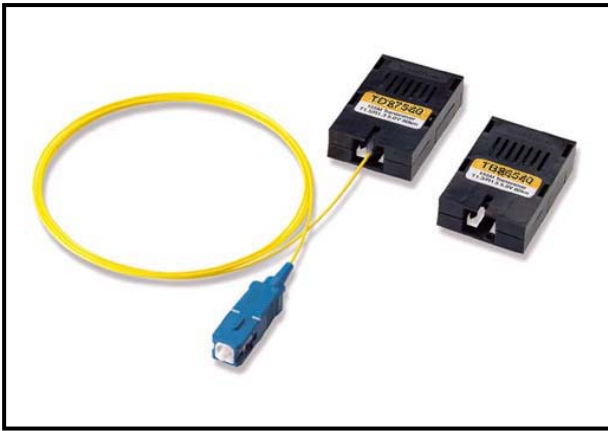


1.25Gbps Bi-Directional Transceiver TB8#xxx Series



- T1.3 μ m/R1.55 μ m or T1.55 μ m/R1.3 μ m Bi-Di transceiver with SMF
 - 1.25Gbps Gigabit Ethernet(1000Base-LX)
- Single +3.3V or +5V Power Supply
 - 1X9 package with SC Simplex or Pigtailed type

Family Model - x:3.3V or 5V

TB86x10/20/30/40 / TB87x10/20/30/40

TD86x10/20/30/40 / TD87x10/20/30/40

Features

- 1.31 μ m/1.55 μ m Bi-Directional transceiver with single mode fiber
- Compliant with IEEE 802.3z 1000BASE-LX specifications for Gigabit Ethernet
- Industry standard 1X9 package with SC connector or pigtailed module with SC connector
- Uncooled InGaAsP SMQW 1.31 μ m FP-LD, DFB-LD and 1.55 μ m DFB-LD
- High sensitive InGaAs PIN photodiode used at wavelengths from 1.1 μ m to 1.6 μ m
- Single +3.3V or +5V power supply
- LVPECL differential data inputs and outputs
- Operating temperature ; 0 to +70 $^{\circ}$ C/-40 to +85 $^{\circ}$ C
- Tested by Teradian's Reliability and Qualification Program
- Distance options
10km/20km/30km/40km with 9/125 μ m SMF

Description

The Tx8#xxx series transceivers are designed to meet the Gigabit Ethernet LX specifications. The transceivers are manufactured in 1x9 pin package with SC connector or pigtailed module with SC, FC, ST or LC connector interface.

The transmitter consists of a long wavelength (1.31 μ m or 1.55 μ m) InGaAsP SMQW laser diode (FP-LD or DFB LD) in an optical subassembly (OSA).

The OSA is driven by a custom IC which converts differential LVPECL logic signals into a laser diode drive current. The receiver includes a planar InGaAs PIN photodiode mounted with a transimpedance preamplifier IC in an OSA. The OSA is mated to a custom limiting-amplifier which provides post-amplification and signal detect function(active high).

The transceivers are designed to used in a single power supply(+3.3V or +5V) and an

operating temperature range of 0°C to +70°C or -40°C to +85°C.

Applications

- High-speed video link
- Private optical networks

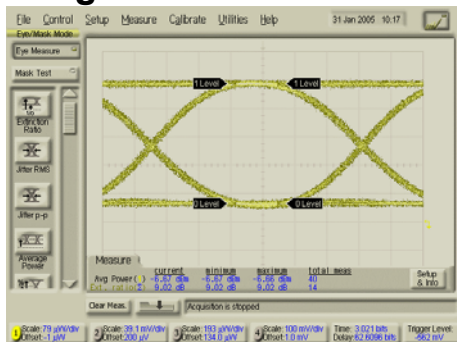
Absolute Maximum Ratings

Parameters	Symbol	Unit	Min.	Max.	Remarks
Ambient Operating Temperature	T _{op}	°C	0 -40	70 85	Indoor use Outdoor use
Storage Temperature	T _{stg}	°C	-40	85	
Supply Voltage	V _{CC} -V _{EE}	V	-	6.0	
Lead Soldering Temperature/Time		°C/sec		260/10	
Relative Humidity	RH	%	-	95	

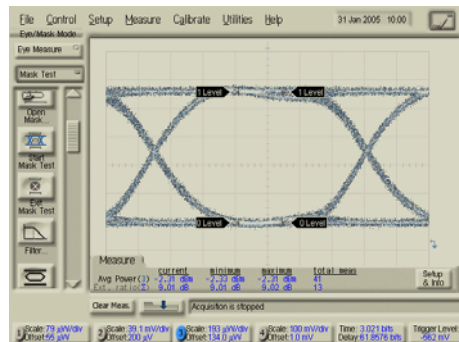
Electrical Characteristics

Parameters	Symbol	Unit	Min.	Typ.	Max.	Remarks
DC Power Supply Voltage	V _{CC} -V _{EE}	V	3.1 4.75	3.3 5	3.5 5.25	3.3V 5V
DC Power Supply Current	I _{CC,TX} I _{CC,RX}	mA	35 95		120 115	5V option
Input Data Voltage	Low High	V _{IL} - V _{CC} V _{IH} - V _{CC}	-1.810 -1.165		-1.475 -0.880	3.3V/5V
Output Data Voltage	Low High	V _{OL} - V _{CC} V _{OH} - V _{CC}	-1.892 -1.051		-1.548 -0.879	3.3V/5V
SD Output Voltage	Low High	V _{SD, Low} V _{SD, High}	- 2.20		0.50 -	3.3/5V TTL

Eye Diagram



a. Tx : 1.3µm



b. Tx : 1.55µm

Fig. 1 Back-to-back

Optical Characteristics

(T_{op} = 25°C)

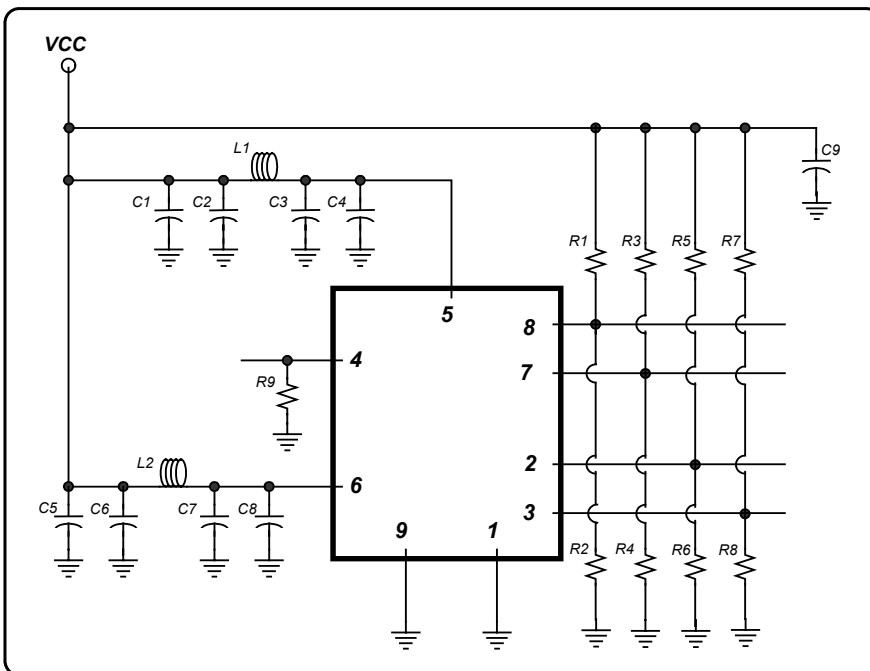
Parameters	Symbol	Condition	Unit	Min.	Typ.	Max.	Remark
Data Bit Rate		PRBS 2 ⁷ -1,NRZ	Gbps		1.25		
Fiber Length 9μm core SMF		10 ⁻¹⁰ BER, 1.25Gbps	km	1 10 20 30 40			1.3FP/1.5FP 1.3FP/1.5DFB 1.3FP/1.5DFB 1.3DFB/1.5DFB 1.3DFB/1.5DFB
TRANSMITTER							
Average Power Output	P _{OUT}	I _f =I _{BIAS} + I _{mod} /2	dBm	-9.5 -7 -1 -4	-7.5 -5 0 -3	-3.0 -3 1 -1	*10km 20km 40km(1.3DFB) 40km(1.5DFB)
Extinction Ratio	ER		dB	9			
Center Wavelength	λ _C	CW, @ P _{OUT}	nm	1290 1300 1290 1530	1310 1310 1310 1550	1330 1320 1330 1570	*10km(FP) 20km(FP) 1.3 DFB 1.5 DFB
Spectral Width	Δλ	RMS Width Max. -20dB WD	nm			2.8 2.0 1.0	*10km(FP) 20km(FP) DFB-LD
Side Mode Suppression Ratio	SMSR		dB	30			DFB-LD
Optical Rise/Fall Time	t _r /t _f	20 – 80%	nsec			0.26	
RECEIVER							
Sensitivity (Average Input Power)	P _{IN,MIN}	PRBS 2 ⁷ -1, 10 ⁻¹² BER	dBm			-19 -20 -21 -23	1km 10km 20km 40km
Wavelength	λ		nm	1500 1260	1550 1310	1600 1360	@1.55μm @1.31μm
Receiver Overload	P _{IN,MAX}		dBm	-3.0			
Signal Detect Threshold Decreasing light input Increasing light input	P _D P _A		dBm dBm	-35		-20	
Signal Detect Hysteresis	P _A - P _D		dB	0.5	2.0		

Pin Descriptions

Pin No.	Symbol	Description	Level/Logic
1	V _{EER}	Rx Ground	Power supply
2	RD+	Rx Data out(+)	PECL
3	RD-	Rx Data out(-)	PECL
4	SD	Rx Signal detect. (HIGH level for normal operation)	TTL output
5	V _{CCR}	Rx Power supply	Power supply
6	V _{CCT}	Tx Power supply	Power supply
7	TD-	Tx Data in(-)	PECL
8	TD+	Tx Data in(+)	PECL
9	V _{EET}	Tx Ground	Power supply

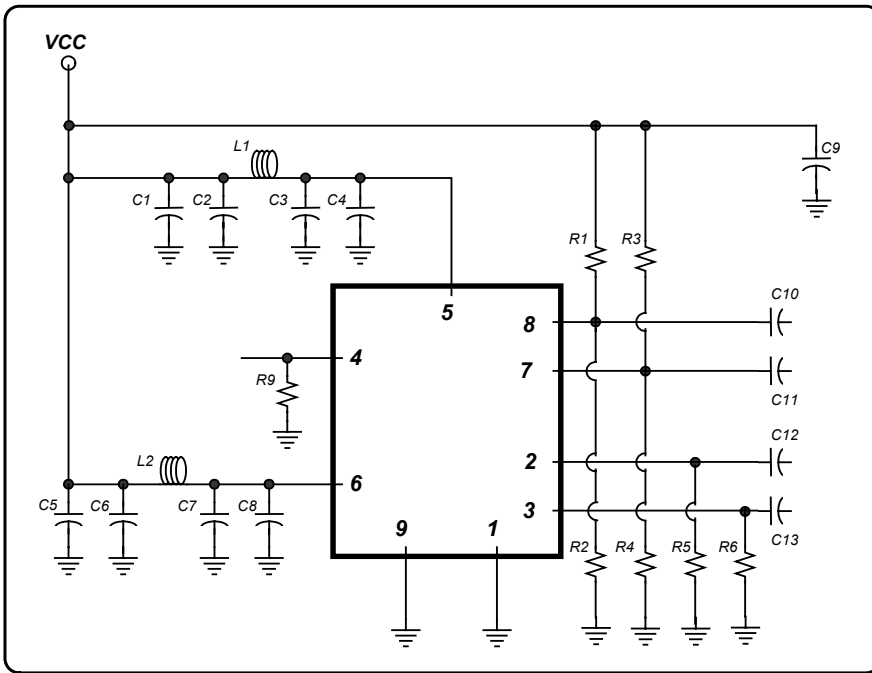
Recommended Interface Circuit

The transceiver can operate with PECL logic level. The interface circuit with direct-coupled PECL interface is shown in Figure 1. When interfacing with non-PECL logic level, AC coupling can be used as shown in Figure 2. The Signal Detect circuit monitors the incoming optical signal and generates a logic LOW signal when the optical signal is lower than a predefined level. The power supply filters are required for good EMI performance and should be as close to the transceiver as possible.



- C1=C4=C5=C8=10uF,
- C2=C3=C6=C7=0.1uF,
- C9=0.1uF
- L1=L2=1.0uH or Ferrite inductor
- R1=R3=R5=R7=82Ω (5.0V/3.3V)
- R2=R4=R6=R8=130Ω (5.0V/3.3V)
- R9(TTL/ Default)=N/C (PECL)=510Ω(5.0V) 270Ω(3.3V)

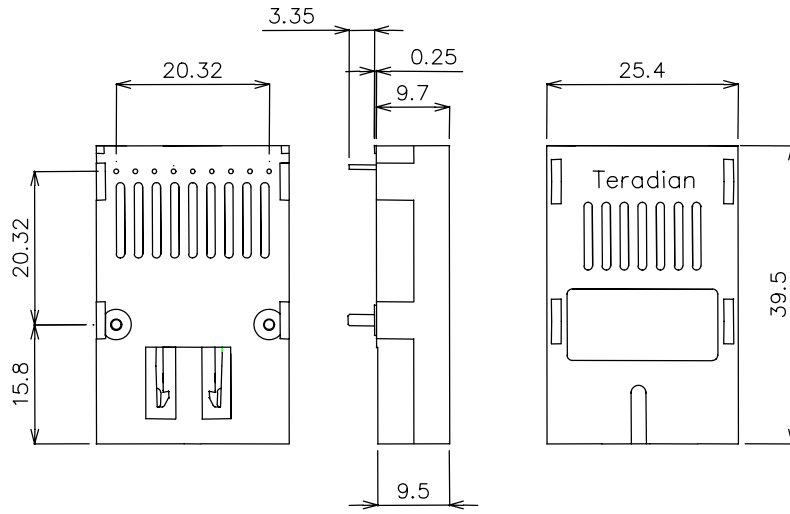
Fig. 2 DC-Coupled PECL Interface



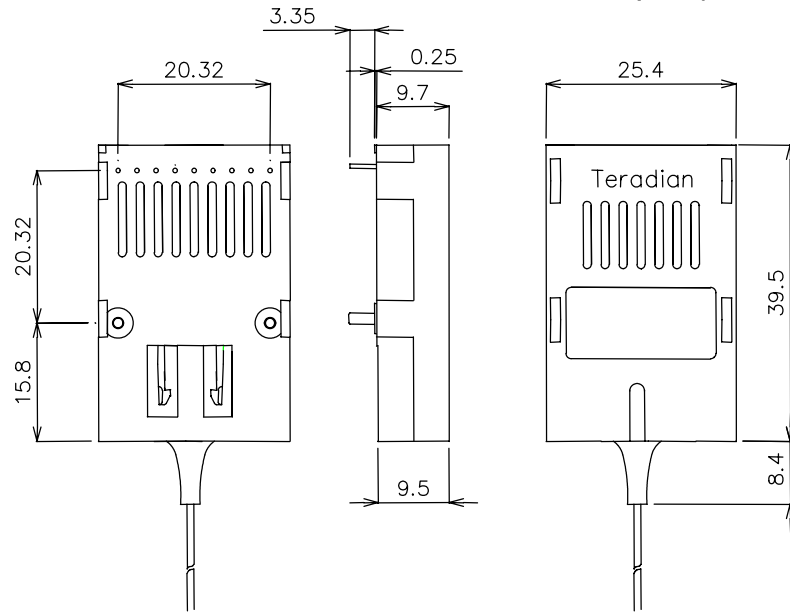
$C1=C4=C5=C8=10\mu\text{F}$,
 $C2=C3=C6=C7=0.1\mu\text{F}$,
 $C9=0.1\mu\text{F}$
 $L1=L2=1.0\mu\text{H}$ or
 Ferrite inductor
 $C10=C11=C12=C13$
 $=0.1\mu\text{F}$
 $R1=R3=68\Omega(5.0\text{V})$
 $82\Omega(3.3\text{V})$
 $R2=R4=180\Omega(5.0\text{V})$
 $130\Omega(3.3\text{V})$
 $R5=R6=270\Omega(5.0\text{V})$
 $142\Omega(3.3\text{V})$,
 $R9(\text{TTL/ Default})=N/C$
 $(\text{PECL})=510\Omega(5.0\text{V})$
 $270\Omega(3.3\text{V})$

Fig. 3 AC-Coupled PECL Interface

Outline Diagram



a. TBxxxx Series Bi-Directional transceiver module(receptacle type)



b. TDxxxx Series Bi-Directional transceiver module(Pigtailed type)

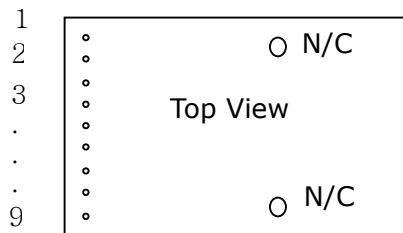


Fig.4 SC Simplex Transceiver Package Dimensions [unit: mm]

! Handling Caution

The transceiver can be damaged by overvoltage and current surges. Precautions should be taken for transient power supply.

This device is susceptible to damage as a result of electrostatic discharge(ESD). Take proper precautions during both handling and testing

! Caution

- All adjustments are made at the factory before shipment to our customers. No maintenance and alteration to device is required.
- Tampering with or modifying the performance of the modules will result in voided product warranty. It may also result in improper operation of the circuitry, and possible overstress of the semiconductor components. Device degradation or product failure may result.
- Use of controls or adjustments or procedures other than those specified herein (ex : Connection of the modules to a non-approved optical source, operating above the recommended absolute maximum conditions, operating in a manner inconsistent with unit design and function) may result in hazardous radiation exposure and may be considered an act of modifying or manufacturing a laser product. The person(s) performing such an act is required by law to recertify the laser product under the provisions of US 21CFR (Subchapter J).
- The use of optical instruments with this product will increase eye hazard.

Notice
On operation, If optical connectors are unterminated, modules can emit invisible laser radiation. Avoided eye exposure to direct or indirect radiation

Ordering Information

Com pany	Func- tion	Data Rate	Wavelength	Supply Voltage	Distance	Pin	Temp. Range	Shielding
T	B	8	6	3	20	9	I	N
Tera dian	B ;Bi-Di TRV. (Recep- tacle) D ;Bi-Di TRV. (Pig- tailed)	1 ;155Mbps 4 ;622Mbps F ;1.06Gbps 8 ;1.25Gbps S ;2.12Gbps G ;2.5Gbps T ;10Gbps A ;Asy. Bi-Di 622M/155M E ;Asy. Bi-Di 1.25G/155M O ;Order- made	3 ;1.3μm 5 ;1.55μm 6 ;Bi-Di T1.3/R1.5 7 ;Bi-Di T1.5/R1.3 8 ;850nm	3 ;3.3V 5 ;5V	SX ;Note1 01 ;1km 02 ;2km LX ;5km 10 ;10km 15 ;15km 20 ;20km 30 ;30km 40 ;40km 60 ;60km 80 ;80km	1 ;2X5 (10 pin) 2 ;2X10 (20 pin) 9 ;1X9 (9 pin)	I ;Indoor Use (0~70℃) O ;Outdoor Use (-40~ 85℃)	N ;No Shield M ;Metal coating

*Note 1 ;

- 220m with 62.5/125μm MMF @1.25Gbps
- 500m with 50/125μm MMF @1.25Gbps
- 200m with 62.5/125μm MMF @2.125Gbps

*Note 2 ; additional order information

- Connector type default is SC/PC and the default length of fiber is 1m
- In case of ordering pigtailed Bi-Di Transceiver, please specify specs. clearly if not default.

More Information

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