

SDH/SONET 2.5Gpbs CWDM Transceiver TSG#3xx(STM-16/OC-48)



- 1470 ~ 1610nm CWDM Transceiver with 20nm spacing
- SDH STM-16, SONET OC-48
Data Rate of 2.488Gbps
- Single +3.3V Power Supply
- 2X5 or 2X10 Duplex LC Connector

Family Model

TSGA340	TSGB340	TSGC340	TSGD340
TSGE340	TSGF340	TSGG340	TSGH340

Features

- Compliant with SONET OC-48 and ITU-T SDH STM-16 specifications
- Industry standard 2X5 or 2X10 package with duplex LC connector
- 1.47 μ m ~ 1.61 μ m uncooled InGaAsP SMQW distributed feed-back(DFB) LD with 20nm spacing
- High sensitive InGaAs PIN photodiode used at wavelengths from 1.1 μ m to 1.6 μ m
- Single +3.3V power supply and LVPECL differential data inputs/outputs
- Operating temperature ; 0 to +70 $^{\circ}$ C/-40 to +85 $^{\circ}$ C
- Tested by Teradian's Reliability and Qualification Program
- Wavelength options(8 channels with 20nm spacing)
1470nm/1490nm/1510nm/1530nm/1550nm/1570nm/1590nm/1610nm
- Distance options
40km with 9/125 μ m SMF

Description

The TSGX3XX series transceivers are designed to meet the specifications of SONET OC-48 and ITU-T SDH rates of STM-16(2.5Gbps). The transceivers are manufactured in 2x5 pin or 2X10 pin package with duplex LC connector interface and made of metallized housing to obtain excellent EMI shielding.

The transmitter consists of a long wavelength(1.3 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) 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.

- CWDM applications
- Intra-office and Inter-office SONET/ITU-T SDH
- High-speed data links
- Metropolitan Area Network

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	3.3	3.5	
DC Power Supply Current	$I_{CC,TX}$	mA	50		170	
	$I_{CC,RX}$	mA	60		90	
Input Data Voltage Swing (Single-ended)	$V_{IH}-V_{IL}$	mV	150		930	
Output Data Voltage Swing (Single-ended)	$V_{OH}-V_{OL}$	mV	590		900	
Transmit Disable Input Voltage	V_{TDIS}	Low			0.8	CMOS/TTL
		High	2.0			
Signal Detect Output Voltage	V_{SD}	Low	-		0.4	TTL
		High	2.4		-	

Eye Diagram

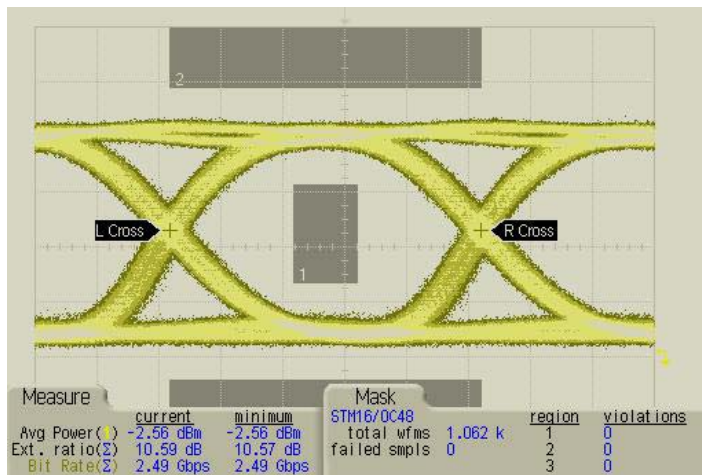


Fig. 1 Back-to-back (measured with 2.5Gbps filter)

Optical Characteristics

(T_{op} = 25°C)

Parameters	Symbol	Condition	Unit	Min.	Typ.	Max.	Remark
Data Bit Rate		PRBS 2 ²³ -1, NRZ	Gbps		2.488		
Fiber Length 9µm core SMF		10 ⁻¹⁰ BER, 2.488Gbps	km	40			
TRANSMITTER							
Average Power Output	P _{OUT}	I _f =I _{BIAS} + I _{mod} /2	dBm	-5.0	-3.0	0	
Extinction Ratio	ER		dB	8.2			
Center Wavelength	λ _c	CW, @ P _{OUT}	nm	1468 1488 1508 1528 1548 1568 1588 1608	1470 1490 1510 1530 1550 1570 1590 1610	1472 1492 1512 1532 1552 1572 1592 1612	TSGA3XX TSGB3XX TSGC3XX TSGD3XX TSGE3XX TSGF3XX TSGG3XX TSGH3XX
Side Mode Suppression Ratio	SMSR		dB	30			
Optical Rise/Fall Time	t _r /t _f	20 – 80%	nsec			0.17	
RECEIVER							
Sensitivity (Average Input Power)	P _{IN,MIN}	PRBS 2 ²³ -1, 10 ⁻¹⁰ BER	dBm		-21.0	-18.0	
Receiver Overload	P _{IN,MAX}		dBm	0			
Signal Detect Threshold Decreasing light input Increasing light input	P _D P _A		dBm dBm	-30		-20	
Signal Detect Hysteresis	P _A - P _D		dB	0.5			
Receiver Reflectance	R		dB			-27	

Pin Descriptions

Pin (2×10)	Pin (2×5)	Symbol	Function	Logic Family
1		V _{PD}	Photodetector(PD) Bias; optional feature If not use the input power monitoring function, connect this pin to power supply.	
2		V _{EE,RX}	Receiver(RX) Signal Ground	
3		V _{EE,RX}	Receiver Signal Ground	
4		N/C		
5		N/C		
6	1	V _{EE,RX}	Receiver Signal Ground	
7	2	V _{CC,RX}	Receiver Power Supply	
8	3	SD	Signal Detect. (Logic HIGH for normal operation)	TTL
9	4	RD-	Received Data Out Bar	LVPECL
10	5	RD+	Received Data Out	LVPECL
11	6	V _{CC,TX}	Transmitter(TX) Power Supply	
12	7	V _{EE,TX}	Transmitter Signal Ground	
13	8	TDis	Transmitter Disable (Logic LOW for normal operation)	TTL
14	9	TD+	Transmitter Data In	LVPECL
15	10	TD-	Transmitter Data In Bar	LVPECL
16		V _{EE,TX}	Transmitter Signal Ground	
17		Bmon(-)	Laser Diode Bias Current Monitor – Negative End	Analog
18		Bmon(+)	Laser Diode Bias Current Monitor – Positive End	Analog
19		Pmon(-)	Laser Diode Optical Power Monitor – Negative End	Analog
20		Pmon(+)	Laser Diode Optical Power Monitor – Positive End	Analog

Recommended Interface Circuit

The transceiver can operate with LVPECL logic level. The interface circuit with DC-coupled PECL interface is recommended as shown in Figure. The power supply filters are required for good EMI performance and should be as close to the transceiver as possible.

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 transmitter is normally enabled except when the TX DISABLE control input is level HIGH. The transmitter offers the functions of monitoring the laser diode bias current and the laser diode optical power. The voltage measured between pins 17 and 18 is proportional to the bias current through an internal 10Ω resistor. Similarly voltage between pins 19 and 20 is measured across an internal 200Ω resistor, which is proportional to the laser diode optical power.

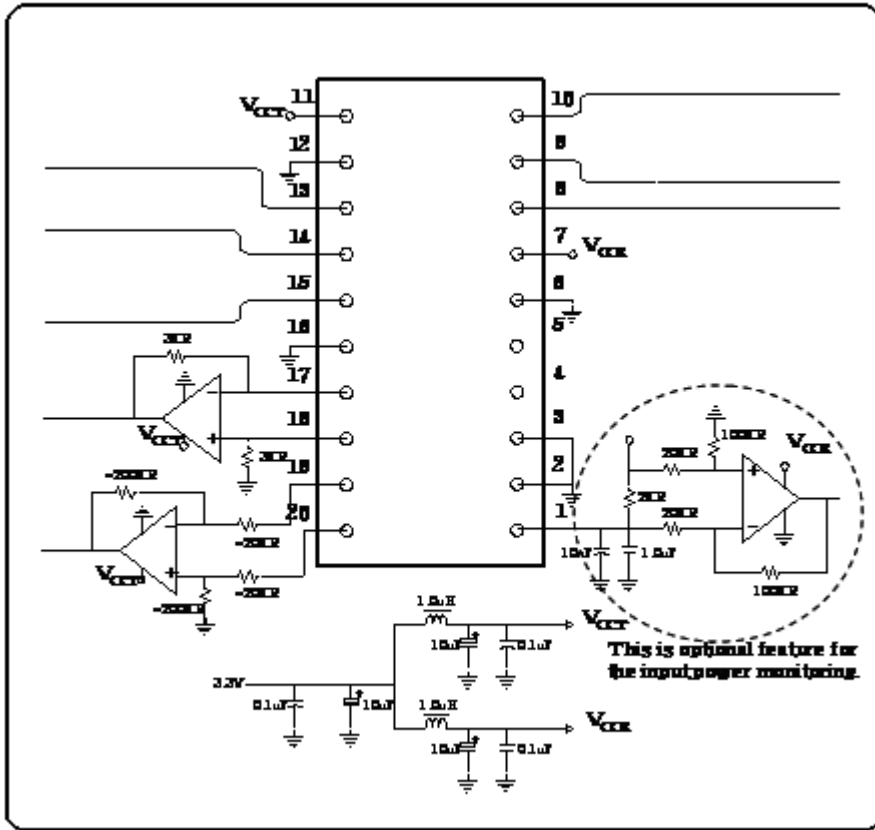


Fig. 2 DC-Coupled PECL Interface

Outline Diagram (2X5 or 2X10 pin)

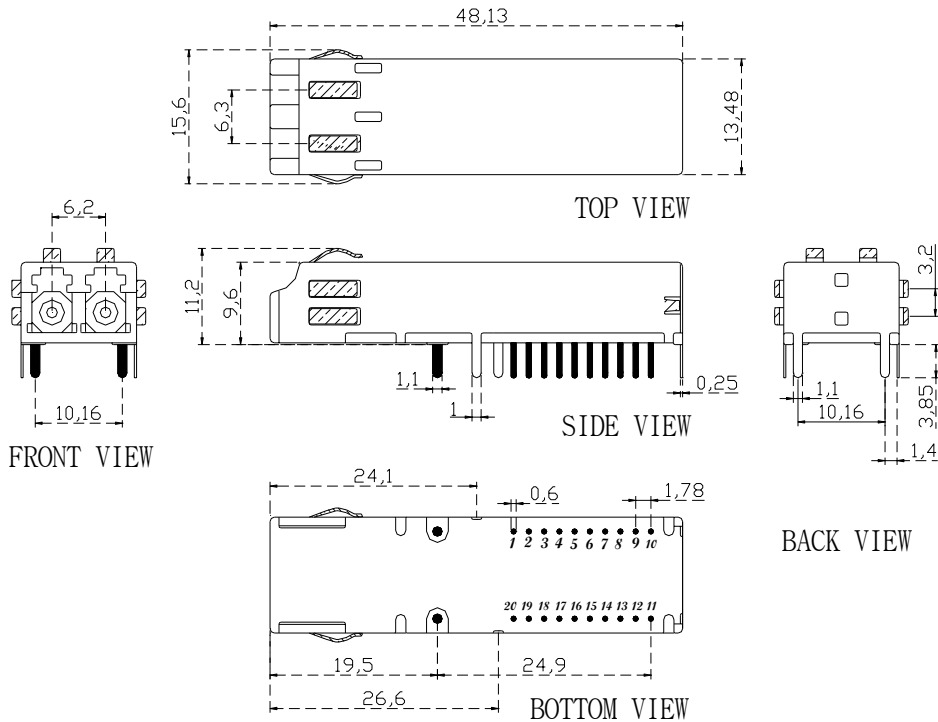
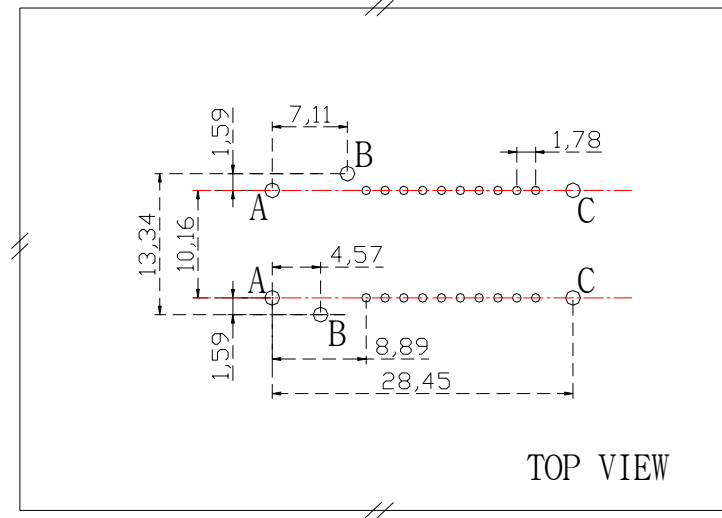


Fig.3 SFF Transceiver Package Dimensions [unit: mm]



Symbol	QTY	Diameter(mm)
A	2	1.40±0.1
B	4	1.40±0.1
C	10	0.78±0.1

Fig.4 Recommended PCB Layout & Hole size [unit : mm]

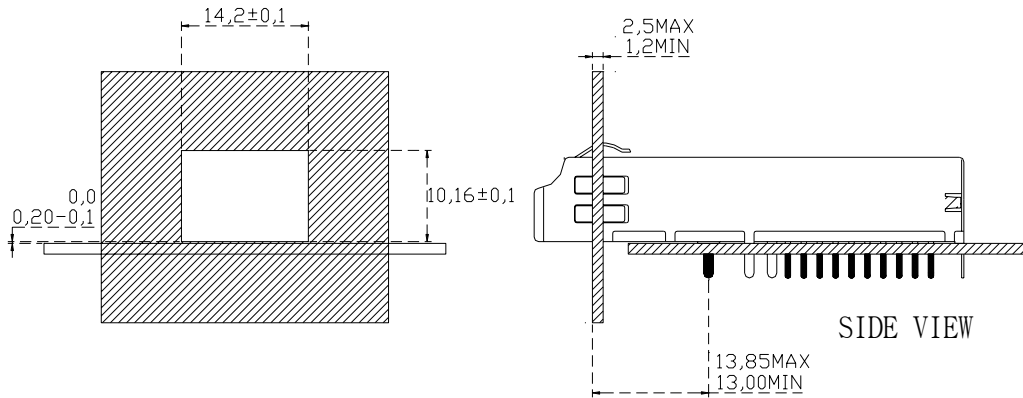


Fig.5 Bezel Opening Dimensions [unit: mm]

Ordering Information

Company	Function	Data Rate	Wavelength	Supply Voltage	Distance	Pin	Temp. Range	Shielding	
T	S	G	C	3	40	-	1	I	N
Teradion	V ;TRV S ;SFF F ;SFP B ;Bi-Di TRV. (Receptacle) D ;Bi-Di TRV. (Pig-tailed)	1 ;155Mbps 4 ;622Mbps F ;1.06Gbps 8 ;1.25Gbps S ;2.12Gbps G ;2.5Gbps A ;Asy. Bi-Di 622M/155M E ;Asy. Bi-Di 1.25G/155M O ;Order-made	3 ;1.3 μ m 5 ;1.55 μ m 6 ;Bi-Di T1.3/R1.5 7 ;Bi-Di T1.5/R1.3 8 ;850nm A ;1470nm B ;1490nm C ;1510nm D ;1530nm E ;1550nm F ;1570nm G ;1590nm H ;1610nm M ;1270nm N ;1290nm O ;1310nm P ;1330nm Q ;1350nm R ;1370nm S ;1390nm T ;1410nm U ;1430nm W ;1450nm	3 ;3.3V	SX ;Note1 02 ;2km LX ;5km 10 ;10km 15 ;15km 20 ;20km 30 ;30km 40 ;40km 60 ;60km 80 ;80km A0 ;100km C0 ;120km	1 ;2X5 (10 pin) 2 ;2X10 (20 pin) 9 ;1X9 (9 pin)	I ;Indoor Use (0~70 $^{\circ}$ C) O ;Outdoor Use (-40~85 $^{\circ}$ C)	N ;No Shield	

*Note 1 ;

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