



**RoHS compliant**  
**Multi-Rate 1470~1610 nm CWDM Transceiver, (30dB margin)**  
**Small Form Pluggable (SFP), with Diagnostic Monitoring**  
**2.67Gb/OC48/STM-16/2FC/GbE/FC/OC12/OC3/Fast Ethernet**



### Features

- SFF8472 diagnostic monitoring interface
- Industry standard small form pluggable (SFP) package
- Multi-Rate
- With APD
- Duplex LC connector
- Differential inputs and outputs
- Single power supply 3.3V
- TTL signal detect indicator
- Hot Pluggable
- Class 1 laser product complies with EN 60825-1

### Ordering Information

PART NUMBER	WAVELENGTH	INPUT/OUTPUT	SIGNAL DETECT	VOLTAGE	TEMPERATURE
LS48-E3U-TC-N47-DC	1470 nm	AC/AC	TTL	3.3V	0°C to 70°C
LS48-E3U-TC-N49-DC	1490 nm	AC/AC	TTL	3.3V	0°C to 70°C
LS48-E3U-TC-N51-DC	1510 nm	AC/AC	TTL	3.3V	0°C to 70°C
LS48-E3U-TC-N53-DC	1530 nm	AC/AC	TTL	3.3V	0°C to 70°C
LS48-E3U-TC-N55-DC	1550 nm	AC/AC	TTL	3.3V	0°C to 70°C
LS48-E3U-TC-N57-DC	1570 nm	AC/AC	TTL	3.3V	0°C to 70°C
LS48-E3U-TC-N59-DC	1590 nm	AC/AC	TTL	3.3V	0°C to 70°C
LS48-E3U-TC-N61-DC	1610 nm	AC/AC	TTL	3.3V	0°C to 70°C



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### Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	-10 to 85	$\pm 3$	$^{\circ}\text{C}$	External
Voltage	3.1 to 3.5	$\pm 0.1$	V	
Bias Current	0 to 90	$\pm 10\%$	mA	
TX Power	0 to +5	$\pm 3$ dB	dBm	
RX Power	-28 to -9	$\pm 3$ dB	dBm	

### Absolute Maximum Ratings

PARAMETER	SYMBOL	MIN	MAX	UNITS	NOTE
Storage Temperature	$T_S$	-40	85	$^{\circ}\text{C}$	
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	70	$^{\circ}\text{C}$	
Supply Voltage	$V_{CC}$	3.1	3.5	V	
Supply Current	$I_{TX} + I_{RX}$	---	300	mA	



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**Transmitter Electro-optical Characteristics**

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

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTE
Output Optical Power 9/125 $\mu\text{m}$ fiber	$P_{out}$	+0	---	+5	dBm	Average
Extinction Ratio	$ER$	8.2	---	---	dB	
Central Wavelength (-N47)		1464.5	---	1477.5		
Central Wavelength (-N49)		1484.5	---	1497.5		
Central Wavelength (-N51)		1504.5	---	1517.5		
Central Wavelength (-N53)	$\lambda_c$	1524.5	---	1537.5	nm	
Central Wavelength (-N55)		1544.5	---	1557.5		
Central Wavelength (-N57)		1564.5	---	1577.5		
Central Wavelength (-N59)		1584.5	---	1597.5		
Central Wavelength (-N61)		1604.5	---	1617.5		
Spectral Width (-20dB)	$\Delta\lambda$	---	---	0.7		
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	
Optical path dispersion penalty				2	dB	
Maximum dispersion				1680	ps/nm	



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**Receiver Electro-optical Characteristics**

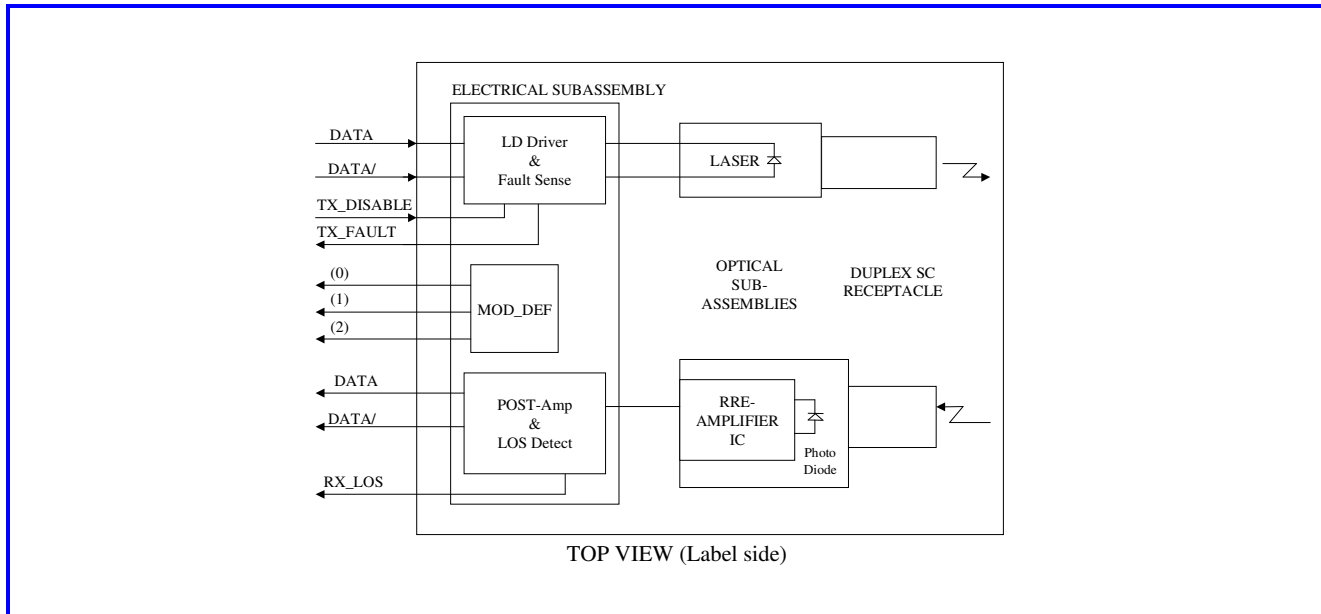
$V_{CC} = 3.1\text{ V to }3.5\text{ V}, T_C = 0\text{ }^\circ\text{C to }70\text{ }^\circ\text{C}$

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTE
Optical Input Power-maximum	$P_{IN}$	-8	---	---	dBm	BER < $10^{-10}$
RX Sensitivity @2.67 Gb/s	$P_{IN}$	---	---	-30	dBm	PRBS23, BER < $10^{-10}$
RX Sensitivity @OC-48/STM-16	$P_{IN}$	---	---	-30	dBm	PRBS23, BER < $10^{-10}$
RX Sensitivity @2xFC	$P_{IN}$	---	---	-30	dBm	PRBS7, BER < $10^{-12}$
RX Sensitivity @GbE	$P_{IN}$	---	---	-30	dBm	PRBS7, BER < $10^{-12}$
RX Sensitivity @OC-12	$P_{IN}$	---	---	-30	dBm	PRBS23, BER < $10^{-10}$
RX Sensitivity @OC-3	$P_{IN}$	---	---	-30	dBm	PRBS23, BER < $10^{-10}$
RX Sensitivity @Fast ethernet	$P_{IN}$	---	---	-30	dBm	PRBS7, BER < $10^{-10}$
Operating Center Wavelength	$\lambda_C$	1460	---	1620	nm	
Optical Return Loss	$ORL$	-27	---	---	dB	
LOS-Deasserted	$P_A$	---	---	-30	dBm	
LOS-Asserted	$P_D$	-45	---	---	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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**Block Diagram of Transceiver**



**Transmitter Section**

The transmitter section consists of an 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 logic signals into an analog laser driving current.

**TX\_DISABLE**

The TX\_DISABLE signal is high (TTL logic "1") to turn off the laser output. The laser will turn on when TX\_DISABLE is low (TTL logic "0").

**Receiver Section**

The receiver utilizes an APD 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.

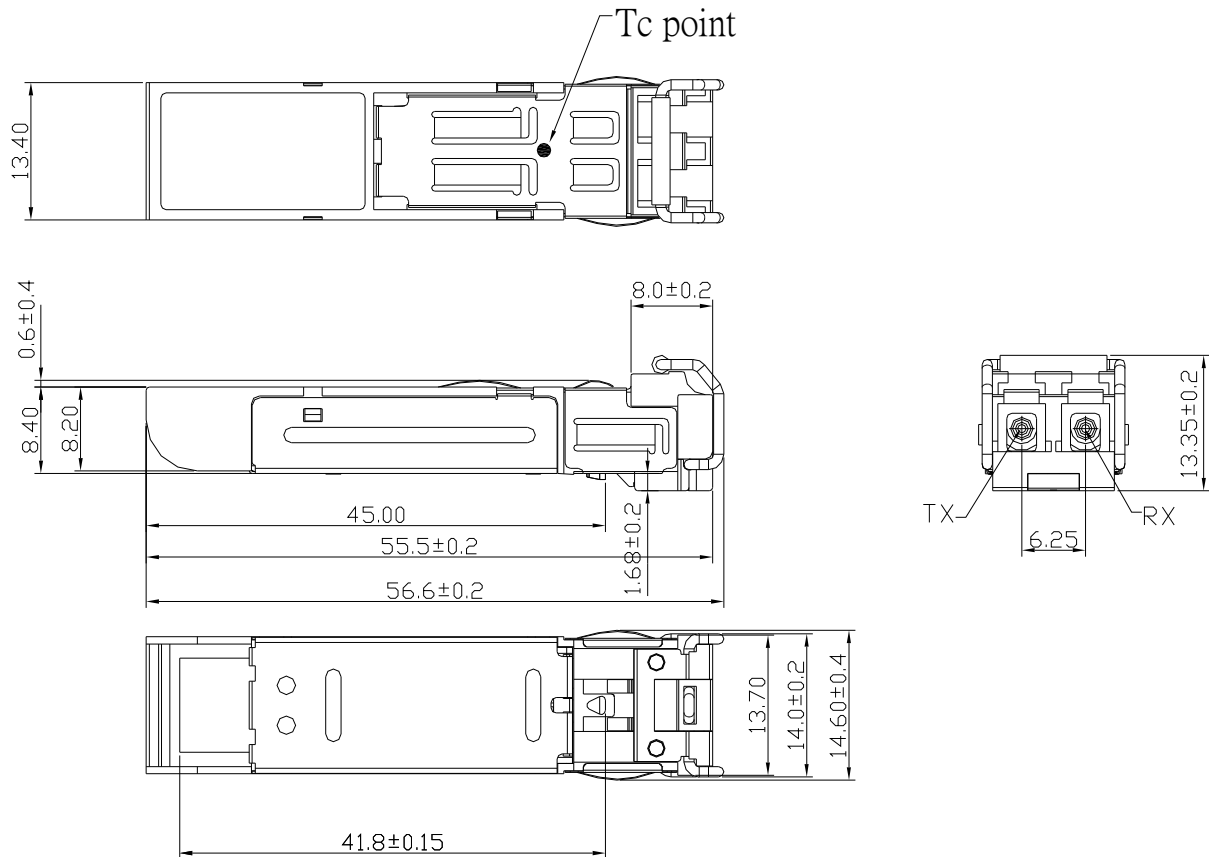
**Receive Loss (RX\_LOS)**

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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### Dimensions

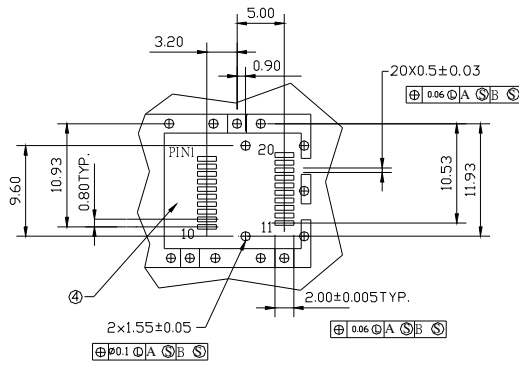
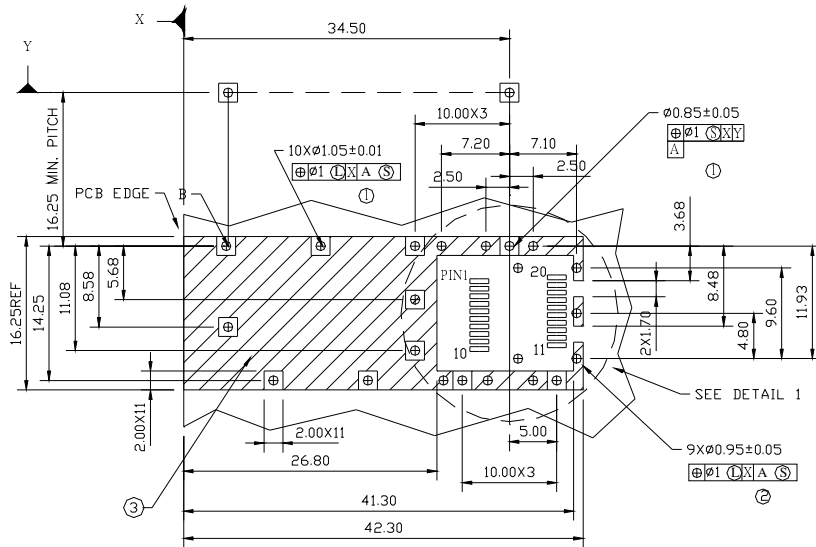


**DIMENSIONS ARE IN MILLIMETERS**

**ALL DIMENSIONS ARE ± 0.1mm UNLESS OTHERWISE SPECIFIED**

Unit: mm

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)

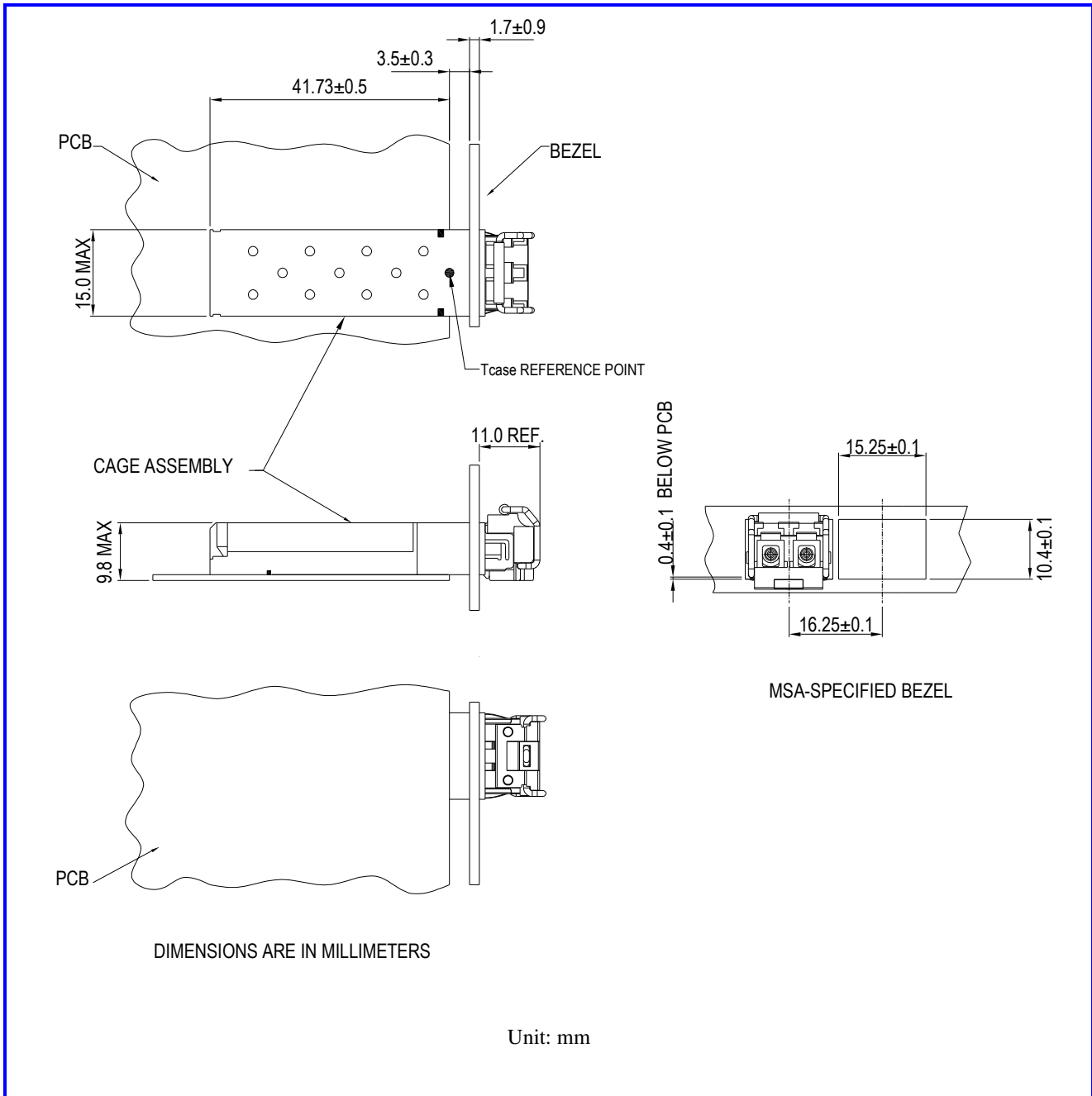
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Unit: mm



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**Assembly drawing**



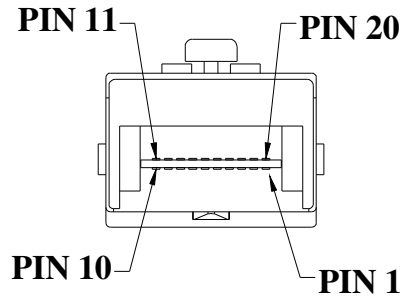




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**Pin Assignment**

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 , ac coupled
13	$RX+$	Receive Data, Differential , 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 , ac coupled
19	$TX-$	Transmit Data Bar, Differential , ac coupled
20	$T_{GND}$	Transmitter Ground

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