



**RoHS compliant**  
**TX-1310/RX-1490 nm Single-mode Bi-directional , 60km**  
**SFP LC Simplex Connector, with Diagnostic Monitoring**  
**2.67G/2.5G/OC48/2FC/FC/1.25G**



**Features**

- SFF8472 diagnostic monitoring interface
- Duplex LC connector
- Differential inputs and outputs
- Single power supply 3.3V
- Hot Pluggable
- Class 1 laser product complies with EN 60825-1

**Ordering Information**

PART NUMBER	TX/RX	INPUT/OUTPUT	LOS	TEMPERATURE	LD Type
LS38-E3L-TC-N-D9	1310/1490	AC/AC	LVTTL	0°C to 70 °C	1310 DFB
LS38-E3L-TI-N-D9	1310/1490	AC/AC	LVTTL	-40°C to 85 °C	1310 DFB

**Diagnostics**

Parameter	Range	Accuracy	Unit	Calibration
Module internal Temperature	-40 to 95	± 3	°C	External
Module internal Voltage	3.1 to 3.5	± 0.1	V	
Bias Current	0 to 100	± 10%	mA	
TX Power	-2 to +8	± 3 dB	dBm	
RX Power	-23 to 0	± 3 dB	dBm	



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### Absolute Maximum Ratings

PARAMETER	SYMBOL	MIN	MAX	UNITS	NOTE
Storage Temperature	$T_S$	-40	85	°C	
Supply Voltage	$V_{CC}$	-0.5	4.0	V	
Input Voltage	$V_{IN}$	-0.5	$V_{CC}$	V	

### Recommended Operating Conditions

PARAMETER	SYMBOL	MIN	MAX	UNITS	NOTE
Case Operating Temperature	$T_C$	0 -40	70 85	°C	
Supply Voltage	$V_{CC}$	3.1	3.5	V	
Supply Current	$I_{TX} + I_{RX}$	---	250	mA	

### Transmitter Electro-optical Characteristics

$V_{CC} = 3.1\text{ V to }3.5\text{ V}, T_C = 0\text{ °C to }70\text{ °C} (-40\text{ °C to }85\text{ °C})$

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTE
Bit Rate	$B$	---	2488	---	Mbps	
Output Optical Power 9/125 $\mu\text{m}$ fiber	$P_{out}$	+1	---	+5	dBm	Average
Extinction Ratio	$ER$	6	---	---	dB	
Center Wavelength	$\lambda_C$	1285	1310	1335	nm	
Spectral Width (-20dB)	$\Delta\lambda$	---	---	0.6	nm	
Side Mode Suppression Ratio	$SMSR$	30			dB	
Output Eye	Compliant with Telcordia GR-253-CORE Issue 3 and ITU-T recommendation G-957					
Max. $P_{out}$ TX-DISABLE Asserted	$P_{OFF}$	---	---	-45	dBm	
Differential Input Voltage	$V_{DIFF}$	0.4	---	2.0	V	



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### Receiver Electro-optical Characteristics

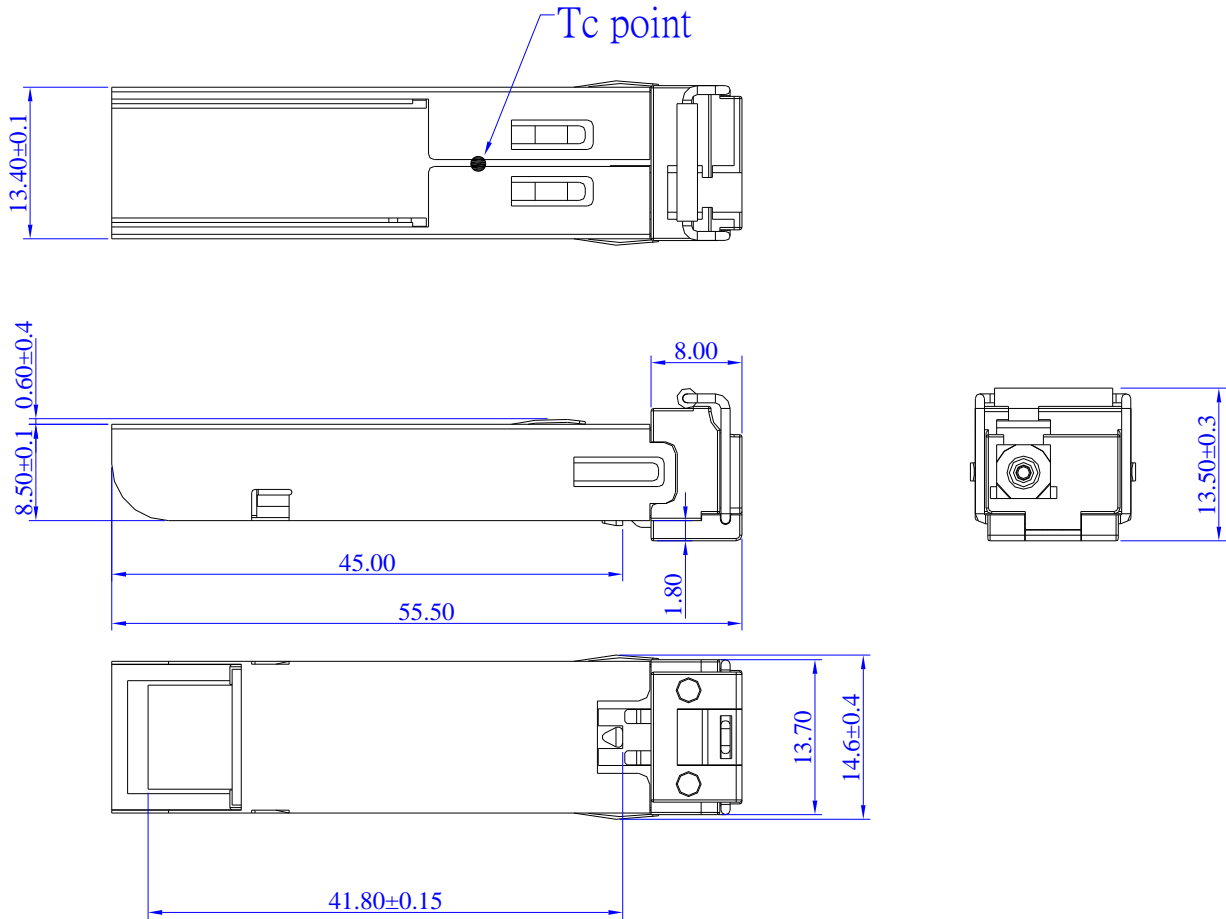
$V_{CC} = 3.1\text{ V to }3.5\text{ V}$ ,  $T_C = 0\text{ }^\circ\text{C to }70\text{ }^\circ\text{C}(-40\text{ }^\circ\text{C to }85\text{ }^\circ\text{C})$

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTE
Bit Rate	$B$	---	2488	---	Mbps	
Optical Input Power-maximum	$P_{IN}$	0	---	---	dBm	BER < $10^{-10}$
Optical Input Power-minimum (Sensitivity)	$P_{IN}$	---	---	-23	dBm	BER < $10^{-10}$
Operating Center Wavelength	$\lambda_C$	1480	---	1500	nm	
Optical Return Loss	$ORL$	14	---	---	dB	$\lambda=1480\sim 1500\text{nm}$
Loss of signal -Deasserted	$P_D$	---	---	-23	dBm	
Loss of signal -Asserted	$P_A$	-35	---	---	dBm	
Differential Output Voltage	$V_{DIFF}$	0.5	---	1.2	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	



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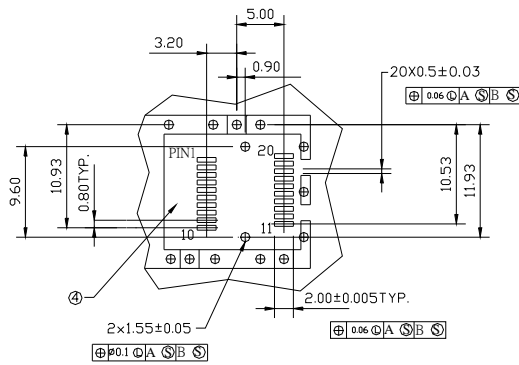
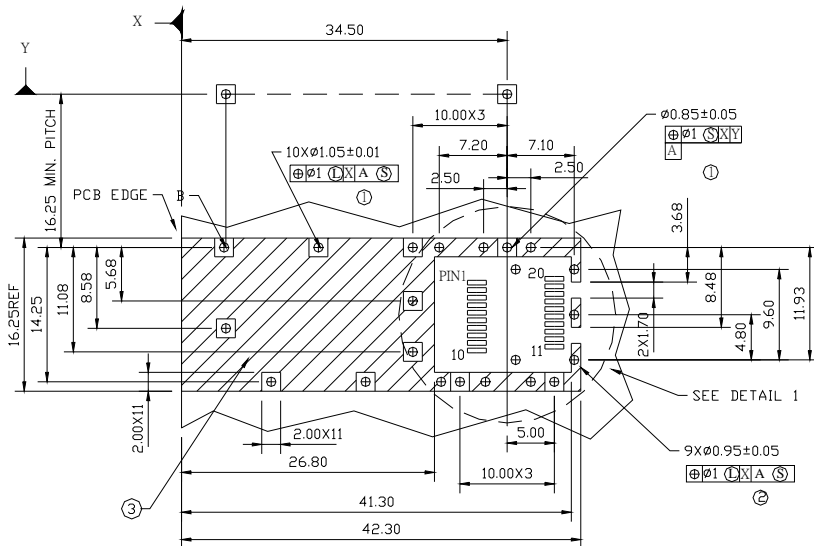
### Dimensions



**DIMENSIONS ARE IN MILLIMETERS**

**ALL DIMENSIONS ARE  $\pm 0.2$ mm 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

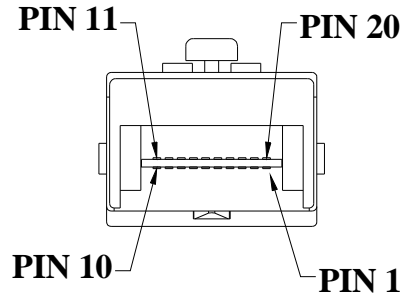
Unit: mm



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**Pin Assignment**

Pin-Out



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 PCEL, ac coupled
19	$TX-$	Transmit Data Bar, Differential PCEL, ac coupled
20	$T_{GND}$	Transmitter Ground



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### Eye Safety Mark

The LS3 series singlemode 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**

Class 1 Laser Product  
Complies with  
21 CFR 1040.10 and 1040.11

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