

Instantly Double Your Bandwidth Capacity of Fiber Optics Networks!

Features

- One single fiber to transmit and receive simultaneously
- 1270/1330 nm wavelength matching pair
- 9.95 – 11.3 Gb/s, 10 km
- SFP MSA compliant
- Single LC connector, Z-axis hot pluggable package
- AC coupling LVPECL differential I/Os, TTL RX_LOS signal detect

Applications

- ✓ FTTH, FTTX, ATM/SONET, SDH, Ethernet
- ✓ 10 Gigabit Ethernet, 10G Fiber Channel
- ✓ High speed I/O bus extension, systems interconnects
- ✓ Data Communication for SAN and LAN
- ✓ Routers and switches, computer cluster cross-connect



Only one single fiber is needed for
Bi-Directional data communication!!

Products Selection Guide					
Part Number	TX Wavelength	Data Rate	Power Budget	Distance*	Temp. Range
10 Gb/s, Single Mode Applications, 10 km					
BD4-10000T2R3-AT10K	1270 nm	10 Gb/s	6 dB	10 km	0 – 70 C
BD4-10000T3R2-AT10K	1330 nm	10 Gb/s	6 dB	10 km	0 – 70 C

*: The indicated distance is for reference only, not guaranteed specifications. The actual transmission distance depends on system configuration and power budget. For single mode fibers, the typical loss is 0.25 dB/km @ 1550 nm and 0.35 dB/km @ 1310 nm.

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.

OptoIC's SFP+ transceivers are compliant with SFP Multi-Source Agreement (MSA). The module supports serial ID functionality and Digital Diagnostic Monitoring (DDM) interface through the 2-wire serial bus. 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 km transmission distance with multimode fibers. The products are RoHS compliant.



Lead-Free

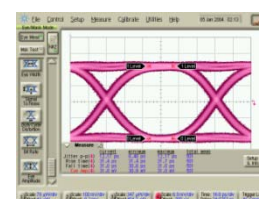
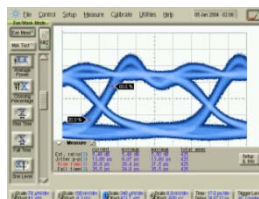
BD4-10000T2R3-AT10K
BD4-10000T3R2-AT10K



10 Gb/s, 2³¹-1 NRZ data eye pattern

TX

RX



Key Features

- Single mode, 10 G/s data rate
- TX 1270/RX 1330 and TX 1330/RX1270 matching pair
- > 9 dB power budget for 10 km
- Z-axis hot pluggable
- SFF-8472 MSA Compliant with DDM function
- Single LC connector optical interface
- AC coupling LVPECL differential I/O logics
- TTL RX_LOS signal detect to monitor optical signals
- 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: BD4-10000T2R3-AT10K
 10 Gb/s, Single Mode, SFP+ BIDI Transceiver, TX 1270 nm and RX 1330 nm, 10 km reach, 0 – 70 °C.

Part Number: BD4-10000T3R2-AT10K
 10 Gb/s, Single Mode, SFP+ BIDI Transceiver, TX 1330 nm and RX 1270 nm, 10 km reach, 0 – 70 °C.

Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	C
Data Rate	9.95	---	11.3	Gb/s
Supply Voltage (3.3V)	3.13	3.3	3.47	V
Supply Current	---	370	450	mA

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
Output Current	I_o	---	50	mA

Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage ¹	ΔV_i	0.4	---	1.2	V
Differential Input Impedance ²	Z	---	100	---	ohm
Optical Output Power ³	P_o	-8.2	---	+0.5	dBm
Optical Wavelength (BD4-1000T2R3-AT10K)	λ_o	1260	1270	1280	nm
Optical Wavelength (BD4-1000T3R2-AT10K)	λ_o	1320	1330	1340	nm
Extinction Ratio	ET	3.5	---	---	dB
TX Disable Asserted	P_{OFF}	---	---	-30	dBm
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}	2.4	---	V_{CC}	V
TX Disable Voltage - Low	V_{DL}	0	---	0.5	V
TX Fault Output - High	V_{FH}	2.4	---	V_{CC}	V
TX Fault Output - Low	V_{FL}	0	---	0.5	V
TX Disable Assert Time	T_{ass}	---	---	10	μ s
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	μ s
TX Disable Time to Start Reset	T_{reset}	10	---	---	μ s

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.
3. Output of coupling optical power into 9/125 μ m SMF.

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Output Voltage ¹	ΔV_o	0.4	---	0.8	V
Differential Input Impedance ²	Z	---	100	---	Ohm
Operating Wavelength (BD4-10000T3R2-AT10K)	λ_c	1320	1330	1340	nm
Operating Wavelength (BD4-10000T2R3-AT10K)	λ_c	1260	1270	1280	nm
Receiver Overload	P_{max}	+0.5	---	---	dBm
Receiver Sensitivity ³	P_i	---	---	-14.4	dBm
Receiver Sensitivity in OMA ³	P_i	---	---	-12.5	dBm
RX Signal Loss – Asserted	P_{RL+}	---	---	-18	dBm
RX Signal Loss – Deasserted	P_{RL-}	-30	---	---	dBm
Optical Return Loss	OL	12	---	---	dB
Rise/Fall Time (20% - 80%)	T_r/T_f	---	---	40	ps
RX Signal Loss – Asserted	P_{SD+}	---	---	-18	dBm
RX Signal Loss – Deasserted	P_{SD-}	-30	---	---	dBm
RX Signal Loss Output - High	V_{RL+}	2.4	---	V_{CC}	V
RX Signal Loss Output - Low	V_{RL-}	0	---	0.5	V
RX Signal Loss Assert Time	T_{RL+}	---	---	100	μ s
RX Signal Loss Deassert Time	T_{RL-}	---	---	100	μ s
Serial ID Clock Rate	f_C	---	---	100	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.
3. Test at 10 Gb/s, 2³¹ – 1 PRBS data pattern, and > 1x10⁻¹² of Bit-Error-Rate (BER).

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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