

## Instantly Double Your Bandwidth Capacity of Fiber Optics Networks!

### Features

- One single fiber to transmit and receive simultaneously
- Single mode and multimode applications
- 1310/1550 nm and 1510/1570 nm wavelength matching pair
- Up to 80 km for 1.25 Gb/s and 120 km for 155 Mb/s
- Single SC connector, standard 2x5 pluggable package
- AC/DC coupling LVPECL differential I/Os
- TTL/PECL signal detect (SD), single 3.3 V power supply

### Applications

- ✓ FTTH, FTTX, ATM/SONET, SDH, Ethernet
- ✓ High speed I/O bus extension, systems interconnects
- ✓ Video over fiber links, media converters
- ✓ 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
<b>155 Mb/s &amp; 1.25 Gb/s Multimode Applications, 500 m – 5 km</b>					
BD5-155T3R5-DPM2K	1310 nm	155 Mb/s	18 dB	2 km	0 – 70/-40 – 85 C
BD5-155T5R3-DPM2K	1550 nm	155 Mb/s	18 dB	2 km	0 – 70/-40 – 85 C
BD5-155T3R5-DPM5K	1310 nm	155 Mb/s	20 dB	5 km	0 – 70/-40 – 85 C
BD5-155T5R3-DPM5K	1550 nm	155 Mb/s	20 dB	5 km	0 – 70/-40 – 85 C
BD5-1250T3R5-ATM500M	1310 nm	1.25 Gb/s	10 dB	500 m	0 – 70 C
BD5-1250T5R3-ATM500M	1550 nm	1.25 Gb/s	10 dB	500 m	0 – 70 C
<b>155 Mb/s Single Mode Applications, 15 – 120 km</b>					
BD5-155T3R5-DP15K	1310 nm	155 Mb/s	17 dB	15 km	0 – 70/-40 – 85 C
BD5-155T5R3-DP15K	1550 nm	155 Mb/s	17 dB	15 km	0 – 70/-40 – 85 C
BD5-155T3R5-DP25K	1310 nm	155 Mb/s	22 dB	25 km	0 – 70/-40 – 85 C
BD5-155T5R3-DP25K	1550 nm	155 Mb/s	22 dB	25 km	0 – 70/-40 – 85 C
BD5-155T3R5-DP40K	1310 nm	155 Mb/s	26 dB	40 km	0 – 70/-40 – 85 C
BD5-155T5R3-DP40K	1550 nm	155 Mb/s	26 dB	40 km	0 – 70/-40 – 85 C
BD5-155T3R5-DP60K	1310 nm	155 Mb/s	29 dB	60 km	0 – 70/-40 – 85 C
BD5-155T5R3-DP60K	1550 nm	155 Mb/s	29 dB	60 km	0 – 70/-40 – 85 C

# 2x5 SFF Bi-Directional SC Optical Transceivers



Products Selection Guide (Cont'd)					
Part Number *	TX Wavelength	Data Rate	Power Budget	Distance **	Temp. Range
<b>155 Mb/s Single Mode Applications, 15 – 120 km</b>					
BD5-155T3R5-DP80K	1310 nm	155 Mb/s	34 dB	80 km	0 – 70/-40 – 85 C
BD5-155T5R3-DP80K	1550 nm	155 Mb/s	33 dB	80 km	0 – 70/-40 – 85 C
BD5-155T1R7-DP100K	1510 nm	155 Mb/s	28 dB	100 km	0 – 70 C
BD5-155T7R1-DP100K	1570 nm	155 Mb/s	28 dB	100 km	0 – 70 C
BD5-155T1R7-DP120K	1510 nm	155 Mb/s	32 dB	120 km	0 – 70 C
BD5-155T7R1-DP120K	1570 nm	155 Mb/s	32 dB	120 km	0 – 70 C
<b>1.25 Gb/s Single Mode Applications, 15 – 80 km</b>					
BD5-1250T3R5-AT15K	1310 nm	1.25 Gb/s	12 dB	15 km	0 – 70/-40 – 85 C
BD5-1250T5R3-AT15K	1550 nm	1.25 Gb/s	12 dB	15 km	0 – 70/-40 – 85 C
BD5-1250T3R5-AT25K	1310 nm	1.25 Gb/s	16 dB	25 km	0 – 70/-40 – 85 C
BD5-1250T5R3-AT25K	1550 nm	1.25 Gb/s	16 dB	25 km	0 – 70/-40 – 85 C
BD5-1250T3R5-AT40K	1310 nm	1.25 Gb/s	20 dB	40 km	0 – 70/-40 – 85 C
BD5-1250T5R3-AT40K	1550 nm	1.25 Gb/s	20 dB	40 km	0 – 70/-40 – 85 C
BD5-1250T3R5-AT60K	1310 nm	1.25 Gb/s	24 dB	60 km	0 – 70 C
BD5-1250T5R3-AT60K	1550 nm	1.25 Gb/s	24 dB	60 km	0 – 70 C
BD5-1250T1R7-AT80K	1510 nm	1.25 Gb/s	24 dB	80 km	0 – 70 C
BD5-1250T7R1-AT80K	1570 nm	1.25 Gb/s	24 dB	80 km	0 – 70 C

\*: Add "-T" in the Part Number for products with extended temperature range -40-85 °C. For example, BD5-155T3R5-DP15K-T.

\*\* : 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.

- Note that 1310/1550 nm lasers are used for most of the bi-directional transceiver but 1510/1570 nm are used for long distance parts. -

Class 1 Laser Product  
Complies with  
21 CFR 1040.10 and 1040.11



### 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 1310 nm LD to transmit and 1550 nm PD to receive, and vice versa for the matching one (1310 nm to receive and 1550 nm to transmit) at the other end to make a complete link.

OptoIC's BIDI transceivers utilize advanced filter optics to separate the two wavelength with more than 45 dB of isolation. The products use industry standard 2x5 SFF pluggable package. These transceivers operate at 155 Mb/s for 2 - 5 km transmission distance with multimode fibers. The products are RoHS compliant.

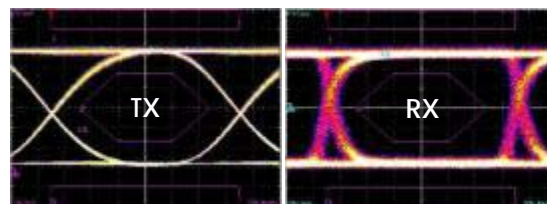


Lead-Free

BD5-155T3R5-DPM $\underline{X}$ K  
 BD5-155T5R3-DPM $\underline{X}$ K  
 ( $\underline{X}$  = 2, 5)



155 Mb/s, 2<sup>23</sup>-1 NRZ Data Eye Pattern



### Key Features

- Multimode, 155 M/s data rate
- TX 1310/RX 1550 and TX 1550/RX1310 matching pair
- 2 - 5 km reach and single 3.3 V power supply
- 18 – 20 dB power budget
- Industry standard 2x5 pluggable package
- Single SC connector optical interface
- DC coupling LVPECL differential I/O logics
- LVPECL Signal detect to monitor optical signals
- -40–85 °C extended temperatures available
- RoHS compliant

### Applications

- ✓ FTTH, Ethernet, ATM/SONET , SDH STM-1
- ✓ High speed I/O for file server
- ✓ Video over fiber links
- ✓ Media converter, bus extension
- ✓ Central offices routers and switches
- ✓ Mass storage systems interconnect
- ✓ Computer cluster cross-connect

### Ordering Information

**Part Number:** BD5-155T3R5-DPM $\underline{X}$ K

**Description:**

155 Mb/s, Multimode, 2x5 BIDI Transceiver, TX 1310 nm and RX 1550 nm,  $\underline{X}$  km reach, 0 – 70 °C.

**Part Number:** BD5-155T5R3-DPM $\underline{X}$ K

**Description:**

155 Mb/s, Multimode, 2x5 BIDI Transceiver, TX 1550 nm and RX 1310 nm,  $\underline{X}$  km reach, 0 – 70 °C.

\* Add "-T" in the Part Number for extended temperature range -40–85 °C, i.e., BD5-155T3R5-DPM5K-T.

### Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	C
- T Transceivers	-40	25	85	C
Data Rate	---	155	200	Mb/s
Supply Voltage	3.1	3.3	3.5	V

### Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units
Storage Temperature	$T_{st}$	-40	85	C
Supply Voltage	$V_{CC}$	-0.5	4.0	V
Input Voltage	$V_{IN}$	-0.5	$V_{CC}$	V
Operating Current	$I_{op}$	---	400	mA
Output Current	$I_o$	---	50	mA
Soldering Temperature (10 sec. on leads)	$T_{sd}$	---	260	C

### General Transmitter Characteristics (FP Laser)

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage <sup>1</sup>	$\Delta V_i$	0.3	---	1.6	V
Differential Input Impedance <sup>2</sup>	$Z$	---	100	---	ohm
Rise/Fall Time (10% - 90%)	$T_r/T_f$	---	1	2	ns
Data Input Current - High	$I_{IH}$	---	---	350	$\mu$ A
Data Input Current - Low	$I_{IL}$	-350	---	---	$\mu$ A
Data Input Voltage - High	$V_{IH}$	$V_{CC} - 1.1$	---	$V_{CC} - 0.7$	V
Data Input Voltage - Low	$V_{IL}$	$V_{CC} - 2.0$	---	$V_{CC} - 1.6$	V
TX Disable Voltage - Low	$V_{DL}$	0	---	0.8	V
TX Disable Voltage - High	$V_{DH}$	2.0	---	$V_{CC}$	V
TX Disable Power	$P_{DP}$	---	---	-45	dBm

### General Receiver Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Output Voltage <sup>1</sup>	$\Delta V_o$	0.3	---	1.6	V
Differential Input Impedance <sup>2</sup>	$Z$	---	100	---	Ohm
Optical Return Loss	$OL$	14	---	---	dB
Rise/Fall Time (10% - 90%)	$T_r/T_f$	---	1	2	ns
Signal Detect Hysteresis	$P_{SD+} - P_{SD}$	1	---	---	dB
Crosstalk		---	---	-45	dB
Signal Detect Output - High	$V_{SD+}$	$V_{CC} - 1.1$	---	$V_{CC} - 0.7$	V
Signal Detect Output - Low	$V_{SD-}$	$V_{CC} - 2.0$	---	$V_{CC} - 1.6$	V
Data Output Voltage - High	$V_{OH}$	$V_{CC} - 1.1$	---	$V_{CC} - 0.7$	V
Data Output Voltage - Low	$V_{OL}$	$V_{CC} - 2.0$	---	$V_{CC} - 1.6$	V

Notes:

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

**Transmitter Electro-Optical Characteristics**

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power <sup>1</sup>	$P_o$	-10	---	0	dBm
Optical Wavelength (BD5-155T3R5-DPM2K)	$\lambda_o$	1260	1310	1360	nm
Optical Wavelength (BD5-155T5R3-DPM2K)	$\lambda_o$	1480	1550	1580	nm
Extinction Ratio	$ET$	9	---	---	dB
Spectral Width (rms)	$\Delta\lambda$	---	---	7	nm

**Receiver Electro-Optical Characteristics**

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength (BD5-155T3R5-DPM2K)	$\lambda_c$	1480	---	1600	nm
Operating Wavelength (BD5-155T5R3-DPM2K)	$\lambda_c$	1260	---	1360	nm
Receiver Overload	$P_{max}$	0	---	---	dBm
Receiver Sensitivity <sup>2</sup>	$P_I$	---	---	-28	dBm
Signal Detect- Asserted	$P_{SD+}$	---	---	-28	dBm
Signal Detect- Deasserted	$P_{SD-}$	-45	---	---	dBm

## Notes:

1. Output of coupling optical power into 50/125 or 62.5/125  $\mu\text{m}$  MMF.
2. Test at 155 Mb/s, 2<sup>23</sup> - 1 PRBS data pattern, and > 1x10<sup>-10</sup> of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with Telcordia GR-253-CORE and ITU-T G-957 standard.
4. Maximum supply current for the transceiver from Vcc is 180 mA.

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

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power <sup>1</sup>	$P_o$	-8	---	0	dBm
Optical Wavelength (BD5-155T3R5-DPM5K)	$\lambda_o$	1260	1310	1360	nm
Optical Wavelength (BD5-155T5R3-DPM5K)	$\lambda_o$	1480	1550	1580	nm
Extinction Ratio	$ET$	9	---	---	dB
Spectral Width (rms)	$\Delta\lambda$	---	---	7	nm

### Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength (BD5-155T3R5-DPM5K)	$\lambda_c$	1480	---	1600	nm
Operating Wavelength (BD5-155T5R3-DPM5K)	$\lambda_c$	1260	---	1360	nm
Receiver Overload	$P_{max}$	0	---	---	dBm
Receiver Sensitivity <sup>2</sup>	$P_I$	---	---	-28	dBm
Signal Detect- Asserted	$P_{SD+}$	---	---	-28	dBm
Signal Detect- Deasserted	$P_{SD-}$	-45	---	---	dBm

Notes:

1. Output of coupling optical power into 50/125 or 62.5/125  $\mu\text{m}$  MMF.
2. Test at 155 Mb/s,  $2^{23} - 1$  PRBS data pattern, and  $> 1 \times 10^{-10}$  of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with Telcordia GR-253-CORE and ITU-T G-957 standard.
4. Maximum supply current for the transceiver from  $V_{cc}$  is 180 mA.

Class 1 Laser Product  
 Complies with  
 21 CFR 1040.10 and 1040.11



### 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 1310 nm LD to transmit and 1550 nm PD to receive, and vice versa for the matching one (1310 nm to receive and 1550 nm to transmit) at the other end to make a complete link.

OptoIC's BIDI transceivers utilize advanced filter optics to separate the two wavelength with more than 45 dB of isolation. The products use industry standard 2x5 pluggable package. These transceivers operate at 1.25 Gb/s for 500m transmission distance with multimode fibers. The products are RoHS compliant.

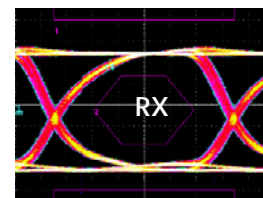
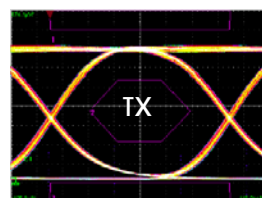


Lead-Free

**BD5-1250T3R5-ATM500M**  
**BD5-1250T5R3-ATM500M**



1.25 Gb/s, 2<sup>7</sup>-1 NRZ Data Eye pattern



### Key Features

- Multimode, 1.25 G/s data rate
- TX 1310/RX 1550 and TX 1550/RX1310 matching pair
- 500 m reach and single 3.3 V power supply
- 10 dB power budget
- Industry standard 2x5 pluggable package
- Single SC connector optical interface
- AC coupling LVPECL differential I/O logics
- TTL Signal detect to monitor optical signals
- RoHS compliant

### Applications

- ✓ FTTH, FTTX, Gigabit Ethernet, SONET, ATM
- ✓ High speed I/O for file server
- ✓ Video over fiber links
- ✓ Media converter, bus extension
- ✓ Central offices routers and switches
- ✓ Mass storage systems interconnect
- ✓ Computer cluster cross-connect

### Ordering Information

**Part Number:** BD5-1250T3R5-ATM500M

**Description:**  
 1.25 Gb/s, Multimode, 2x5 BIDI Transceiver, TX 1310 nm and RX 1550 nm, 500 m reach, 0 – 70 °C.

**Part Number:** BD5-1250T5R3-ATM500M

**Description:**  
 1.25 Gb/s, Multimode, 2x5 BIDI Transceiver, TX 1550 nm and RX 1310 nm, 500 m reach, 0 – 70 °C.

### Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	C
Data Rate	---	1.25	1.3	Gb/s
Supply Voltage	3.1	3.3	3.5	V
Supply Current	---	200	300	mA

### Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units
Storage Temperature	$T_{st}$	-40	85	C
Supply Voltage	$V_{cc}$	-0.5	6.0	V
Input Voltage	$V_{in}$	-0.5	$V_{cc}$	V
Operating Current	$I_{op}$	---	400	mA
Output Current	$I_o$	---	50	mA
Soldering Temperature (10 sec. on leads)	$T_{sd}$	---	260	C

### General Transmitter Characteristics (FP Laser)

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage <sup>1</sup>	$\Delta V_i$	0.3	---	1.6	V
Differential Input Impedance <sup>2</sup>	$Z$	---	100	---	ohm
Relative Intensity Noise	$RIN$	---	---	-120	dB/Hz
Rise/Fall Time (20% - 80%)	$T_r/T_f$	---	---	260	ps
Data Input Current - High	$I_{IH}$	---	---	350	$\mu A$
Data Input Current - Low	$I_{IL}$	-350	---	---	$\mu A$
Side Mode Suppression Ratio	$SMSR$	30	---	---	dB

### General Receiver Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Output Voltage <sup>1</sup>	$\Delta V_o$	1.0	---	1.8	V
Differential Input Impedance <sup>2</sup>	$Z$	---	100	---	Ohm
Optical Return Loss	$OL$	14	---	---	dB
Rise/Fall Time (20% - 80%)	$T_r/T_f$	---	---	350	ps
Signal Detect Hysteresis	$P_{SD+} - P_{SD}$	1	---	---	dB
Crosstalk		---	---	-45	dB
Signal Detect Output - High	$V_{SD+}$	2.4	---	$V_{cc}$	V
Signal Detect Output - Low	$V_{SD-}$	0	---	0.5	V

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.



**Transmitter Electro-Optical Characteristics**

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power <sup>1</sup>	$P_o$	-8	---	0	dBm
Optical Wavelength (BD5-1250T3R5-ATM500M)	$\lambda_o$	1260	1310	1360	nm
Optical Wavelength (BD5-1250T5R3-ATM500M)	$\lambda_o$	1480	1550	1580	nm
Extinction Ratio	$ET$	9	---	---	dB
Spectral Width (rms)	$\Delta\lambda$	---	---	4	nm

**Receiver Electro-Optical Characteristics**

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength (BD5-1250T3R5-ATM500M)	$\lambda_c$	1500	---	1600	nm
Operating Wavelength (BD5-1250T5R3-ATM500M)	$\lambda_c$	1260	---	1360	nm
Receiver Overload	$P_{max}$	0	---	---	dBm
Receiver Sensitivity <sup>2</sup>	$P_I$	---	---	-18	dBm
Signal Detect- Asserted	$P_{SD+}$	---	---	-18	dBm
Signal Detect- Deasserted	$P_{SD-}$	-35	---	---	dBm

Notes:

1. Output of coupling optical power into 50/125 or 62.5/125  $\mu\text{m}$  MMF.
2. Test at 1.25 Gb/s,  $2^7 - 1$  PRBS data pattern, and  $> 1 \times 10^{-12}$  of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with IEEE 802.3z standard.
4. Maximum supply current for the transceiver from Vcc is 300 mA.

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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155 Mb/s, 2x5 SFF Package, BIDI  
 TX 1310/RX 1550, TX 1550/RX 1310  
 Single mode, 15 – 80 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 1310 nm LD to transmit and 1550 nm PD to receive, and vice versa for the matching one (1310 nm to receive and 1550 nm to transmit) at the other end to make a complete link.

OptoIC's BIDI transceivers utilize advanced filter optics to separate the two wavelength with more than 45 dB of isolation. The products use industry standard 2x5 SFF pluggable package. These transceivers operate at 155 Mb/s for 15 - 80 km transmission distance with single mode fibers. The products are RoHS compliant.

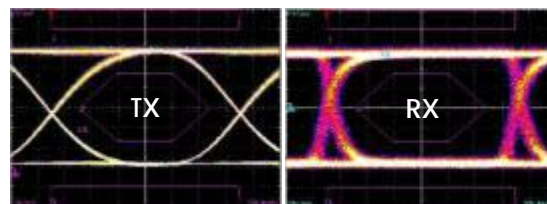


Lead-Free

BD5-155T3R5-DPXXK  
 BD5-155T5R3-DPXXK  
 (XX = 15, 25, 40, 60, 80)



155 Mb/s, 2<sup>23</sup>-1 NRZ Data Eye Pattern



### Key Features

- Single mode, 155 M/s data rate
- TX 1310/RX 1550 and TX 1550/RX1310 matching pair
- 15 - 60 km reach and single 3.3 V power supply
- 17 – 33 dB power budget
- Industry standard 2x5 pluggable package
- Single SC connector optical interface
- DC coupling LVPECL differential I/O logics
- LVPECL Signal detect to monitor optical signals
- -40–85 °C extended temperatures available
- RoHS compliant

### Applications

- ✓ FTTH, FTTX, ATM/SONET OC-3, SDH STM-1
- ✓ High speed I/O for file server
- ✓ Video over fiber links
- ✓ Media converter, bus extension
- ✓ Central offices routers and switches
- ✓ Mass storage systems interconnect
- ✓ Computer cluster cross-connect

### Ordering Information

**Part Number:** BD5-155T3R5-DPXXK

**Description:**

155 Mb/s, Single mode, 2x5 BIDI Transceiver, TX 1310 nm and RX 1550 nm, XX km reach, 0 – 70 °C.

**Part Number:** BD5-155T5R3-DPXXK

**Description:**

155 Mb/s, Single mode, 2x5 BIDI Transceiver, TX 1550 nm and RX 1310 nm, XX km reach, 0 – 70 °C.

\* Add "-T" in the Part Number for extended temperature range -40–85 °C, i.e., BD5-155T3R5-DP15K-T.

### Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	C
- T Transceivers	-40	25	85	C
Data Rate	---	155	200	Mb/s
Supply Voltage	3.1	3.3	3.5	V

### Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units
Storage Temperature	$T_{st}$	-40	85	C
Supply Voltage	$V_{CC}$	-0.5	4.0	V
Input Voltage	$V_{IN}$	-0.5	$V_{CC}$	V
Operating Current	$I_{op}$	---	400	mA
Output Current	$I_o$	---	50	mA
Soldering Temperature (10 sec. on leads)	$T_{sd}$	---	260	C

### General Transmitter Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage <sup>1</sup>	$\Delta V_i$	0.3	---	1.6	V
Differential Input Impedance <sup>2</sup>	$Z$	---	100	---	ohm
Rise/Fall Time (10% - 90%)	$T_r/T_f$	---	1	2	ns
Data Input Current - High	$I_{IH}$	---	---	350	$\mu$ A
Data Input Current - Low	$I_{IL}$	-350	---	---	$\mu$ A
Data Input Voltage - High	$V_{IH}$	$V_{CC} - 1.1$	---	$V_{CC} - 0.7$	V
Data Input Voltage - Low	$V_{IL}$	$V_{CC} - 2.0$	---	$V_{CC} - 1.6$	V
TX Disable Voltage - Low	$V_{DL}$	0	---	0.8	V
TX Disable Voltage - High	$V_{DH}$	2.0	---	$V_{CC}$	V
TX Disable Power	$P_{DP}$	---	---	-45	dBm

### General Receiver Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Output Voltage <sup>1</sup>	$\Delta V_o$	0.3	---	1.6	V
Differential Input Impedance <sup>2</sup>	$Z$	---	100	---	Ohm
Optical Return Loss	$OL$	14	---	---	dB
Rise/Fall Time (10% - 90%)	$T_r/T_f$	---	1	2	ns
Signal Detect Hysteresis	$P_{SD+} - P_{SD}$	1	---	---	dB
Crosstalk		---	---	-45	dB
Signal Detect Output - High	$V_{SD+}$	$V_{CC} - 1.1$	---	$V_{CC} - 0.7$	V
Signal Detect Output - Low	$V_{SD-}$	$V_{CC} - 2.0$	---	$V_{CC} - 1.6$	V
Data Output Voltage - High	$V_{OH}$	$V_{CC} - 1.1$	---	$V_{CC} - 0.7$	V
Data Output Voltage - Low	$V_{OL}$	$V_{CC} - 2.0$	---	$V_{CC} - 1.6$	V

Notes:

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

**Transmitter Electro-Optical Characteristics (FP Laser)**

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power <sup>1</sup>	$P_o$	-14	---	-8	dBm
Optical Wavelength (BD5-155T3R5-DP15K)	$\lambda_o$	1260	1310	1360	nm
Optical Wavelength (BD5-155T5R3-DP15K)	$\lambda_o$	1480	1550	1580	nm
Extinction Ratio	$ET$	9	---	---	dB
Spectral Width (rms) (BD5-155T3R5-DP15K)	$\Delta\lambda$	---	---	4	nm
Spectral Width (rms) (BD5-155T5R3-DP15K)	$\Delta\lambda$	---	---	3	nm

**Receiver Electro-Optical Characteristics**

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength (BD5-155T3R5-DP15K)	$\lambda_c$	1480	---	1600	nm
Operating Wavelength (BD5-155T5R3-DP15K)	$\lambda_c$	1260	---	1360	nm
Receiver Overload	$P_{max}$	0	---	---	dBm
Receiver Sensitivity <sup>2</sup>	$P_I$	---	---	-31	dBm
Signal Detect- Asserted	$P_{SD+}$	---	---	-31	dBm
Signal Detect- Deasserted	$P_{SD-}$	-45	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125  $\mu\text{m}$  SMF.
2. Test at 155 Mb/s, 2<sup>23</sup> - 1 PRBS data pattern, and > 1x10<sup>-10</sup> of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with Telcordia GR-253-CORE and ITU-T G-957 standard.
4. Maximum supply current for the transceiver from Vcc is 200 mA.

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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**Transmitter Electro-Optical Characteristics (FP Laser)**

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power <sup>1</sup>	$P_o$	-9	---	-3	dBm
Optical Wavelength (BD5-155T3R5-DP25K)	$\lambda_o$	1260	1310	1360	nm
Optical Wavelength (BD5-155T5R3-DP25K)	$\lambda_o$	1480	1550	1580	nm
Extinction Ratio	$ET$	9	---	---	dB
Spectral Width (rms) (BD5-155T3R5-DP25K)	$\Delta\lambda$	---	---	4	nm
Spectral Width (rms) (BD5-155T5R3-DP25K)	$\Delta\lambda$	---	---	3	nm

**Receiver Electro-Optical Characteristics**

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength (BD5-155T3R5-DP25K)	$\lambda_c$	1480	---	1600	nm
Operating Wavelength (BD5-155T5R3-DP25K)	$\lambda_c$	1260	---	1360	nm
Receiver Overload	$P_{max}$	0	---	---	dBm
Receiver Sensitivity <sup>2</sup>	$P_I$	---	---	-31	dBm
Signal Detect- Asserted	$P_{SD+}$	---	---	-31	dBm
Signal Detect- Deasserted	$P_{SD-}$	-45	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125  $\mu$ m SMF.
2. Test at 155 Mb/s, 2<sup>23</sup> – 1 PRBS data pattern, and > 1x10<sup>-10</sup> of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with Telcordia GR-253-CORE and ITU-T G-957 standard.
4. Maximum supply current for the transceiver from Vcc is 220 mA.

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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BD5-155T3R5-DP40K-T  
 BD5-155T5R3-DP40K-T

**Transmitter Electro-Optical Characteristics (DFB Laser)**

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power <sup>1</sup>	$P_o$	-8	---	0	dBm
Optical Wavelength (BD5-155T3R5-DP40K)	$\lambda_o$	1280	1310	1355	nm
Optical Wavelength (BD5-155T5R3-DP40K)	$\lambda_o$	1530	1550	1570	nm
Extinction Ratio	$ET$	9	---	---	dB
Spectral Width (rms) (BD5-155T3R5-DP40K)	$\Delta\lambda$	---	---	2.5	nm
Spectral Width (-20 dB) (BD5-155T5R3-DP40K)	$\Delta\lambda$	---	---	1	nm
Side Mode Suppression Ratio	$SMSR$	30	---	---	dB

**Receiver Electro-Optical Characteristics**

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength (BD5-155T3R5-DP40K)	$\lambda_c$	1480	---	1600	nm
Operating Wavelength (BD5-155T5R3-DP40K)	$\lambda_c$	1260	---	1360	nm
Receiver Overload	$P_{max}$	0	---	---	dBm
Receiver Sensitivity <sup>2</sup>	$P_I$	---	---	-34	dBm
Signal Detect- Asserted	$P_{SD+}$	---	---	-34	dBm
Signal Detect- Deasserted	$P_{SD-}$	-45	---	---	dBm

## Notes:

1. Output of coupling optical power into 9/125  $\mu\text{m}$  SMF.
2. Test at 155 Mb/s, 2<sup>23</sup> - 1 PRBS data pattern, and  $> 1 \times 10^{-10}$  of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with Telcordia GR-253-CORE and ITU-T G-957 standard.
4. Maximum supply current for the transceiver from Vcc is 250 mA.

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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BD5-155T3R5-DP60K-T  
 BD5-155T5R3-DP60K-T

**Transmitter Electro-Optical Characteristics (DFB Laser)**

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power <sup>1</sup>	$P_o$	-5	---	0	dBm
Optical Wavelength (BD5-155T3R5-DP60K)	$\lambda_o$	1280	1310	1355	nm
Optical Wavelength (BD5-155T5R3-DP60K)	$\lambda_o$	1530	1550	1570	nm
Extinction Ratio	$ET$	10	---	---	dB
Spectral Width (rms) (BD5-155T3R5-DP60K)	$\Delta\lambda$	---	---	2.5	nm
Spectral Width (-20 dB) (BD5-155T5R3-DP60K)	$\Delta\lambda$	---	---	1	nm
Side Mode Suppression Ratio	$SMSR$	30	---	---	dB

**Receiver Electro-Optical Characteristics**

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength (BD5-155T3R5-DP60K)	$\lambda_c$	1480	---	1600	nm
Operating Wavelength (BD5-155T5R3-DP60K)	$\lambda_c$	1260	---	1360	nm
Receiver Overload	$P_{max}$	0	---	---	dBm
Receiver Sensitivity <sup>2</sup>	$P_I$	---	---	-34	dBm
Signal Detect- Asserted	$P_{SD+}$	---	---	-34	dBm
Signal Detect- Deasserted	$P_{SD-}$	-45	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125  $\mu$ m SMF.
2. Test at 155 Mb/s, 2<sup>23</sup> - 1 PRBS data pattern, and > 1x10<sup>-10</sup> of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with Telcordia GR-253-CORE and ITU-T G-957 standard.
4. Maximum supply current for the transceiver from Vcc is 250 mA.

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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BD5-155T3R5-DP80K-T  
 BD5-155T5R3-DP80K-T

**Transmitter Electro-Optical Characteristics (DFB Laser)**

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power <sup>1</sup> (BD5-155T3R5-DP80K)	$P_o$	0	---	+5	dBm
Optical Output Power <sup>1</sup> (BD5-155T5R3-DP80K)	$P_o$	-2	---	+4	dBm
Optical Wavelength (BD5-155T3R5-DP80K)	$\lambda_o$	1280	1310	1340	nm
Optical Wavelength (BD5-155T5R3-DP80K)	$\lambda_o$	1530	1550	1570	nm
Extinction Ratio	$ET$	10	---	---	dB
Spectral Width (rms) (BD5-155T3R5-DP80K)	$\Delta\lambda$	---	---	2.5	nm
Spectral Width (-20dB) (BD5-155T5R3-DP80K)	$\Delta\lambda$	---	---	1	nm

**Receiver Electro-Optical Characteristics**

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Wavelength (BD5-155T3R5-DP80K)	$\lambda_c$	1500	---	1600	nm
Optical Wavelength (BD5-155T5R3-DP80K)	$\lambda_c$	1260	---	1360	nm
Receiver Overload	$P_{max}$	0	---	---	dBm
Receiver Sensitivity <sup>2</sup> (BD5-155T3R5-DP80K)	$P_I$	---	---	-34	dBm
Receiver Sensitivity <sup>2</sup> (BD5-155T5R3-DP80K)	$P_I$	---	---	-35	dBm
Signal Detect– Asserted	$P_{SD+}$	---	---	-35	dBm
Signal Detect– Deasserted	$P_{SD-}$	-45	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125  $\mu\text{m}$  SMF.
2. Test at 155 Mb/s, 2<sup>23</sup> – 1 PRBS data pattern, and > 1x10<sup>-10</sup> of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with Telcordia GR-253-CORE and ITU-T G-957 standard.
4. Maximum supply current for the transceiver from Vcc is 300 mA.

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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**155 Mb/s, 2x5 SC Package, BIDI  
TX 1510/RX 1570, TX 1570/RX 1510  
Single mode, 100 – 120 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 1510 nm LD to transmit and 1570 nm PD to receive, and vice versa for the matching one (1510 nm to receive and 1570 nm to transmit) at the other end to make a complete link.

OptoIC's BIDI transceivers utilize advanced filter optics to separate the two wavelength with more than 45 dB of isolation. The products use industry standard 2x5 pluggable package. These transceivers operate at 155 Mb/s for 100 - 120 km transmission distance with single mode fibers. The products are RoHS compliant.

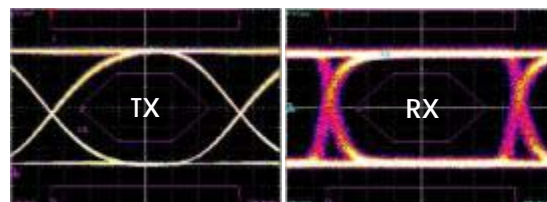


Lead-Free

**BD5-155T1R7-DPXXXK**  
**BD5-155T7R1-DPXXXK**  
**(XXX = 100, 120)**



155 Mb/s, 2<sup>23</sup>-1 NRZ Data Eye Pattern



### Key Features

- Single mode, 155 M/s data rate
- TX 1510/RX 1570 and TX 1570/RX1510 matching pair
- 100 - 120 km reach and single 3.3 V power supply
- 28 – 32 dB power budget
- Industry standard 2x5 pluggable package
- Single SC connector optical interface
- DC coupling LVPECL differential I/O logics
- LVPECL Signal detect to monitor optical signals
- RoHS compliant

### Applications

- ✓ FTTH, Ethernet, ATM/SONET , SDH STM-1
- ✓ High speed I/O for file server
- ✓ Video over fiber links
- ✓ Media converter, bus extension
- ✓ Central offices routers and switches
- ✓ Mass storage systems interconnect
- ✓ Computer cluster cross-connect

### Ordering Information

**Part Number:** BD5-155T1R7-DPXXXK

**Description:**

155 Mb/s, Single mode, 2x5 BIDI Transceiver, TX 1510 nm and RX 1570 nm, XXX km reach, 0 – 70 °C.

**Part Number:** BD5-155T7R1-DPXXXK

**Description:**

155 Mb/s, Single mode, 2x5 BIDI Transceiver, TX 1570 nm and RX 1510 nm, XXX km reach, 0 – 70 °C.

### Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	C
Data Rate	---	155	200	Mb/s
Supply Voltage	3.1	3.3	3.5	V
Supply Current	---	200	300	mA

### Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units
Storage Temperature	$T_{st}$	-40	85	C
Supply Voltage	$V_{CC}$	-0.5	4.0	V
Input Voltage	$V_{IN}$	-0.5	$V_{CC}$	V
Operating Current	$I_{op}$	---	400	mA
Output Current	$I_o$	---	50	mA
Soldering Temperature (10 sec. on leads)	$T_{sd}$	---	260	C

### General Transmitter Characteristics (DFB Laser)

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage <sup>1</sup>	$\Delta V_i$	0.3	---	1.6	V
Differential Input Impedance <sup>2</sup>	$Z$	---	100	---	ohm
Relative Intensity Noise	$RIN$	---	---	-120	dB/Hz
Rise/Fall Time (10% - 90%)	$T_r/T_f$	---	1	2	ns
Data Input Current - High	$I_{IH}$	---	---	350	$\mu A$
Data Input Current - Low	$I_{IL}$	-350	---	---	$\mu A$
Data Input Voltage - High	$V_{IH}$	$V_{CC} - 1.1$	---	$V_{CC} - 0.7$	V
Data Input Voltage - Low	$V_{IL}$	$V_{CC} - 2.0$	---	$V_{CC} - 1.6$	V

### General Receiver Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Output Voltage <sup>1</sup>	$\Delta V_o$	0.3	---	1.6	V
Differential Input Impedance <sup>2</sup>	$Z$	---	100	---	Ohm
Optical Return Loss	$OL$	14	---	---	dB
Rise/Fall Time (10% - 90%)	$T_r/T_f$	---	1	2	ns
Signal Detect Hysteresis	$P_{SD+} - P_{SD}$	1	---	---	dB
Crosstalk		---	---	-45	dB
Signal Detect Output - High	$V_{SD+}$	$V_{CC} - 1.1$	---	$V_{CC} - 0.7$	V
Signal Detect Output - Low	$V_{SD-}$	$V_{CC} - 2.0$	---	$V_{CC} - 1.6$	V
Data Output Voltage - High	$V_{OH}$	$V_{CC} - 1.1$	---	$V_{CC} - 0.7$	V
Data Output Voltage - Low	$V_{OL}$	$V_{CC} - 2.0$	---	$V_{CC} - 1.6$	V

Notes:

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

### Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power <sup>1</sup>	$P_o$	-5	---	+2	dBm
Optical Wavelength (BD5-155T1R7-DP100K)	$\lambda_o$	1500	1510	1520	nm
Optical Wavelength (BD5-155T7R1-DP100K)	$\lambda_o$	1560	1570	1580	nm
Extinction Ratio	$ET$	9	---	---	dB
Spectral Width (rms)	$\Delta\lambda$	---	---	1	nm

### Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength (BD5-155T1R7-DP100K)	$\lambda_c$	1560	1570	1580	nm
Operating Wavelength (BD5-155T7R1-DP100K)	$\lambda_c$	1500	1510	1520	nm
Receiver Overload	$P_{max}$	0	---	---	dBm
Receiver Sensitivity <sup>2</sup>	$P_I$	---	---	-33	dBm
Signal Detect- Asserted	$P_{SD+}$	---	---	-33	dBm
Signal Detect- Deasserted	$P_{SD-}$	-45	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125  $\mu\text{m}$  SMF.
2. Test at 155 Mb/s, 2<sup>23</sup> - 1 PRBS data pattern, and > 1x10<sup>-10</sup> of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with Telcordia GR-253-CORE and ITU-T G-957 standard.
4. Maximum supply current for the transceiver from Vcc is 300 mA.

Class 1 Laser Product  
Complies with  
21 CFR 1040.10 and 1040.11



**Transmitter Electro-Optical Characteristics**

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power <sup>1</sup>	$P_o$	-3	---	+3	dBm
Optical Wavelength (BD5-155T1R7-DP120K)	$\lambda_o$	1500	1510	1520	nm
Optical Wavelength (BD5-155T7R1-DP120K)	$\lambda_o$	1560	1570	1580	nm
Extinction Ratio	$ET$	9	---	---	dB
Spectral Width (rms)	$\Delta\lambda$	---	---	1	nm

**Receiver Electro-Optical Characteristics**

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength (BD5-155T1R7-DP120K)	$\lambda_c$	1560	1570	1580	nm
Operating Wavelength (BD5-155T7R1-DP120K)	$\lambda_c$	1500	1510	1520	nm
Receiver Overload	$P_{max}$	0	---	---	dBm
Receiver Sensitivity <sup>2</sup>	$P_I$	---	---	-35	dBm
Signal Detect- Asserted	$P_{SD+}$	---	---	-35	dBm
Signal Detect- Deasserted	$P_{SD-}$	-45	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125  $\mu\text{m}$  SMF.
2. Test at 155 Mb/s, 2<sup>23</sup> - 1 PRBS data pattern, and > 1x10<sup>-10</sup> of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with Telcordia GR-253-CORE and ITU-T G-957 standard.
4. Maximum supply current for the transceiver from Vcc is 300 mA.

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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**1.25 Gb/s, 2x5 SFF Package, BIDI  
TX 1310/RX 1550, TX 1550/RX 1310  
Single mode, 15 – 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 1310 nm LD to transmit and 1550 nm PD to receive, and vice versa for the matching one (1310 nm to receive and 1550 nm to transmit) at the other end to make a complete link.

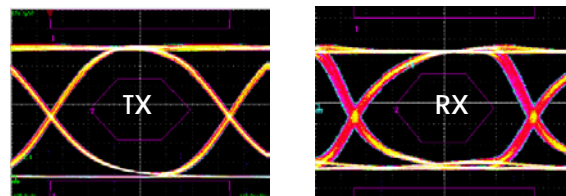
OptoC's BIDI transceivers utilize advanced filter optics to separate the two wavelength with more than 40 dB of isolation. The products use industry standard 2x5 SFF pluggable package. These transceivers operate at 1.25 Gb/s for 15 - 60 km transmission distance with single mode fibers. The products are RoHS compliant.



**BD5-1250T3R5-ATXXK**  
**BD5-1250T5R3-ATXXK**  
(XX= 15, 25, 40, 60)



1.25 Gb/s, 2<sup>-7</sup>-1 NRZ Data Eye pattern



**Key Features**

- Single mode, 1.25 G/s data rate
- TX 1310/RX 1550 and TX 1550/RX1310 matching pair
- 15 - 60 km reach and single 3.3 V power supply
- 12 – 24 dB power budget
- Industry standard 2x5 pluggable package
- Single SC connector optical interface
- AC coupling LVPECL differential I/O logics
- TTL Signal detect to monitor optical signals
- -40~85 °C operating temperatures available
- RoHS compliant

**Applications**

- ✓ FTTH, FTTX, Gigabit Ethernet
- ✓ High speed I/O for file server
- ✓ Video over fiber links
- ✓ Media converter, bus extension
- ✓ Central offices routers and switches
- ✓ Mass storage systems interconnect
- ✓ Computer cluster cross-connect

**Ordering Information**

**Part Number:** BD5-1250T3R5-ATXXK  
**Description:**  
1.25 Gb/s, Single mode, 2x5 BIDI Transceiver, TX 1310 nm and RX 1550 nm, XX km reach, 0 – 70 °C.

**Part Number:** BD5-1250T5R3-ATXXK  
**Description:**  
1.25 Gb/s, Single mode, 2x5 BIDI Transceiver, TX 1550 nm and RX 1310 nm, XX km reach, 0 – 70 °C.

\* Add "-T" in the Part Number for extended temperature range -40~85 °C, i.e., BD5-1250T3R5-AT15K-T.

**Operating Conditions**

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	C
- T Transceivers	-40	25	85	C
Data Rate	---	1.25	1.3	Gb/s
Supply Voltage	3.1	3.3	3.5	V

### Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units
Storage Temperature	$T_{st}$	-40	85	C
Supply Voltage	$V_{CC}$	-0.5	4.0	V
Input Voltage	$V_{IN}$	-0.5	$V_{CC}$	V
Operating Current	$I_{op}$	---	400	mA
Output Current	$I_o$	---	50	mA
Soldering Temperature (10 sec. on leads)	$T_{sd}$	---	260	C

### Transmitter Electro-Optical Characteristics (DFB Laser)

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage <sup>1</sup>	$\Delta V_i$	0.4	---	2.0	V
Differential Input Impedance <sup>2</sup>	$Z$	---	100	---	ohm
Relative Intensity Noise	$RIN$	---	---	-120	dB/Hz
Rise/Fall Time (20% - 80%)	$T_r/T_f$	---	---	260	ps
Data Input Current - High	$I_{IH}$	---	---	350	$\mu A$
Data Input Current - Low	$I_{IL}$	-350	---	---	$\mu A$
Side Mode Suppression Ratio	$SMSR$	30	---	---	dB
TX Disable Voltage - Low	$V_{DL}$	0	---	0.8	V
TX Disable Voltage - High	$V_{DH}$	2.0	---	$V_{CC}$	V
TX Disable Power	$P_{DP}$	---	---	-45	dBm

### General Receiver Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Output Voltage <sup>1</sup>	$\Delta V_o$	0.6	---	1.8	V
Differential Input Impedance <sup>2</sup>	$Z$	---	100	---	Ohm
Optical Return Loss	$OL$	14	---	---	dB
Rise/Fall Time (20% - 80%)	$T_r/T_f$	---	---	350	ps
Signal Detect Hysteresis	$P_{SD+} - P_{SD}$	1	---	---	dB
Crosstalk		---	---	-40	dB
Signal Detect Output - High	$V_{SD+}$	2.4	---	$V_{CC}$	V
Signal Detect Output - Low	$V_{SD-}$	0	---	0.4	V

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.

### Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power <sup>1</sup>	$P_o$	-9	---	-3	dBm
Optical Wavelength (BD5-1250T3R5-AT15K)	$\lambda_o$	1280	1310	1355	nm
Optical Wavelength (BD5-1250T5R3-AT15K)	$\lambda_o$	1530	1550	1570	nm
Extinction Ratio	$ET$	9	---	---	dB
Spectral Width (rms) (BD5-1250T3R5-AT15K)	$\Delta\lambda$	---	---	2.5	nm
Spectral Width (-20dB) (BD5-1250T5R3-AT15K)	$\Delta\lambda$	---	---	1	nm

### Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Wavelength (BD5-1250T3R5-AT15K)	$\lambda_c$	1500	---	1600	nm
Optical Wavelength (BD5-1250T5R3-AT15K)	$\lambda_c$	1260	---	1360	nm
Receiver Overload	$P_{max}$	-3	---	---	dBm
Receiver Sensitivity <sup>2</sup>	$P_I$	---	---	-21	dBm
Signal Detect- Asserted	$P_{SD+}$	---	---	-21	dBm
Signal Detect- Deasserted	$P_{SD-}$	-35	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125  $\mu\text{m}$  SMF.
2. Test at 1.25 Gb/s, 2<sup>7</sup> – 1 PRBS data pattern, and > 1x10<sup>-12</sup> of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with IEEE 802.3z standard.
4. Maximum supply current for the transceiver from Vcc is 300 mA.

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

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power <sup>1</sup>	$P_o$	-7	---	-2	dBm
Optical Wavelength (BD5-1250T3R5-AT25K)	$\lambda_o$	1280	1310	1355	nm
Optical Wavelength (BD5-1250T5R3-AT25K)	$\lambda_o$	1530	1550	1570	nm
Extinction Ratio	$ET$	9	---	---	dB
Spectral Width (rms) (BD5-1250T3R5-AT25K)	$\Delta\lambda$	---	---	2.5	nm
Spectral Width (-20dB) (BD5-1250T5R3-AT25K)	$\Delta\lambda$	---	---	1	nm

### Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Wavelength (BD5-1250T3R5-AT25K)	$\lambda_c$	1500	---	1600	nm
Optical Wavelength (BD5-1250T5R3-AT25K)	$\lambda_c$	1260	---	1360	nm
Receiver Overload	$P_{max}$	-2	---	---	dBm
Receiver Sensitivity <sup>2</sup>	$P_I$	---	---	-23	dBm
Signal Detect- Asserted	$P_{SD+}$	---	---	-23	dBm
Signal Detect- Deasserted	$P_{SD-}$	-35	---	---	dBm

#### Notes:

1. Output of coupling optical power into 9/125  $\mu\text{m}$  SMF.
2. Test at 1.25 Gb/s, 2<sup>7</sup> – 1 PRBS data pattern, and > 1x10<sup>-12</sup> of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with IEEE 802.3z standard.
4. Maximum supply current for the transceiver from Vcc is 300 mA.

Class 1 Laser Product  
 Complies with  
 21 CFR 1040.10 and 1040.11





**Transmitter Electro-Optical Characteristics**

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power <sup>1</sup>	$P_o$	-3	---	+2	dBm
Optical Wavelength (BD5-1250T3R5-AT40K)	$\lambda_o$	1280	1310	1340	nm
Optical Wavelength (BD5-1250T5R3-AT40K)	$\lambda_o$	1530	1550	1570	nm
Extinction Ratio	$ET$	9	---	---	dB
Spectral Width (-20dB) (BD5-1250T3R5-AT40K)	$\Delta\lambda$	---	---	1	nm
Spectral Width (-20dB) (BD5-1250T5R3-AT40K)	$\Delta\lambda$	---	---	1	nm

**Receiver Electro-Optical Characteristics**

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Wavelength (BD5-1250T3R5-AT40K)	$\lambda_c$	1500	---	1600	nm
Optical Wavelength (BD5-1250T5R3-AT40K)	$\lambda_c$	1260	---	1360	nm
Receiver Overload	$P_{max}$	-1	---	---	dBm
Receiver Sensitivity <sup>2</sup>	$P_I$	---	---	-23	dBm
Signal Detect- Asserted	$P_{SD+}$	---	---	-23	dBm
Signal Detect- Deasserted	$P_{SD-}$	-35	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125  $\mu\text{m}$  SMF.
2. Test at 1.25 Gb/s,  $2^7 - 1$  PRBS data pattern, and  $> 1 \times 10^{-12}$  of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with IEEE 802.3z standard.
4. Maximum supply current for the transceiver from  $V_{cc}$  is 300 mA.

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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\* -40 – 85 °C not available for above parts \*

**Transmitter Electro-Optical Characteristics**

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power <sup>1</sup> (BD5-1250T3R5-AT60K)	$P_o$	0	---	+5	dBm
Optical Output Power <sup>1</sup> (BD5-1250T5R3-AT60K)	$P_o$	-1	---	+4	dBm
Optical Wavelength (BD5-1250T3R5-AT60K)	$\lambda_o$	1280	1310	1340	nm
Optical Wavelength (BD5-1250T5R3-AT60K)	$\lambda_o$	1530	1550	1570	nm
Extinction Ratio	$ET$	7	---	---	dB
Spectral Width (-20dB) (BD5-1250T3R5-AT60K)	$\Delta\lambda$	---	---	1	nm
Spectral Width (-20dB) (BD5-1250T5R3-AT60K)	$\Delta\lambda$	---	---	1	nm

**Receiver Electro-Optical Characteristics**

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Wavelength (BD5-1250T3R5-AT60K)	$\lambda_c$	1500	---	1600	nm
Optical Wavelength (BD5-1250T5R3-AT60K)	$\lambda_c$	1260	---	1360	nm
Receiver Overload	$P_{max}$	-1	---	---	dBm
Receiver Sensitivity <sup>2</sup>	$P_I$	---	---	-25	dBm
Signal Detect- Asserted	$P_{SD+}$	---	---	-25	dBm
Signal Detect- Deasserted	$P_{SD-}$	-35	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125  $\mu$ m SMF.
2. Test at 1.25 Gb/s, 2<sup>7</sup> – 1 PRBS data pattern, and > 1x10<sup>-12</sup> of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with IEEE 802.3z standard.
4. Maximum supply current for the transceiver from Vcc is 350 mA.

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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# 1.25 Gb/s, 2x5 SFF Package, BIDI TX 1510/RX 1570, TX 1570/RX 1510 Single mode, 80 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 1510 nm LD to transmit and 1570 nm PD to receive, and vice versa for the matching one (1510 nm to receive and 1570 nm to transmit) at the other end to make a complete link.

OptoIC's BIDI transceivers utilize advanced filter optics to separate the two wavelength with more than 45 dB of isolation. The products use industry standard 2x5 pluggable package. These transceivers operate at 1.25 Gb/s for 80 km transmission distance with single mode fibers. The products are RoHS compliant.



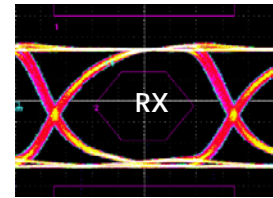
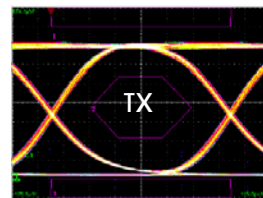
Lead-Free

**BD5-1250T1R7-AT80K**  
**BD5-1250T7R1-AT80K**



## Key Features

- Single mode, 1.25 G/s data rate
- TX 1510/RX 1570 and TX 1570/RX1510 matching pair
- 80 km reach and single 3.3 V power supply
- 24 dB power budget
- Industry standard 2x5 pluggable package
- Single SC connector optical interface
- AC coupling LVPECL differential I/O logics
- TTL Signal detect to monitor optical signals
- RoHS compliant



## Applications

- ✓ FTTH, FTTX, Gigabit Ethernet
- ✓ High speed I/O for file server
- ✓ Video over fiber links
- ✓ Media converter, bus extension
- ✓ Central offices routers and switches
- ✓ Mass storage systems interconnect
- ✓ Computer cluster cross-connect

## Ordering Information

**Part Number:** BD5-1250T1R7-AT80K

**Description:**

1.25 Gb/s single mode, 2x5 BIDI Transceiver, TX 1510 nm and RX 1570 nm, 80 km reach, 0 – 70 °C.

**Part Number:** BD5-1250T7R1-AT80K

**Description:**

1.25 Gb/s single mode, 2x5 BIDI Transceiver, TX 1570 nm and RX 1510 nm, 80 km reach, 0 – 70 °C.

## Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	C
Data Rate	---	1.25	1.3	Gb/s
Supply Voltage	3.1	3.3	3.5	V
Supply Current	---	200	300	mA

**Absolute Maximum Ratings**

Parameter	Symbol	Min.	Max.	Units
Storage Temperature	$T_{st}$	-40	85	C
Supply Voltage	$V_{CC}$	-0.5	4.0	V
Input Voltage	$V_{IN}$	-0.5	$V_{CC}$	V
Operating Current	$I_{op}$	---	400	mA
Output Current	$I_o$	---	50	mA
Soldering Temperature (10 sec. on leads)	$T_{sd}$	---	260	C

**General Transmitter Characteristics (DFB Laser)**

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage <sup>1</sup>	$\Delta V_i$	0.3	---	2.0	V
Differential Input Impedance <sup>2</sup>	$Z$	---	100	---	ohm
Relative Intensity Noise	$RIN$	---	---	-120	dB/Hz
Rise/Fall Time (20% - 80%)	$T_r/T_f$	---	---	260	ps
Data Input Current - High	$I_{IH}$	---	---	350	$\mu A$
Data Input Current - Low	$I_{IL}$	-350	---	---	$\mu A$
Side Mode Suppression Ratio	$SMSR$	30	---	---	dB

**General Receiver Characteristics**

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Output Voltage <sup>1</sup>	$\Delta V_o$	1.0	---	1.8	V
Differential Input Impedance <sup>2</sup>	$Z$	---	100	---	Ohm
Optical Return Loss	$OL$	14	---	---	dB
Rise/Fall Time (20% - 80%)	$T_r/T_f$	---	---	350	ps
Signal Detect Hysteresis	$P_{SD+} - P_{SD}$	1	---	---	dB
Crosstalk		---	---	-45	dB
Signal Detect Output - High	$V_{SD+}$	2.4	---	$V_{CC}$	V
Signal Detect Output - Low	$V_{SD-}$	0	---	0.5	V

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.

**Transmitter Electro-Optical Characteristics**

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power <sup>1</sup>	$P_o$	-2	---	+3	dBm
Optical Wavelength (BD5-1250T1R7-AT80K)	$\lambda_o$	1500	1510	1520	nm
Optical Wavelength (BD5-1250T7R1-AT80K)	$\lambda_o$	1560	1570	1580	nm
Extinction Ratio	$ET$	9	---	---	dB
Spectral Width (-20dB)	$\Delta\lambda$	---	---	1	nm

**Receiver Electro-Optical Characteristics**

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Wavelength (BD5-1250T1R7-AT80K)	$\lambda_c$	1560	1570	1580	nm
Optical Wavelength (BD5-1250T7R1-AT80K)	$\lambda_c$	1510	1520	1530	nm
Receiver Overload	$P_{max}$	-1	---	---	dBm
Receiver Sensitivity <sup>2</sup>	$P_i$	---	---	-26	dBm
Signal Detect- Asserted	$P_{SD+}$	---	---	-26	dBm
Signal Detect- Deasserted	$P_{SD-}$	-35	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125  $\mu$ m SMF.
2. Test at 1.25 Gb/s, 2<sup>7</sup> – 1 PRBS data pattern, and > 1x10<sup>-12</sup> of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with IEEE 802.3z standard.
4. Maximum supply current for the transceiver from Vcc is 300 mA.

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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