



## **155Mbps TX:1310nm/RX:1550nm SMF 20km BiDi SFP LC Optical Transceiver**

**CS3T5-03H-3S-Tx-L**



### **DESCRIPTION**

The CS3T5-03H-3S-Tx-L is a 155Mbps bidirectional SFP optical transceiver designed for single-mode fiber (SMF) transmission over distances up to 20km. It features a 1310nm FP laser transmitter and a 1550nm PIN photodiode receiver, allowing full-duplex communication on a single strand of fiber via an LC connector.

### **FEATURES**

- Compliant with SONET/SDH standard
- Compliant with Fast Ethernet standard
- Small form pluggable (SFP) package
- Simplex LC connector
- Single power supply 3.3V
- Differential LVPECL inputs and outputs
- TTL signal detect indicator
- Hot pluggable
- Class 1 laser product compliant with EN 60825-1
- LD Type: 1310 FP

### **APPLICATIONS**

- Single-mode core fiber backbone links up to 20km
- S1.1 / Fast Ethernet

### **PRODUCT OVERVIEW**

<b>PART NUMBER</b>	<b>OPERATING TEMPERATURE</b>
CS3T5-03H-3S-TC-L	0°C to 70°C
CS3T5-03H-3S-TI-L	-40°C to 85°C

## DIAGNOSTICS

PARAMETER	RANGE	ACCURACY	UNIT	CALIBRATION
Temperature	-40 to 95	±3	°C	External
Voltage	3.0 to 3.6	±0.1	V	
Bias Current	0 to 100	±5	mA	
TX Power	-17 to -5	±3 dB	dBm	
RX Power	-31 to -8	±3 dB	dBm	

## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT	NOTES
Storage Temperature	T <sub>S</sub>	-40	85	°C	
Supply Voltage	V <sub>CC</sub>	-0.5	4.0	V	
Input Voltage	V <sub>IN</sub>	-0.5	V <sub>CC</sub>	V	
Output Current	I <sub>o</sub>	-	50	mA	
Operating Current	I <sub>OP</sub>	-	400	mA	

## RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN	MAX	UNIT	NOTES
Case Operating Temperature	T <sub>C</sub>	0	70	°C	CS3T5-03H-3S-TC-L
		-40	85		CS3T5-03H-3S-TI-L
Supply Voltage	V <sub>CC</sub>	3.1	3.5	V	
Supply Current	I <sub>TX</sub> + I <sub>RX</sub>	-	200	mA	

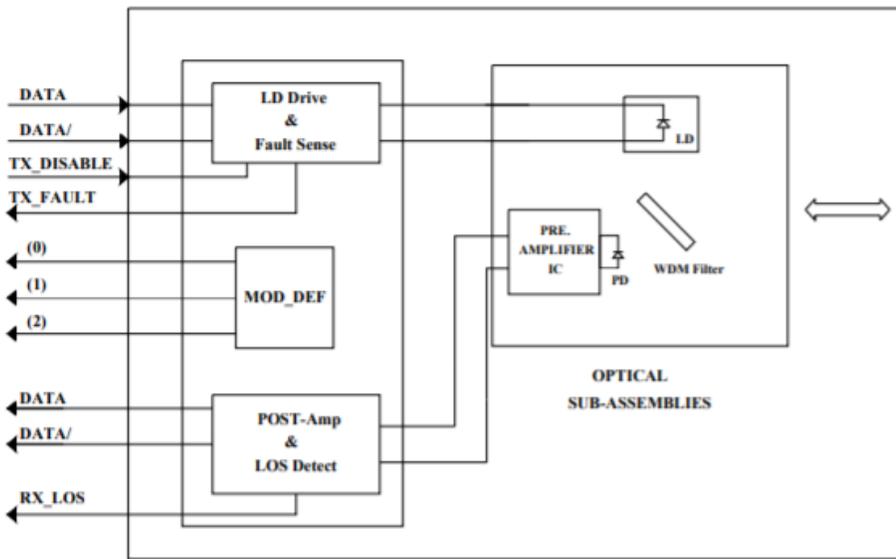
TRANSMITTER ELECTRO-OPTICAL CHARACTERISTICS (V<sub>CC</sub> = 3.1V to 3.5V, T<sub>C</sub> = 0°C to 70°C, -40°C to 85°C)

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT	NOTES
Output Optical Power 9/125um fiber	P <sub>out</sub>	-14	-	-8	dBm	Average
Extinction Ratio	ER	8.2	-	-	dB	
Center Wavelength	λ <sub>C</sub>	1261	1310	1360	nm	
Spectral Width (RMS)	Δλ	-	-	4	nm	
Rise/Fall Time, 10%~90%	T <sub>r, f</sub>	-	1	2	ns	
Output Eye	Compliant with Telcordia GR-253-CORE Issue 3 and ITU-T recommendation G-957					
Max. P <sub>out</sub> TX-DISABLE Asserted	P <sub>OFF</sub>	-	-	-45	dBm	
Differential Input Voltage	V <sub>DIFF</sub>	0.4	-	2.0	V	
Transmit Fault Output-Low	TX_FAULT <sub>L</sub>	0.0	-	0.5	V	
Transmit Fault Output-High	TX_FAULT <sub>H</sub>	2.4	-	V <sub>CC</sub>	V	
Time to initialize, include reset of TX_FAULT	t <sub>init</sub>	-	-	300	ms	
TX_FAULT from fault to assertion	t <sub>fault</sub>	-	-	100	us	
TX_DISABLE time to start reset	t <sub>reset</sub>	10	-	-	us	

RECEIVER ELECTRO-OPTICAL CHARACTERISTICS (V<sub>CC</sub> = 3.1V to 3.5V, T<sub>C</sub> = 0°C to 70°C, -40°C to 85°C)

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT	NOTES
Optical Input Power-Maximum	P <sub>IN</sub>	0	-	-	dBm	BER<10 <sup>-10</sup>
RX Sensitivity @OC-3	P <sub>IN</sub>	-	-	-32	dBm	PRBS23, BER<10 <sup>-10</sup>
RX Sensitivity @125Mbps	P <sub>IN</sub>	-	-	-32	dBm	PRBS7, BER<10 <sup>-10</sup>
Operating Center Wavelength	λ <sub>C</sub>	1480	-	1600	nm	
Optical Return Loss	ORL	14	-	-	dB	λ=1480~1600nm
Optical Isolation	ISO	-	-	-45	dB	λ=1260~1360nm
Loss of Signal-Asserted	P <sub>A</sub>	-	-	-32	dBm	
Loss of Signal-Deasserted	P <sub>D</sub>	-45	-	-	dBm	
Differential Output Voltage	V <sub>DIFF</sub>	0.5	-	1.2	V	
Receiver Loss of Signal Output Voltage-Low	RX_LOS <sub>L</sub>	0	-	0.5	V	
Receiver Loss of Signal Output Voltage-High	RX_LOS <sub>H</sub>	2.4	-	V <sub>CC</sub>	V	

**BLOCK DIAGRAM OF TRANSCEIVER**



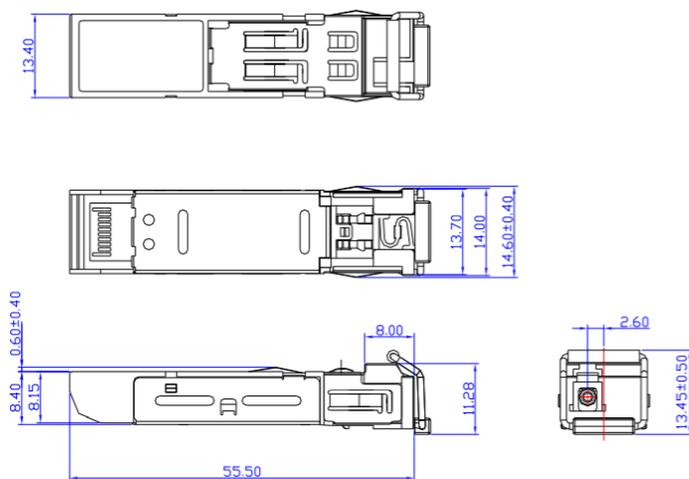
**Transmitter and Receiver Optical Sub-Assembly Section** - A 1310 nm InGaAsP laser and an InGaAs PIN photodiode integrate with an WDM filter to form a bi-directional single fiber optical subassembly (OSA). The laser of OSA is driven by a LD driver IC which converts differential input LVPECL logic signals into an analog laser driving current. The photodiode of OSA is connected to a circuit providing post-amplification quantization, and optical signal detection.

**TX\_FAULT** - When sensing an improper power level in the laser driver, the SFP set this signal high and turns off the Laser. TX\_FAULT can be reset with the TX\_DISABLE line. The signal is in TTL level.

**TX\_DISABLE** - The TX\_DISABLE signal is high (TTL logic “1”) to turn off the laser output.

**Receive Loss (RX\_LOS)** - The RX\_LOS is high (logic “1”) when there is no incoming light from the companion transceiver. This signal is normally used by the system for the diagnostic purpose. The signal is operated in TTL level.

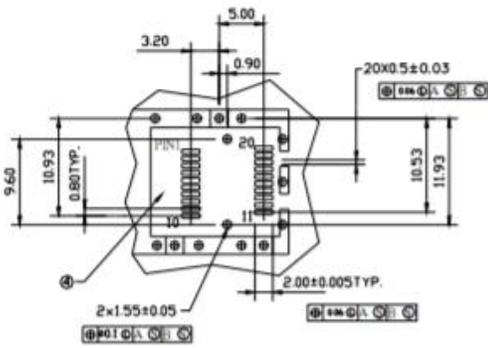
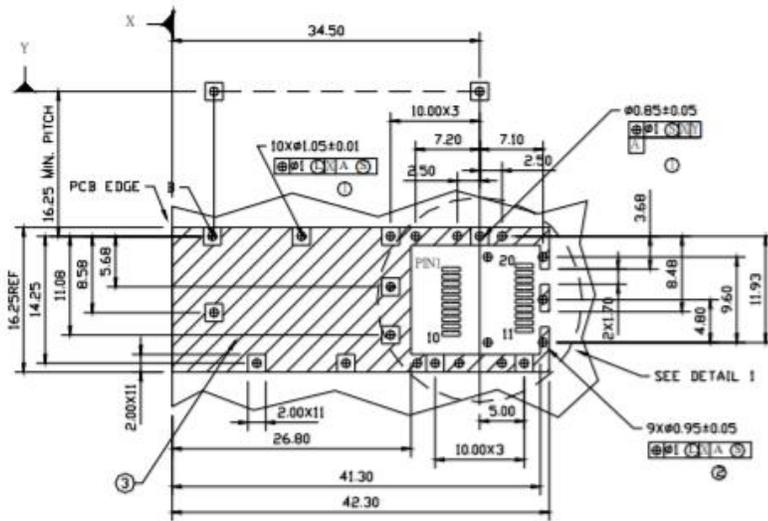
**DIMENSIONS**



**DIMENSIONS ARE IN MILLIMETERS**

**ALL DIMENSIONS ARE ± 0.2mm UNLESS OTHERWISE SPECIFIED**

SFP HOST BOARD MECHANICAL LAYOUT



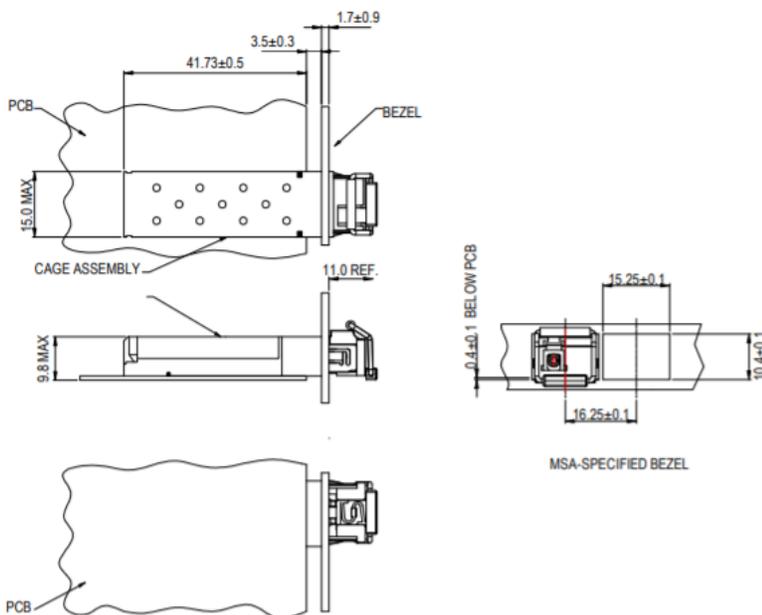
DETAIL 1

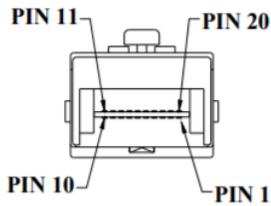
LEGEND

- 1. PADS AND VIAS ARE CHASSIS GROUND
- 2. THROUGH HOLES, PLATING OPTIONAL
- 3. HATCHED AREA DENOTES COMPONENT AND TRACE KEEPOUT (EXCEPT CHASSIS GROUND)
- 4. AREA DENOTES COMPONENT KEEPOUT (TRACES ALLOWED)

DIMENSIONS ARE IN MILLIMETERS

ASSEMBLY DRAWING (unit: mm)



**PIN ASSIGNMENT**

Pin	Signal Name	Description
1	$T_{GND}$	Transmit Ground
2	$TX\_FAULT$	Transmit Fault
3	$TX\_DISABLE$	Transmit Disable
4	$MOD\_DEF (2)$	SDA Serial Data Signal
5	$MOD\_DEF (1)$	SCL Serial Clock Signal
6	$MOD\_DEF (0)$	TTL Low
7	$RATE\_SELECT$	Open Circuit
8	$RX\_LOS$	Receiver Loss of Signal, TTL High, open collector
9	$R_{GND}$	Receiver Ground
10	$R_{GND}$	Receiver Ground
11	$R_{GND}$	Receiver Ground
12	$RX-$	Receive Data Bar, Differential PECL, ac coupled
13	$RX+$	Receive Data, Differential PECL, ac coupled
14	$R_{GND}$	Receiver Ground
15	$V_{CCR}$	Receiver Power Supply
16	$V_{CCT}$	Transmitter Power Supply
17	$T_{GND}$	Transmitter Ground
18	$TX+$	Transmit Data, Differential PECL, ac coupled
19	$TX-$	Transmit Data Bar, Differential PECL, ac coupled
20	$T_{GND}$	Transmitter Ground

**ADDITIONAL NOTES**

- Avoid eye or skin exposure to laser radiations.
- The device is sensitive to electro-static discharge (ESD). The device should be handled with ESD proof tools. To assemble the device on PCB, proper grounding is required to prevent ESD.
- Specifications are subject to change without notice.



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