



# LTB3450 1250 Mb/sec BX10-U P2P Upstream 2x5 SFF E-PON Transceiver, 10 km

The LTB3450 E-PON upstream transceiver module has been designed for low cost point-to-point (P2P) Fiber to the Home, Business or Curb (FTTx) systems employing high-speed CW mode receivers/transmitters in 1250 Mb/sec symmetrical duplex data links. The device is based on the IEEE 802.3ah 1000BASE BX-10U specification for bi-directional communications over a single fiber and incorporates a high performance 1310 nm CW mode F-P transmitter and 1490 nm CW mode PIN/TIA receiver. It is capable of serving in advanced P2P FTTH equipment over distances of up to 10 km. The LVTTTL compatible Tx Disable feature controls the laser transmitter and the Rx Signal Detect feature monitors the status of the receiver. The industry standard 2x5 small form factor (SFF) package incorporates a pigtail fiber with SC/APC or SC/PC connector and is fabricated with a rugged die cast metal housing and cage assembly and operates over the extended temperature range from -40 to +85 degrees Centigrade.



### Applications

Gigabit Ethernet Access Networks  
Fiber to the FTTx:  
Home  
Curb  
Node  
Business  
Office  
Point to Point Service (P2P)

### Features

1250 Mb/s Upstream Transmit  
1310 nm F-P Laser  
CW mode  
1250 Mb/s Downstream Receive  
1490 nm PIN/TIA  
CW Mode  
Single 3.3 Volt DC Supply  
IEEE 802.3ah 1000BASE BX-10U  
Reach: 10 km  
2x5 SFF Package Outline  
Dual Wavelength (WDM)

Single Fiber, Full Duplex Operation

Operating Temperature Ranges

Commercial 0° to 70° C

Extended -10° to 80° C

Industrial -40° to 85° C

Data and Control Interfaces

Tx\_DATA LVPECL Differential

Rx\_DATA LVPECL Differential

Rx\_SD LVTTTL Single Ended

Tx\_Disable LVTTTL Single Ended

BER <10<sup>-12</sup> (PRBS = 2<sup>7</sup>-1)

Recommended Operating Conditions					
Parameter	Symbol	Min	Typ	Max	Units
Ambient Operating Temperature	T <sub>amb</sub>	-40	25	+85	°C
DC Supply Voltage	V <sub>CC</sub>	3.135	3.3	3.465	Volts
Module Supply Current	I <sub>IN</sub>	-	150	200	mA
Module Power Dissipation	P <sub>D</sub>	-	500	700	mW
Signaling Speed +/- 100 ppm	S	-	1.25	-	GBd

Ordering Information				
Part Number	Package Option (X)		Temperature Option (Y)	
<b>LTB3450 XY</b>	<b>A</b>	Pigtail, no connector	<b>C</b>	Commercial
	<b>B</b>	Pigtail, SC/APC	<b>E</b>	Extended
	<b>C</b>	Pigtail, SC/PC	<b>H</b>	Industrial



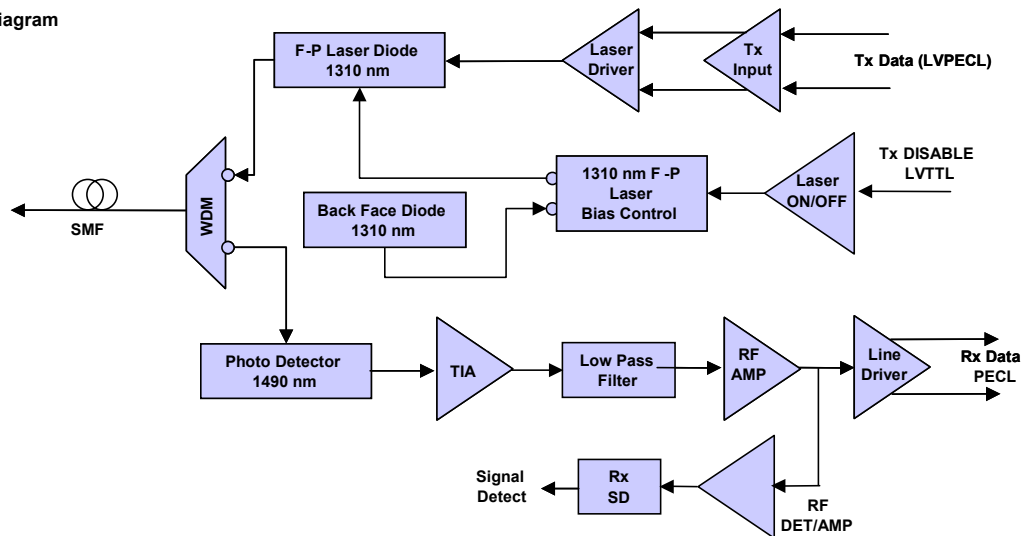
Absolute Maximum Ratings					
Parameter	Symbol	Min	Max	Units	Notes
Storage Temperature	T <sub>stg</sub>	-40	+85	°C	Exceeding the Absolute Maximum Ratings may cause irreversible damage to the device.
Operating Temperature	T <sub>O</sub>	-40	+85	°C	
Relative Humidity - Storage	RH <sub>S</sub>	0	95	%	
Relative Humidity - Operating	RH <sub>O</sub>	0	85	%	The device is not intended to be operated under the condition of simultaneous Absolute Maximum Ratings, a condition which may cause irreversible damage to the device.
DC Supply Voltage	V <sub>CC</sub>	0	3.6	V	
Soldering Temperature	T <sub>slid</sub>	0	260	°C	
Soldering Duration	t <sub>slid</sub>	0	10	sec	

Absolute Maximum Ratings: Control Function Logic Levels					
Tx_DISABLE Logic HIGH State	Tx_DIS	-	VCC+0.5	V	LVTTTL
Rx_SD Logic HIGH State	Rx_SD	-	VCC+0.5	V	LVTTTL

Transmitter Electrical Specifications						
Parameter	Symbol	Min	Typ	Max	Unit	Conditions / Notes
Tx DC Supply Current	I <sub>CC</sub>	-	-	150	mA	
Tx_Data Differential Input Voltage	V <sub>IH</sub> , V <sub>IL</sub>	300	-	-	mV p-p	LVPECL Tx_DATA Electrical Signal
Tx_DIS = HIGH (Transmitter OFF)	V <sub>OH</sub>	2.4	-	3.3	V	LVTTTL
Tx_DIS = LOW (Transmitter ON)	V <sub>OL</sub>	0	-	0.8	V	LVTTTL

Receiver Electrical Specifications						
Parameter	Symbol	Min	Typ	Max	Unit	Conditions / Notes
Rx DC Supply Current	I <sub>RX</sub>	-	-	125	mA	
Rx_Data Differential Output Voltage	V <sub>IH</sub> , V <sub>IL</sub>	600	-	1900	mV p-p	LVPECL Rx_DATA Electrical Signal
Rx_Data Output Rise / Fall Time	t <sub>r</sub> / t <sub>f</sub>	-	156	260	ps	20% to 80%
Rx_SD = HIGH (Receiver ON)	V <sub>OH</sub>	2.4	-	3.3	V	LVTTTL
Rx_SD = LOW (Receiver OFF)	V <sub>OL</sub>	0	-	0.8	V	LVTTTL

**LTB3450 Block Diagram**

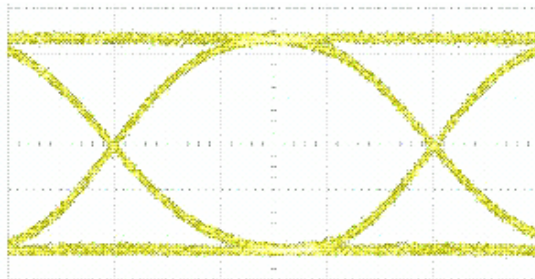




Transmitter Optical Specification						
Parameter	Symbol	Min	Typ	Max	Units	Conditions / Notes
Transmitter Type		1310 nm F-P CW Mode				
Average Output Power (9/125 $\mu$ SMF)	P <sub>out</sub>	-9	-	-3	dBm	
Optical Rise and Fall Time	t <sub>r</sub> / t <sub>f</sub>	-	150	260	ps	20% to 80%
Tx Wavelength	$\lambda$	1260	1310	1360	nm	
Spectral Line Width	$\Delta\lambda$	-	-	3.5	nm	IEEE 802.3ah Compliant
Extinction Ratio	ER	6	9	-	dB	
Relative Intensity Noise	RIN	-	-	-113	dB/Hz	
Optical Return Loss	RL	-	-	15	dB	
Total Jitter	T <sub>j</sub>	-	-	0.2	UI	
Optical Cross Talk	C <sub>RT</sub>	-	40	-	dB	
Transmit Reflectance	RFL	-	-	-12	dB	

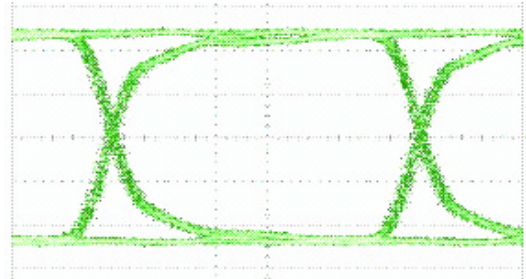
Receiver Optical Specifications						
Parameter	Symbol	Min	Typ	Max	Units	Conditions / Notes
Receiver Type		1490 nm P-I-N/TIA CW Mode				
Wavelength	$\lambda$	1480	1490	1500	nm	
Received Optical Power	P <sub>in</sub>	-20	-	-3	dBm	BER < 10 <sup>-10</sup> , 1250 Mb/s, PRBS 2 <sup>23</sup> -1
Maximum Input Optical Power	P <sub>in(max)</sub>	-	-	0	dBm	Damage Threshold
OMA Receiver Sensitivity	P <sub>in</sub>	-	-	-20	dBm	
Receiver Reflectance	RFL	-	-	-12	dB	
Stressed Receiver Sensitivity	P <sub>in</sub>	-	-	-17	dBm	
OMA Stressed Receiver Sensitivity	P <sub>in</sub>	-	-	-16.3	dBm	
	P <sub>in</sub>	-	-	24	$\mu$ W	
Vertical Eye Closure Penalty	VEP	1.5	-	-	dB	

Eye Diagram



**Transmitter Test Conditions**

- Optical Output Power = -5 dBm
- Test Pattern = 2<sup>7</sup>-1 NRZ PRBS



**Receiver Test Conditions**

- Optical Input Power = -17 dBm
- Test Pattern = 2<sup>7</sup>-1 NRZ PRBS



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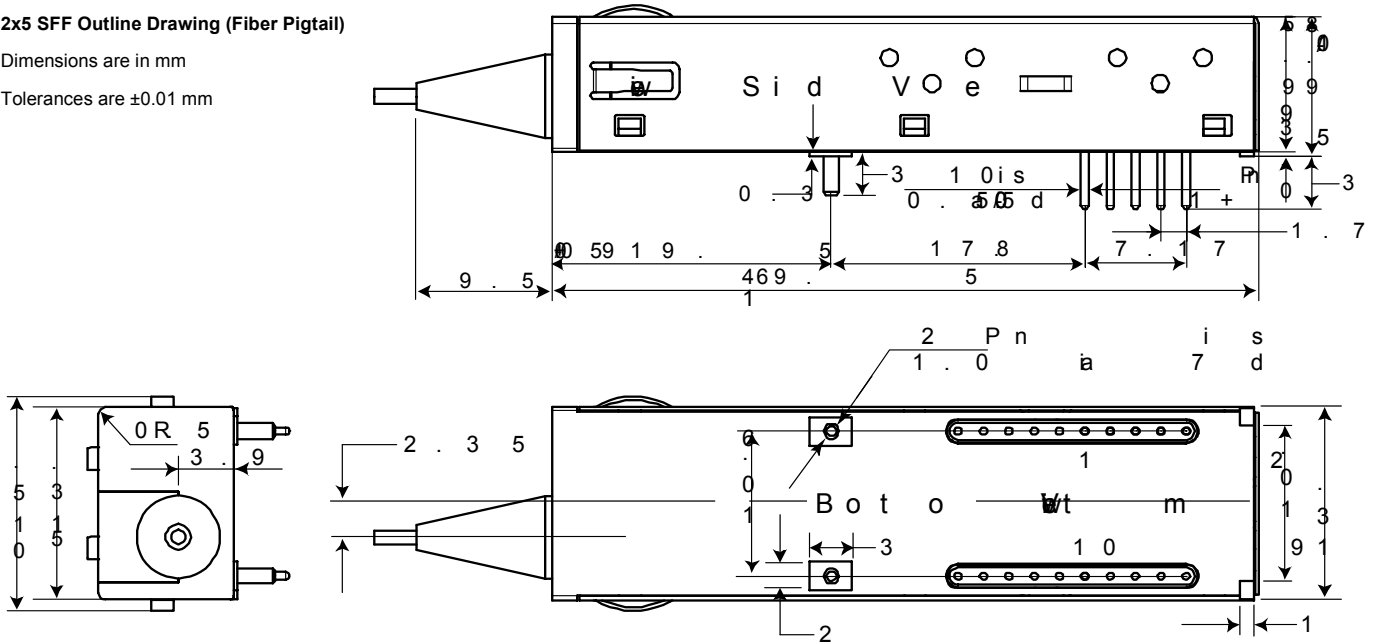
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# LTB3450 1250 Mb/sec BX10-U P2P Upstream 2x5 SFF E-PON Transceiver, 10 km

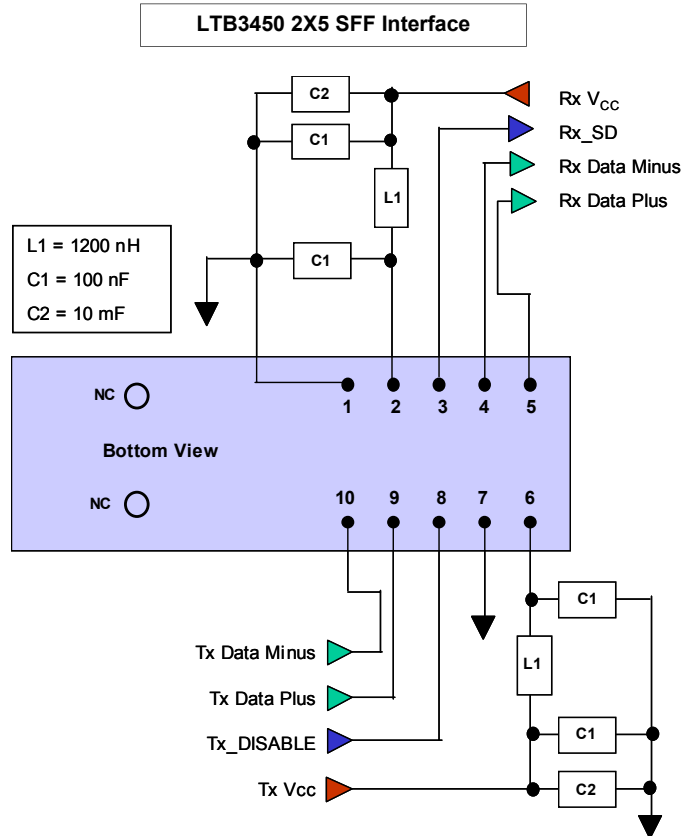
## 2x5 SFF Outline Drawing (Fiber Pigtail)

Dimensions are in mm

Tolerances are  $\pm 0.01$  mm



SFF PIN ASSIGNMENT		
Pin	Symbol	Description
1	$V_{EER}$	Receiver Signal Ground
2	$V_{CCR}$	+3.3 Volt Receiver Power Supply
3	$Rx\_SD$	CW Mode Receiver Signal Detect
4	$RD-$	Rx Data - Inverted Differential Output
5	$RD+$	Rx Data - Non Inverted Differential Output
6	$V_{CCT}$	+3.3 Volt Transmitter Power Supply
7	$V_{EET}$	Transmitter Signal Ground
8	$Tx\_DIS$	Burst Mode Transmitter Disable
9	$TD+$	Tx Data - Non Inverted Differential Input
10	$TD-$	Tx Data - Inverted Differential Input
Mounting Posts		The mounting posts are provided for mechanically attaching the transceiver to the circuit board. They should not be connected to the circuit ground but can be connected to the chassis
Housing Leads		The housing leads should be connected to





## LTB3450 1250 Mb/sec BX10-U P2P Upstream 2x5 SFF E-PON Transceiver, 10 km

### Eye Safety

The transceiver is a Class 1 eye-safe device according to FDA 21CFR1040.10 and 1040.11, IEC 60825-1 and IEC 60825-2.

### Electromagnetic Interference (EMI), Immunity and Product Safety

The transceiver is ESD safe (electrical pins) when tested according to MIL-STD-883, Method 3015.4 and ESD safe (optical connector) when tested according to IEC 61000-4-2. The device is immune to strong RF fields when tested in accordance with IEC 610004-3. The device complies with (US) FCC, Part 15, Subpart J; (Europe) CENELEC EN 55022; (Canada) Class B (CISPR22A); and (Japan) VCCI Class 1. The device has been designed to conform to product safety requirements including UL1950, CSA 22.2, and IEC 60950, and has been designed to meet the flammability requirements of UL94.

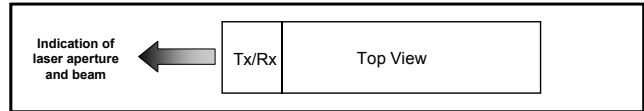
### Notice

The factory has made all adjustments to this device prior to shipment. No adjustments or modifications to the device are required or permitted. Any adjustment, modification or tampering of the device voids the product warranty. The US Food and Drug Administration may consider that any adjustment or modification to this device is an act of manufacturing and therefore will require that the device be recertified in accordance with 21 CFR 1040.10 Subpart j.

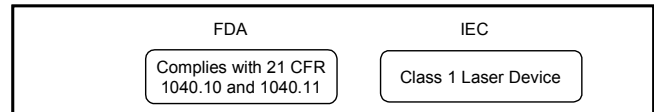
### Required Label and Laser Emission

This device is labeled in accordance with FDA and IEC requirements for laser safety.

#### Required Label



#### Laser Emission



Laser Radiation Information	
Wavelength	1310 nm
FDA Total Optical Pout : 7 mm aperture at 20 cm distance	< 195 microwatts
IEC Total Optical Pout: 7 mm aperture at 14 cm distance	< 15,600 microwatts
Beam Divergence	17.25°



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# LTB3450 1250 Mb/sec BX10-U P2P Upstream

## 2x5 SFF E-PON Transceiver, 10 km

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