

## SDH/SONET 622Mbps Transceiver TV4xxxx(STM-4/OC-12)



- 1.3 $\mu$ m or 1.55 $\mu$ m SMF Transceiver
- SDH STM-4, SONET OC-12
- Data Rate of 622Mbps
- Single +3.3V or 5V Power Supply
- 1X9 Duplex SC Connector

### Family Model

TV43315 TV43340 TV45380 / TV43515 TV43540 TV45580

### Features

- Compliant with SONET OC-12 and ITU-T SDH STM-4 specifications
- Industry standard 1X9 package with duplex SC connector
- 1.3 $\mu$ m or 1.55 $\mu$ m uncooled InGaAsP SMQW Fabry-Perot(FP) LD or distributed feed-back(DFB) LD and APC for constant output power
- High sensitive InGaAs PIN photodiode used at wavelengths from 1.1 $\mu$ m to 1.6 $\mu$ 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  
15km/40km/80km with 9/125 $\mu$ m SMF

### Description

The TV4xxxx series transceivers are designed to meet the specifications of SONET OC-12 and ITU-T SDH rates of STM-4(622.08Mbps). The transceivers are manufactured in 1x9 pin package with duplex SC connector interface and made of plastic or metallized housing to obtain excellent EMI shielding.

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

Used in telecommunication and data communication systems, from medium to high speed for intra-office, short-haul inter-office and long-haul inter-office applications.

- Intra-office and Inter-office SONET/ITU-T SDH
- Fiber in the loop(FTTO, FTTC, FTTH etc.)
- Subscriber loops
- High-speed data links, Single-mode FDDI
- Private optical networks
- ATM

## 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	-0.5	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 mA	35 95		140 115	5V option		
Input Data Voltage	Low High	$V_{IL}-V_{CC}$ $V_{IH}-V_{CC}$	V	-1.810 -1.165	-1.475 -0.880	3.3V/5V		
Output Data Voltage	Low High	$V_{OL}-V_{CC}$ $V_{OH}-V_{CC}$	V	-1.892 -1.051	-1.548 -0.879	3.3V/5V		
Output SD Voltage	TTL option	Low	$V_{SD, Low}$	V	-	0.8	3.3V	
		High	$V_{SD, High}$	V	2.2	-		
		Low	$V_{SD, Low}$	V	-		0.8	5V
		High	$V_{SD, High}$	V	4.2		-	

Eye Diagram

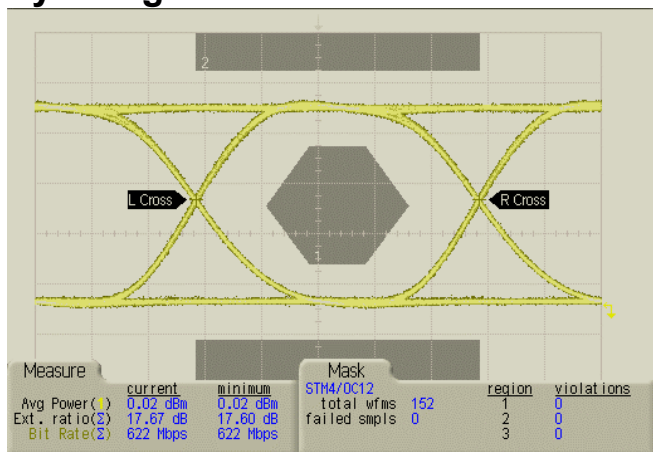


Fig. 1 Back-to-back

Optical Characteristics

(T<sub>op</sub> = 25°C)

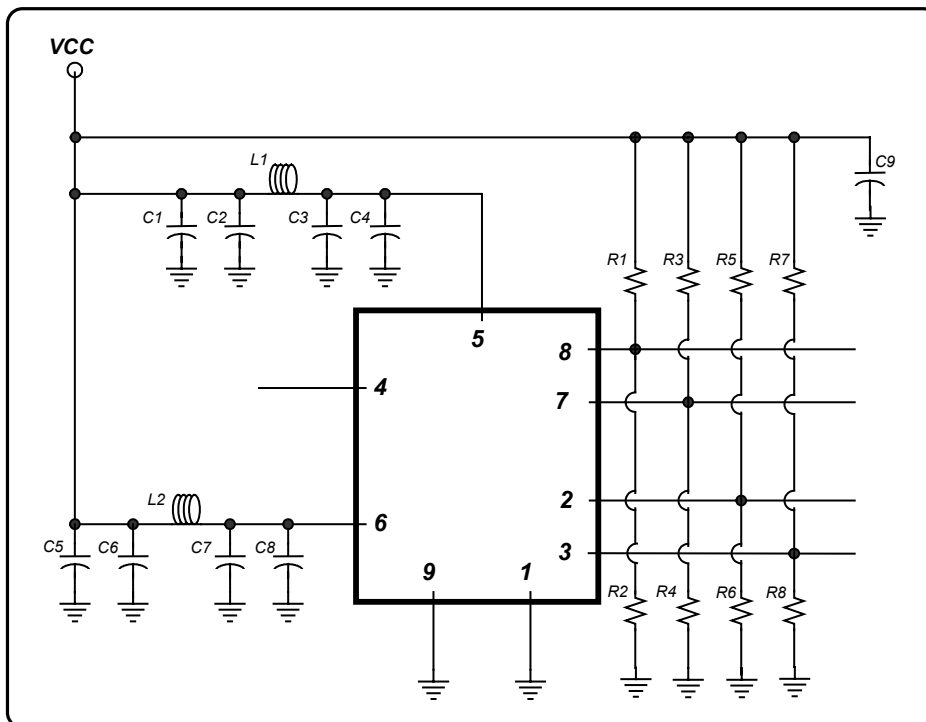
Parameters	Symbol	Condition	Unit	Min.	Typ.	Max.	Remark
Data Bit Rate		PRBS 2 <sup>23</sup> -1,NRZ	Mbps		622.08		
Fiber Length 9μm core SMF		10 <sup>-10</sup> BER, 622Mbps	km	15		40* 80*	* option @1.3μm @1.55μm
<b>TRANSMITTER</b>							
Average Power Output	P <sub>OUT</sub>	I <sub>f</sub> =I <sub>BIAS</sub> + I <sub>mod</sub> /2	dBm	-15 -3	-10 -1	-8 +2	15km 40/80km
Extinction Ratio	ER		dB	10	12		
Center Wavelength	λ <sub>c</sub>	CW, @ P <sub>OUT</sub>	nm	1293 1280 1480	1310 1310 1550	1334 1335 1580	15km 40km 80km
Spectral Width	Δλ	RMS Width Max. -20dB WD	nm		2.5	4.0 1.0	FP-LD DFB-LD
Side Mode Suppression Ratio	SMSR		dB	30			40/80km
Optical Rise/Fall Time	t <sub>r</sub> /t <sub>f</sub>	10 - 90%	nsec			0.5	
<b>RECEIVER</b>							
Sensitivity (Average Input Power)	P <sub>IN,MIN</sub>	PRBS 2 <sup>23</sup> -1, 10 <sup>-10</sup> BER	dBm		-30	-28	
Receiver Overload	P <sub>IN,MAX</sub>		dBm	-3.0			
Signal Detect Threshold Decreasing light input Increasing light input	P <sub>D</sub> P <sub>A</sub>		dBm dBm	-36		-28	
Signal Detect Hysteresis	P <sub>A</sub> - P <sub>D</sub>		dB	0.5	1.0		
Receiver Reflectance	R		dB			-27	80km

## Pin Descriptions

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

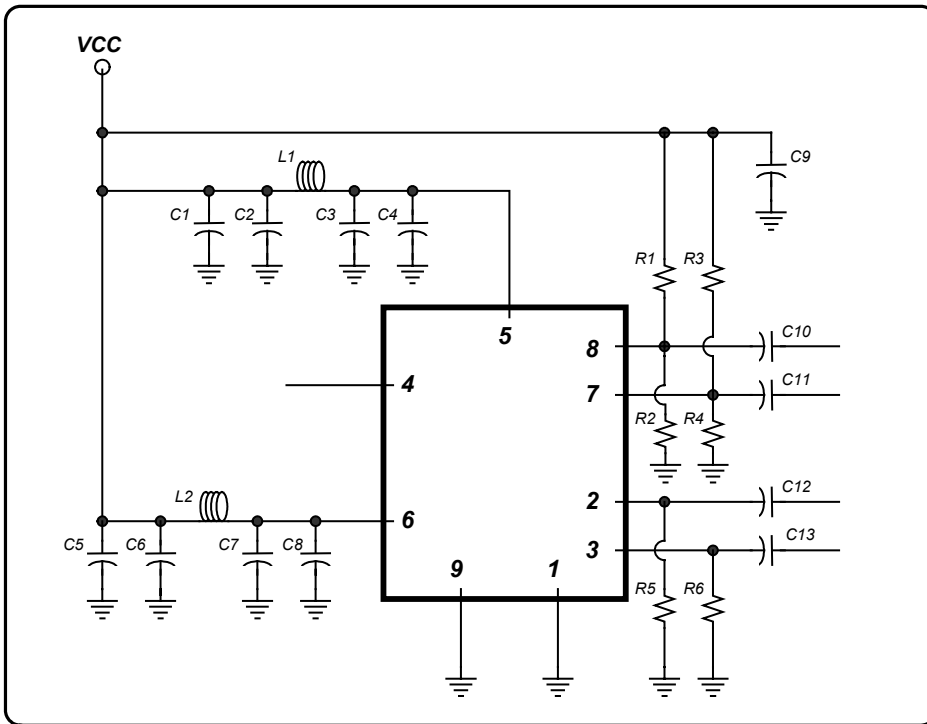


C1=C4=C5=C8=10uF,  
C2=C3=C6=C7=0.1uF,  
C9=0.1uF,

L1=L2=1.0uH or  
Ferrite inductor

R1=R3=R5=R7=82Ω  
(5.0V) or 82Ω (3.3V),  
R2=R4=R6=R8=130Ω  
(5.0V) or 130Ω (3.3V),

Fig. 2 DC-Coupled PECL Interface



$C1=C4=C5=C8=10\mu F$ ,  
 $C2=C3=C6=C7=0.1\mu F$ ,  
 $C9=0.1\mu F$ ,  $R1=R3=68\Omega$   
 (5.0V) or  $82\Omega$  (3.3V),  
 $R2=R4=180\Omega$ (5.0V)  
 $130\Omega$  (3.3V),  
 $R5=R6=270\Omega$  (5.0V)  
 or  $142\Omega$  (3.3V),  
 $C10=C11=C12=C13=0$   
 $.1\mu F$ ,  
 $L1=L2=1.0\mu H$   
 or Ferrite inductor

Figure 3. AC-Coupled PECL Interface.

Outline Diagram

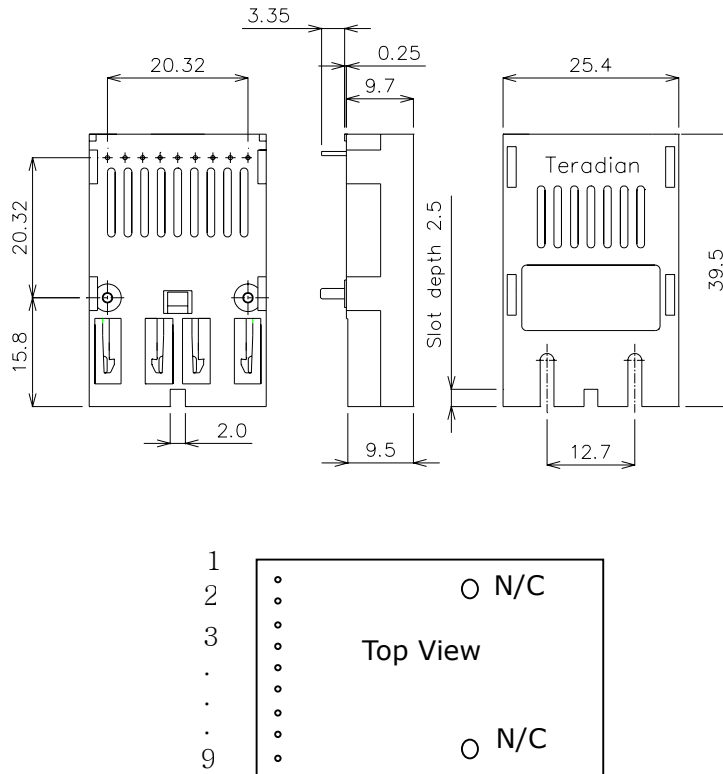


Fig.4 SC duplex Transceiver Package Dimensions [unit: mm]

## **! 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
<b>T</b>	<b>V</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>15</b>	<b>9</b>	<b>I</b>	<b>N</b>
Terad ian	<b>V</b> ;TRV <b>S</b> ;SFF <b>F</b> ;SFP  <b>B</b> ;Bi-Di TRV. (Recep- tacle)  <b>D</b> ;Bi-Di TRV. (Pig- tailed)	<b>1</b> ;155Mbps <b>4</b> ;622Mbps <b>F</b> ;1.06Gbps <b>8</b> ;1.25Gbps <b>S</b> ;2.12Gbps <b>G</b> ;2.5Gbps  <b>A</b> ;Asy. Bi-Di 622M/155M <b>E</b> ;Asy. Bi-Di 1.25G/155M  <b>O</b> ;Order- made	<b>3</b> ;1.3μm <b>5</b> ;1.55μm <b>6</b> ;Bi-Di T1.3/R1.5 <b>7</b> ;Bi-Di T1.5/R1.3 <b>8</b> ;850nm <b>A</b> ;1470nm <b>B</b> ;1490nm <b>C</b> ;1510nm <b>D</b> ;1530nm <b>E</b> ;1550nm <b>F</b> ;1570nm <b>G</b> ;1590nm <b>H</b> ;1610nm  <b>M</b> ;1270nm <b>N</b> ;1290nm <b>O</b> ;1310nm <b>P</b> ;1330nm <b>Q</b> ;1350nm <b>R</b> ;1370nm <b>S</b> ;1390nm <b>T</b> ;1410nm <b>U</b> ;1430nm <b>W</b> ;1450nm	<b>3</b> ;3.3V <b>5</b> ;5V	<b>SX</b> ;Note1 <b>02</b> ;2km <b>LX</b> ;5km <b>10</b> ;10km <b>15</b> ;15km <b>20</b> ;20km <b>30</b> ;30km <b>40</b> ;40km <b>60</b> ;60km <b>80</b> ;80km <b>A0</b> ;100km <b>C0</b> ;120km	<b>1</b> ;2X5 (10 pin) <b>2</b> ;2X10 (20 pin) <b>9</b> ;1X9 (9 pin)	<b>I</b> ;Indoor Use (0~70℃) <b>O</b> ;Outdoor Use (-40~85℃)	<b>N</b> ;No Shield <b>M</b> ;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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