40 dB of isolation. These transceivers operate at 10 Gb/s for 10 - 60 km transmission distance with single mode fibers. The products are RoHS compliant. Total power consumption is < 2W.



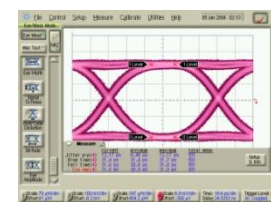
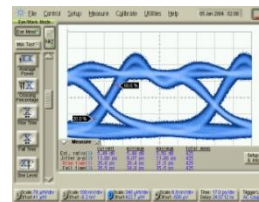
**BD6-1000T2R3-ATXXK**  
**BD6-1000T3R2-ATXXK**  
(XX = 10, 20, 40, 60)



10 Gb/s, 2<sup>31</sup>-1 NRZ data eye pattern

**TX**

**RX**



## Key Features

- Single mode, 10 G/s data rate
- TX1270/RX1330 & TX1330/RX1270 nm pair
- > 9 dB power budget for 10 km
- > 12 dB power budget for 20 km
- > 16 dB power budget for 40 km
- > 22 dB power budget for 60 km
- Simplex LC connector optical interface
- 30-pin Z-axis hot pluggable connector
- AC coupling CML differential I/O logics
- Compliant with XFP MSA standard
- Compliant with IEEE 802.3ae, 10GBASE-SW/SR
- Compliant with 10G FC Fiber Channel Standard
- RoHS compliant

## Applications

- ✓ 10G Fiber Channel,
- ✓ 10 Gigabit Ethernet
- ✓ High speed I/O for file server
- ✓ Data Communication for SAN and LAN
- ✓ Central offices routers and switches
- ✓ Computer cluster cross-connect

## Ordering Information

**Part Number:** BD6-1000T2R3-ATXXK  
10 Gb/s, Single Mode, XFP BIDI Transceiver, TX 1270 nm and RX 1330 nm, XX km reach, 0 – 70 °C.

**Part Number:** BD6-1000T3R2-ATXXK  
10 Gb/s, Single Mode, XFP BIDI Transceiver, TX 1330 nm and RX 1270 nm, XX km reach, 0 – 70 °C.

Add "-T" in the Part Number for extended temperature range -20–85 °C, i.e., BD6-1000T2R3-AT10K-T.

## Operating Conditions

| Parameter             | Min. | Typical | Max. | Units |
|-----------------------|------|---------|------|-------|
| Operate Temperature   | 0    | 25      | 70   | °C    |
| - T Transceivers      | -20  | 25      | 85   | °C    |
| Data Rate             | 9.95 | ---     | 11.3 | Gb/s  |
| Supply Voltage (3.3V) | 3.13 | 3.3     | 3.47 | V     |
| Supply Voltage (1.8V) | 1.71 | 1.8     | 1.89 | V     |

### Absolute Maximum Ratings

| Parameter             | Symbol   | Min. | Max.     | Units |
|-----------------------|----------|------|----------|-------|
| Storage Temperature   | $T_{st}$ | -40  | 85       | °C    |
| Supply Voltage @ 3.3V | $V_{CC}$ | -0.5 | 4.0      | V     |
| Input Voltage         | $V_{IN}$ | -0.5 | $V_{CC}$ | V     |
| Supply Voltage @ 1.8V | $V_{CC}$ | -0.5 | 2.0      | V     |
| Output Current        | $I_o$    | ---  | 50       | mA    |

### General Transmitter Characteristics

| Parameter                                 | Symbol       | Min. | Typical | Max.     | Units |
|---|--------------|------|---------|----------|-------|
| Differential Input Voltage <sup>1</sup>   | $\Delta V_i$ | 0.2  | ---     | 0.8      | V     |
| Differential Input Impedance <sup>2</sup> | $Z$          | ---  | 100     | ---      | ohm   |
| Side Mode Suppression Ratio               | $SMSR$       | 30   | ---     | ---      | dB    |
| Relative Intensity Noise                  | $RIN$        | ---  | ---     | -128     | dB/Hz |
| Rise/Fall Time (20% - 80%)                | $T_r/T_f$    | ---  | ---     | 40       | ps    |
| TX Disable Voltage – High                 | $V_{DH}$     | 2.0  | ---     | $V_{CC}$ | V     |
| TX Disable Voltage - Low                  | $V_{DL}$     | 0    | ---     | 0.8      | V     |
| TX Fault Output - High                    | $V_{FH}$     | 2.0  | ---     | $V_{CC}$ | V     |
| TX Fault Output - Low                     | $V_{FL}$     | 0    | ---     | 0.8      | V     |
| TX Disable Assert Time                    | $T_{ass}$    | ---  | ---     | 10       | μs    |
| TX Disable Deassert Time                  | $T_{disass}$ | ---  | ---     | 1.0      | ms    |
| Time to Initialize                        | $T_{as}$     | ---  | ---     | 300      | ms    |
| TX Fault from Fault to Assertion          | $T_{fault}$  | ---  | ---     | 100      | μs    |
| TX Disable Time to Start Reset            | $T_{reset}$  | 10   | ---     | ---      | μs    |

Notes:

1. Module is designed for AC LVPECL coupling. See the design guide for proper termination.
2. Single ended will be 50 ohm for each signal line.

**Class 1 Laser Product**  
Complies with  
**21 CFR 1040.10 and 1040.11**



### General Receiver Characteristics

| Parameter                                 | Symbol       | Min.                        | Typical | Max.     | Units   |
|---|--------------|-----------------------------|---------|----------|---------|
| Differential Output Voltage <sup>1</sup>  | $\Delta V_o$ | 0.3                         | ---     | 0.8      | V       |
| Differential Input Impedance <sup>2</sup> | Z            | ---                         | 100     | ---      | Ohm     |
| Optical Return Loss                       | OL           | 12                          | ---     | ---      | dB      |
| Rise/Fall Time (20% - 80%)                | $T_r/T_f$    | ---                         | ---     | 40       | ps      |
| RX Signal Loss Output - High              | $V_{RL+}$    | 2.0                         | ---     | $V_{CC}$ | V       |
| RX Signal Loss Output - Low               | $V_{RL-}$    | 0                           | ---     | 0.8      | V       |
| RX Signal Loss Assert Time                | $T_{RL+}$    | ---                         | ---     | 100      | $\mu$ s |
| RX Signal Loss Deassert Time              | $T_{RL-}$    | ---                         | ---     | 100      | $\mu$ s |
| Serial ID Clock Rate                      | $f_C$        | 1/64 of operating data rate |         |          | kHz     |

Notes:

1. Module is designed for AC LVPECL coupling. See the design guide for proper termination.
2. Single ended will be 50 ohm for each signal line.

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### Transmitter Electro-Optical Characteristics

| Parameter                                  | Symbol      | Min. | Typical | Max. | Units |
|--|-------------|------|---------|------|-------|
| Optical Output Power <sup>1</sup>          | $P_o$       | -2   | ---     | +2   | dBm   |
| Optical Wavelength<br>(BD6-1000T2R3-AT20K) | $\lambda_o$ | 1260 | 1270    | 1280 | nm    |
| Optical Wavelength<br>(BD6-1000T3R2-AT20K) | $\lambda_o$ | 1320 | 1330    | 1340 | nm    |
| Extinction Ratio                           | $ET$        | 8.2  | ---     | ---  | dB    |
| TX Disable Asserted                        | $P_{OFF}$   | ---  | ---     | -30  | dBm   |

### Receiver Electro-Optical Characteristics

| Parameter                                    | Symbol      | Min. | Typical | Max.  | Units |
|--|-------------|------|---------|-------|-------|
| Operating Wavelength<br>(BD6-1000T2R3-AT20K) | $\lambda_c$ | 1320 | 1330    | 1340  | nm    |
| Operating Wavelength<br>(BD6-1000T3R2-AT20K) | $\lambda_c$ | 1260 | 1270    | 1280  | nm    |
| Receiver Overload                            | $P_{max}$   | +0.5 | ---     | ---   | dBm   |
| Receiver Sensitivity <sup>2</sup>            | $P_I$       | ---  | ---     | -14   | dBm   |
| Receiver Sensitivity in OMA <sup>2</sup>     | $P_I$       | ---  | ---     | -12.5 | dBm   |
| RX Signal Loss – Asserted                    | $P_{RL+}$   | ---  | ---     | -18   | dBm   |
| RX Signal Loss – Deasserted                  | $P_{RL-}$   | -30  | ---     | ---   | dBm   |

Notes:

1. Output of coupling optical power into 9/125  $\mu\text{m}$  SMF.
2. Test at 10 Gb/s, 2<sup>31</sup> – 1 PRBS data pattern, and > 1x10<sup>-12</sup> of Bit-Error-Rate (BER).

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