

1310 nm Single-mode Transceiver (S1.1) Small Form Pluggable (SFP), 3.3V 155 Mbps SONET OC-3/SDH STM-1/125 Mbps Fast Ethernet



Features

- Compliant with SONET/SDH standard
- Compliant with Fast Ethernet standard
- Industry standard small form pluggable (SFP) package
- Duplex LC connector
- Differential LVPECL inputs and outputs
- Single power supply 3.3V
- TTL signal detect indicator
- Hot Pluggable
- Class 1 laser product complies with EN 60825-1

Application

- Distributed multi-processing
- Switch to switch interface
- High speed I/O for file server
- Bus extension application
- Channel extender, data storage

Ordering Information

PART NUMBER	INPUT/OUTPUT	SIGNAL DETECT	VOLTAGE	TEMPERATURE
TS3-0155-38S-T2	AC/AC	TTL	3.3V	0°C to 70°C

Absolute Maximum Ratings

PARAMETER	SYMBOL	MIN	MAX	UNITS	NOTE
Storage Temperature	T_S	-40	85	°C	
Supply Voltage	V_{CC}	-0.5	6.0	V	
Input Voltage	V_{IN}	-0.5	V_{CC}	V	
Output Current	I_o	---	50	mA	
Operating Current	I_{OP}	---	400	mA	

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Recommended Operating Conditions

PARAMETER	SYMBOL	MIN	MAX	UNITS	NOTE
Ambient Operating Temperature	T_{AMB}	0	70	°C	
Supply Voltage	V_{CC}	3.1	3.5	V	
Supply Current	$I_{TX} + I_{RX}$	---	300	mA	

Transmitter Electro-optical Characteristics

$V_{CC} = 3.1 \text{ V to } 3.5 \text{ V}, T_A = 0^\circ \text{ C to } 70^\circ \text{ C}$

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTE
Data Rate	B	50	155	200	Mb/s	
Output Optical Power 9/125 μm fiber	P_{out}	-15	---	-8	dBm	Average
Extinction Ratio	ER	8.2	---	---	dB	
Center Wavelength	I_C	1261	1310	1360	nm	
Spectral Width (RMS)	ΔI	---	---	4.0	nm	
Rise/Fall Time (10–90%)	$T_{r,f}$	---	1	2	ns	
Output Eye	Compliant with Telcordia GR-253-CORE Issue 3 and ITU-T recommendation G-957					
Differential Input Voltage	V_{DIFF}	0.65	---	2.0	V	
Transmit Fault Output-Low	TX_FAULT_L	0.0	---	0.5	V	
Transmit Fault Output-High	TX_FAULT_H	2.4	---	V_{CC}	V	
TX_DISABLE Assert Time	t_{off}	---	---	10	μs	
TX_DISABLE Negate Time	t_{on}	---	---	1	ms	
Time to initialize, include reset of TX_FAULT	t_{init}	---	---	300	ms	
TX_FAULT from fault to assertion	t_{fault}	---	---	100	μs	
TX_DISABLE time to start reset	t_{reset}	10	---	---	μs	



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 No. 669, Sec. 4 Chung Hsing Road
 ChuDung, HsinChu, Taiwan 310, R.O.C.
 Tel: +886 (03) 582-8270
 Fax: +886 (03) 582-8416

North American Office:
 1065 E. Hillsdale Blvd., Suite 215,
 Foster City, CA 94404, USA
 Tel: +1 (650) 578-1378
 Fax: +1 (650) 578-9678

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Receiver Electro-optical Characteristics

$V_{CC} = 3.1 \text{ V to } 3.5 \text{ V}, T_A = 0^\circ \text{ C to } 70^\circ \text{ C}$

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTE
Data Rate	B	50	155	200	Mb/s	
Optical Input Power -maximum	P_{IN}	0	---	---	dBm	Note 1
Optical Input Power -minimum (Sensitivity)	P_{IN}	---	---	-34	dBm	Note 1
Operating Center Wavelength	I_C	1100	---	1600	nm	
Data Output Rise, Fall Time (10%~90%)	T_{rf}	---	1	2	ns	
Signal Detect-Asserted	P_A	---	---	-34	dBm	Average
Signal Detect-Deasserted	P_D	-47	---	---	dBm	Average
Signal Detect-Hysteresis	$P_A - P_D$	1.0	---	---	dB	
Signal Detect Assert Time	T_{SD+}	---	---	100	ms	
Signal Detect Deassert Time	T_{SD-}	---	---	100	ms	
Differential Output Voltage	V_{DIFF}	0.37	---	2.0	V	
Receiver Loss of Signal Output Voltage-Low	RX_LOS_L	0	---	0.5	V	
Receiver Loss of Signal Output Voltage-High	RX_LOS_H	2.4	---	V_{CC}	V	
Receiver Loss of Signal Assert Time (off to on)	t_{A,RX_LOS}	---	---	100	ms	
Receiver Loss of Signal Assert Time (on to off)	t_{D,RX_LOS}	---	---	100	ms	

Note 1: The input data is at 155.52 Mbps, 2^3-1 PRBS data pattern with 72 "1"s and 72 "0"s inserted per the ITU-T recommendation G958 Appendix 1. The receiver is guaranteed to provide output data with Bit Error Rate (BER) better than or equal to 1×10^{-10} .



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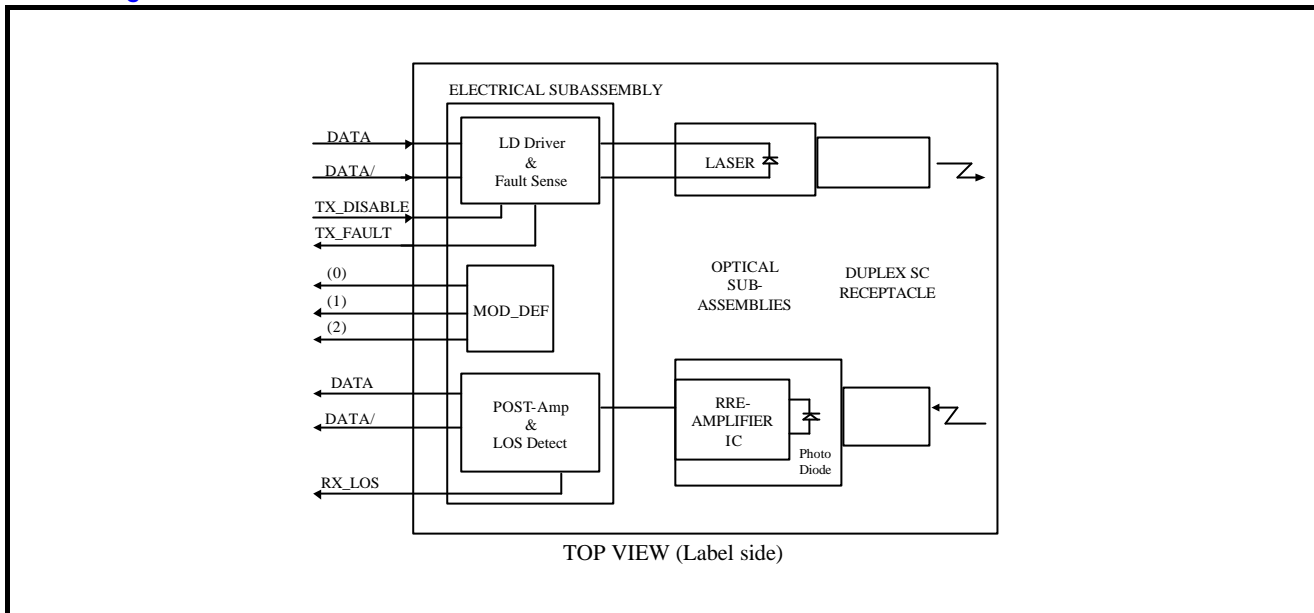
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Block Diagram of Transceiver



Transmitter Section

The transmitter section consists of a 1310 nm InGaAsP laser in an eye safe optical subassembly (OSA) which mates to the fiber cable. The laser OSA is driven by a LD driver IC which converts differential input LVPECL logic signals into an analog laser driving current.

TX_FAULT

When sensing an improper power level in the laser driver, the SFP sets 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. The laser will turn on within 1ms when TX_DISABLE is low (TTL logic "0").

Receiver Section

The receiver utilizes an InGaAs PIN photodiode mounted together with a trans-impedance preamplifier IC in an OSA. This OSA is connected to a circuit providing post-amplification quantization, and optical signal detection.

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.



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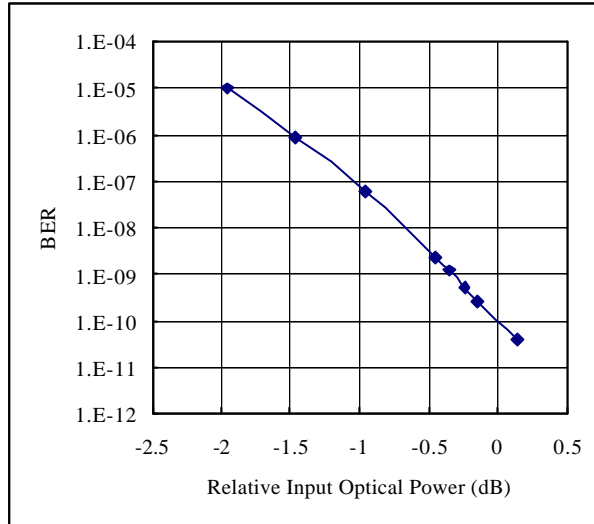
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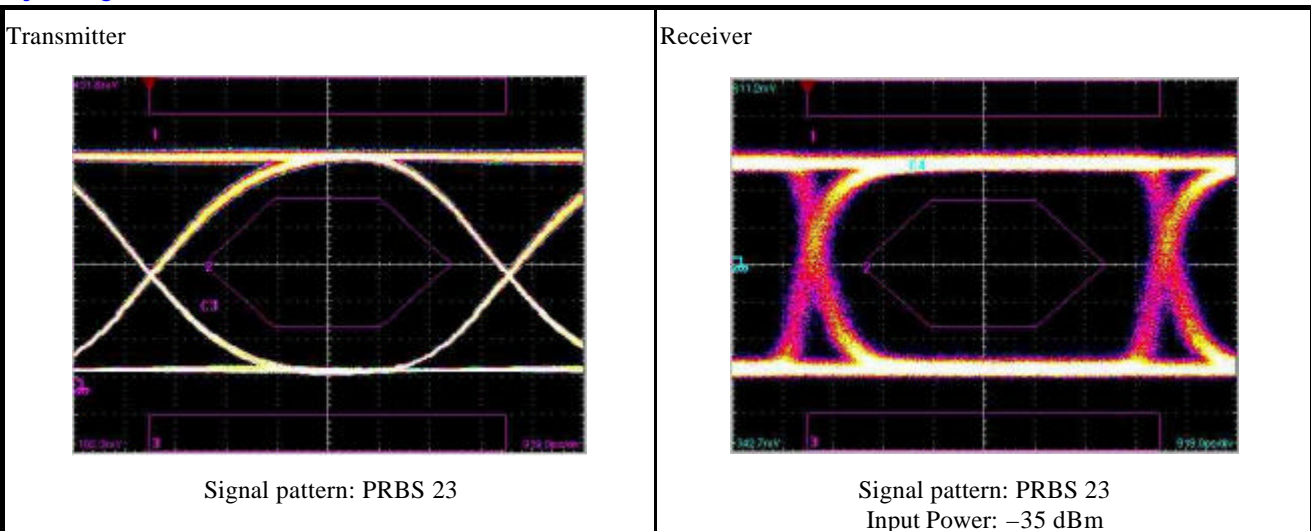


Typical BER Performance of Receiver versus Input Optical Power Level



The figure shows the relationship between typical trade-off of BER and Relative Input Optical Power. Besides the required BER = 1×10^{-10} of the ATM Forum 155.52 Mbps Physical Layer Standard, The transceiver can be operated at other Bit-Error-Rate conditions. The Relative Input Optical Power in dB is referenced to the actual sensitivity of the device. For BER conditions better than 1×10^{-10} , more input signal is needed (+dB).

Eye Diagram



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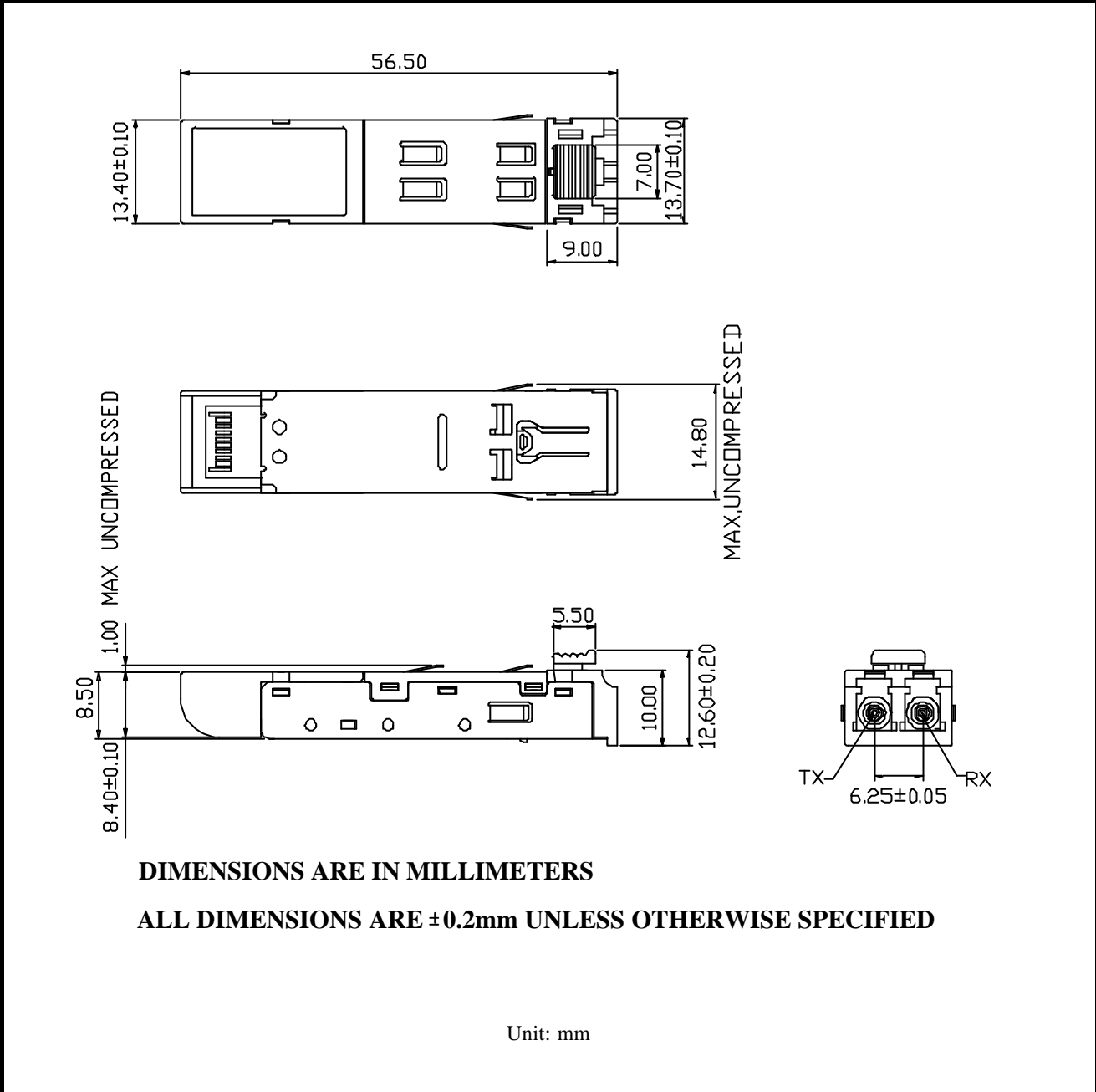
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Dimensions



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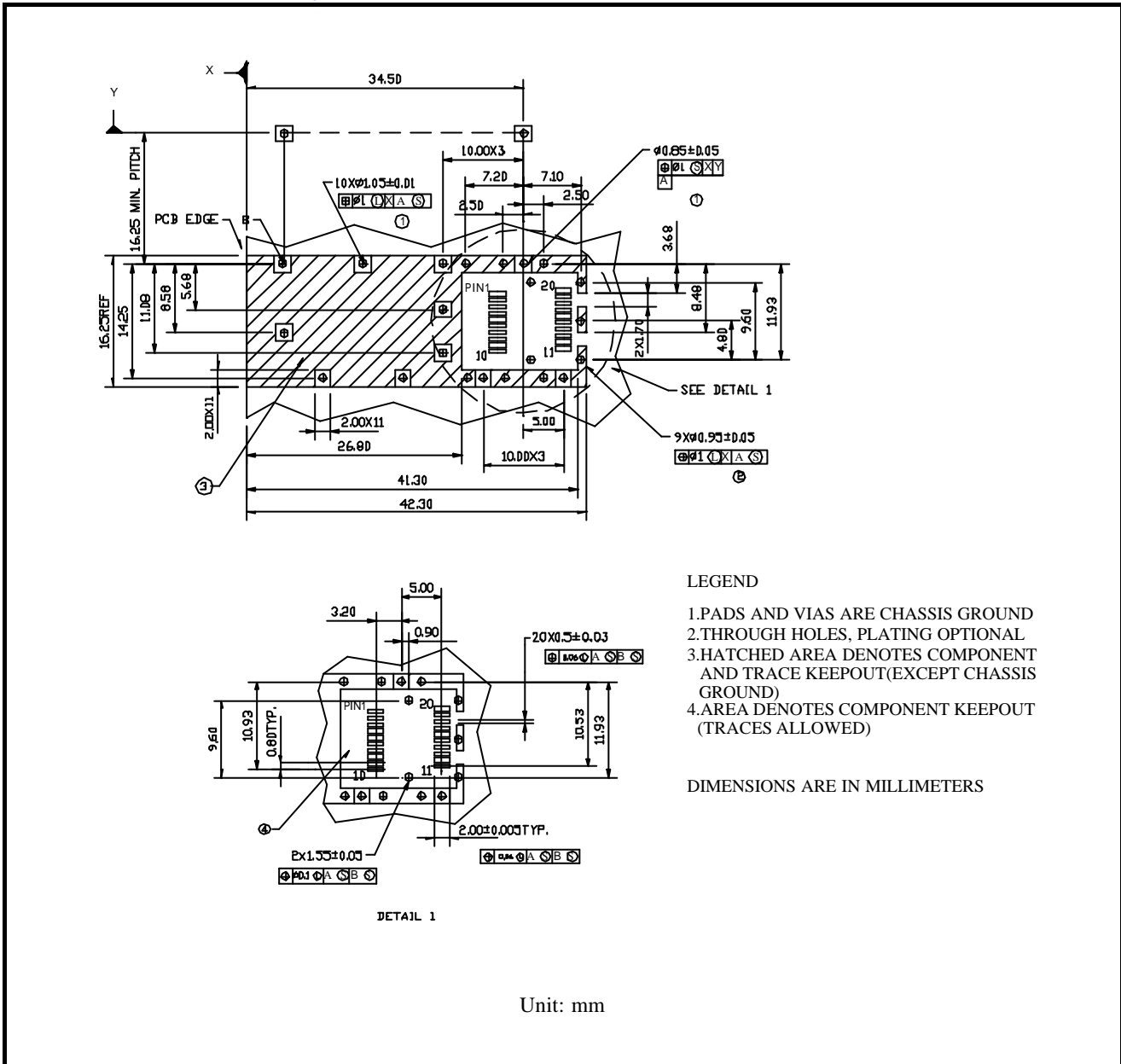
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SFP host board mechanical layout



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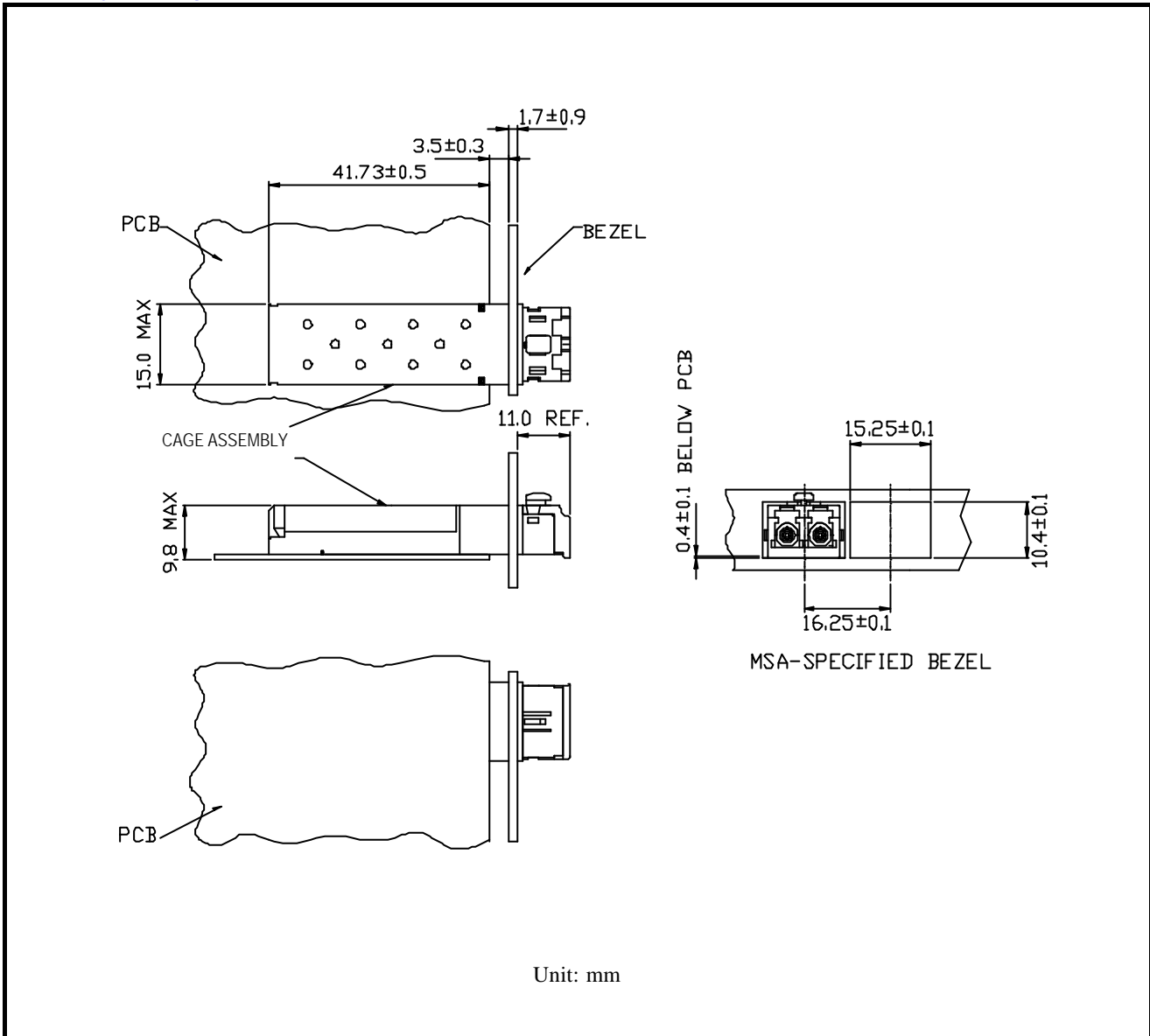
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Assembly drawing



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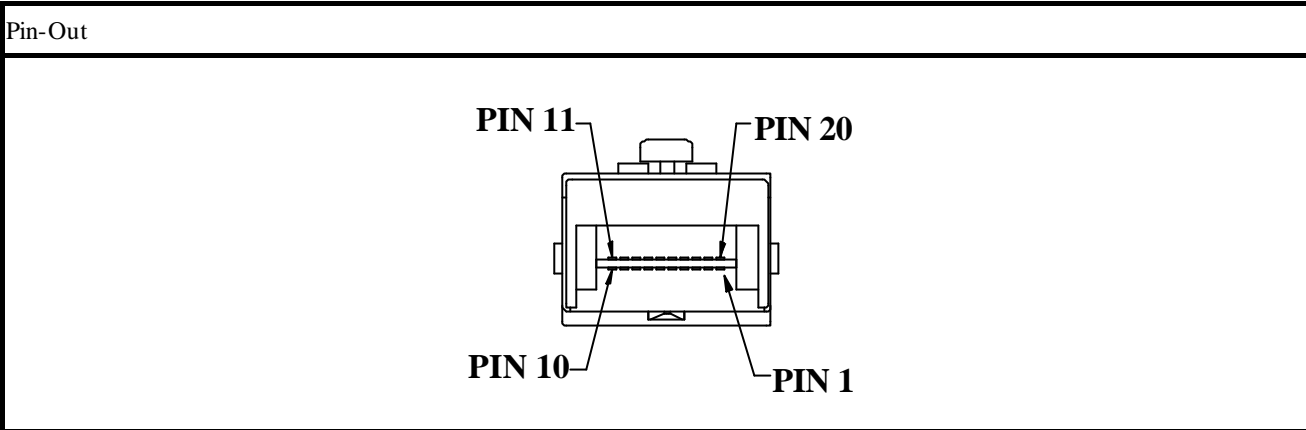
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Pin Assignment



<i>Pin</i>	<i>Signal Name</i>	<i>Description</i>
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 PCEL, ac coupled
19	$TX-$	Transmit Data Bar, Differential PCEL, ac coupled
20	T_{GND}	Transmitter Ground



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Eye Safety

The TS3 series Single-mode transceiver is a class 1 laser product. It complies with EN 60825-1 and FDA 21 CFR 1040.10 and 1040.11. In order to meet laser safety requirements the transceiver shall be operated within the Absolute Maximum Ratings.

Caution

All adjustments have been done at the factory before the shipment of the devices. No maintenance and user serviceable part is required. Tampering with and modifying the performance of the device will result in voided product warranty.

Required Mark



Note : All information contained in this document is subject to change without notice.



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