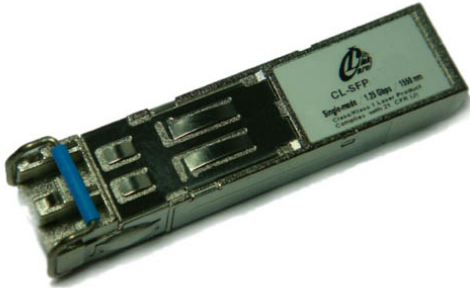




**RoHS compliant**  
**TX-1310/RX-1550 nm Single-mode Bi-directional**  
**SFP LC/SC Simplex Connector (12dB margin) DDM**  
**1.0625Gbd Fiber Channel/1.25 Gigabit Ethernet**



### Features

- Compliant with IEEE802.3z Gigabit Ethernet Standard
- Compliant with Fiber Channel 100-SM-LC-L standard
- Industry standard small form pluggable (SFP) package
- Simplex LC/SC connector
- Differential LVPECL inputs and outputs
- Single power supply 3.3V
- TTL signal detect indicator
- Support Digital Diagnostic Monitoring interface
- Hot Pluggable
- Class 1 laser product complies with EN 60825-1

### Ordering Information

PART NUMBER	TX/RX	INPUT/OUTPUT	SIGNAL DETECT	TEMPERATURE	LD Type	Distance
CL-SFP-WDM-10-31	1310/1550	AC/AC	TTL	-5°C to 70 °C	1310 DFB	10km
CL-SFP-WDM-10-31i	1310/1550	AC/AC	TTL	-40°C to 85 °C	1310 DFB	10km

### 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	
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
Case Operating Temperature	$T_C$	-5	70	°C	CL-SFP-WDM-10-31
		-40	85	°C	CL-SFP-WDM-10-31i
Supply Voltage	$V_{CC}$	3.1	3.5	V	
Supply Current	$I_{TX} + I_{RX}$	---	250	mA	

### Transmitter Electro-optical Characteristics

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

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTE
Output Optical Power 9/125 $\mu\text{m}$ fiber	$P_{out}$	-9	---	-3	dBm	Average
Extinction Ratio	$ER$	9	---	---	dB	
Center Wavelength	$\lambda_C$	1270	1310	1355	nm	
Spectral Width (RMS)	$\Delta\lambda$	---	---	2.5	nm	
Rise/Fall Time, (20–80%)	$T_{rf}$	---	---	260	ps	
Relative Intensity Noise	$RIN$	---	---	-120	dB/Hz	
Total Jitter	$TJ$	---	---	227	ps	
Output Eye						Compliant with IEEE802.3z
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**

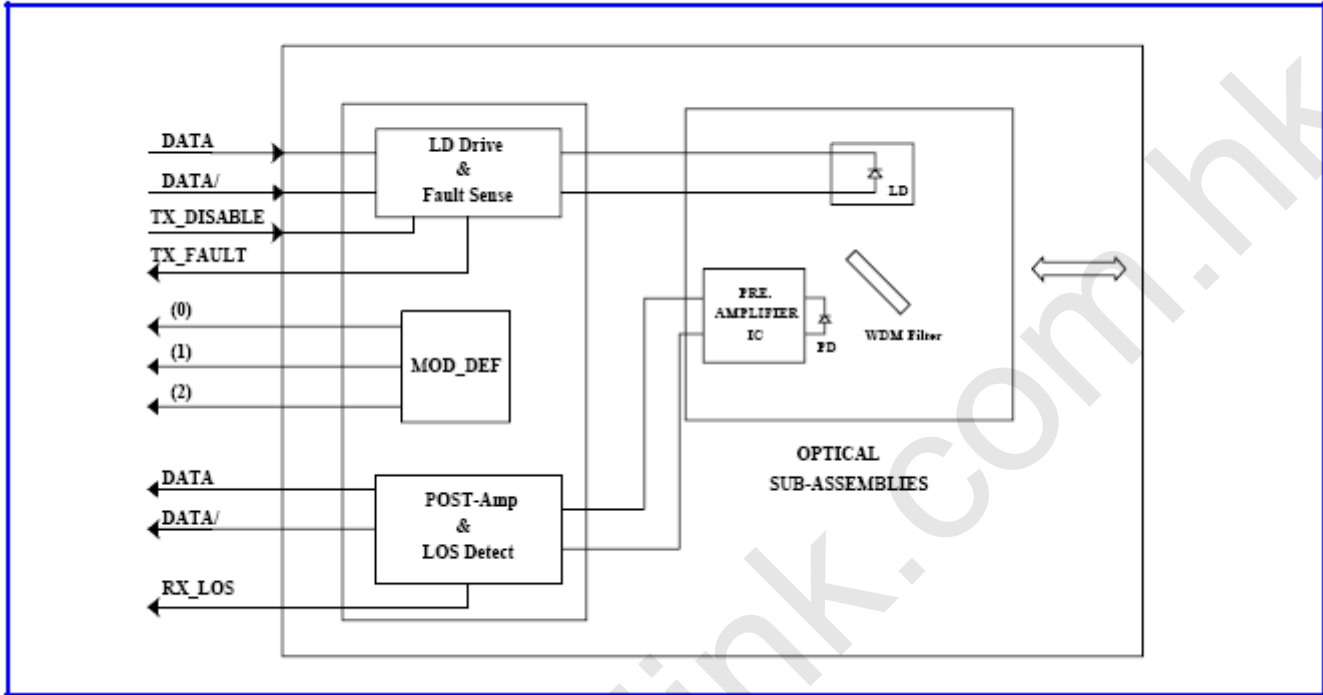
$V_{CC} = 3.1\text{ V to }3.5\text{ V}$ ,  $T_C = 0^\circ\text{C to }70^\circ\text{C}$

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTE
Optical Input Power-maximum	$P_{IN}$	-1	---	---	dBm	BER < $10^{-12}$
Optical Input Power-minimum (Sensitivity)	$P_{IN}$	---	---	-21	dBm	BER < $10^{-12}$
Operating Center Wavelength	$\lambda_C$	1480	---	1580	nm	
Optical Return Loss	ORL	14	---	---	dB	$\lambda=1480\sim 1580\text{nm}$
Optical isolation	ISO	---	---	-40	dB	$\lambda=1480\sim 1580\text{nm}$
Signal Detect-Asserted	$P_A$	---	---	-35	dBm	
Signal Detect-Deasserted	$P_D$	-21	---	---	dBm	
Differential Output Voltage	$V_{DIFF}$	0.5	---	1.2	V	
Data Output Rise, Fall Time (20-80%)	$T_{r,f}$	---	---	0.35	ns	
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 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. And, The photodiode of OSA is connected to a circuit providing post-amplification quantization, and optical signal detection.

#### TX\_DISABLE

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

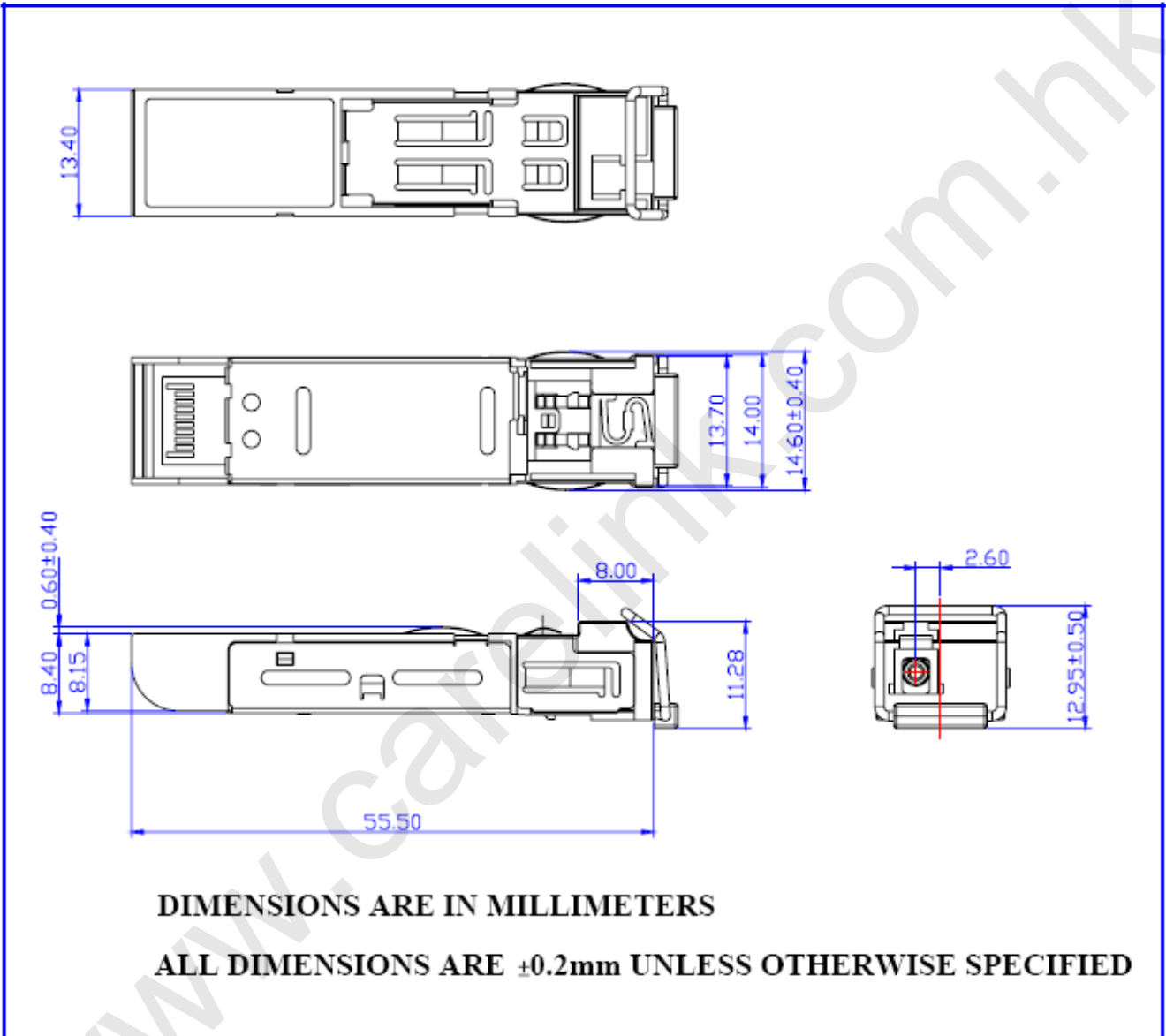
#### Receive Loss (RX\_LOS)

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.



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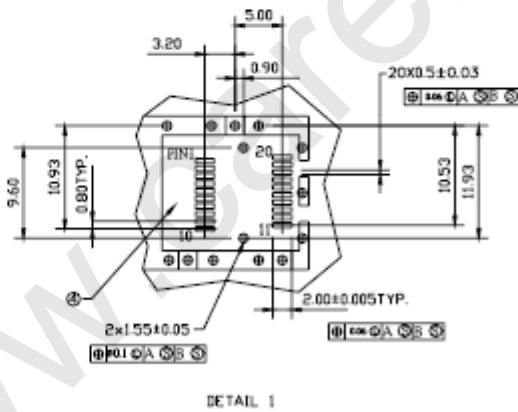
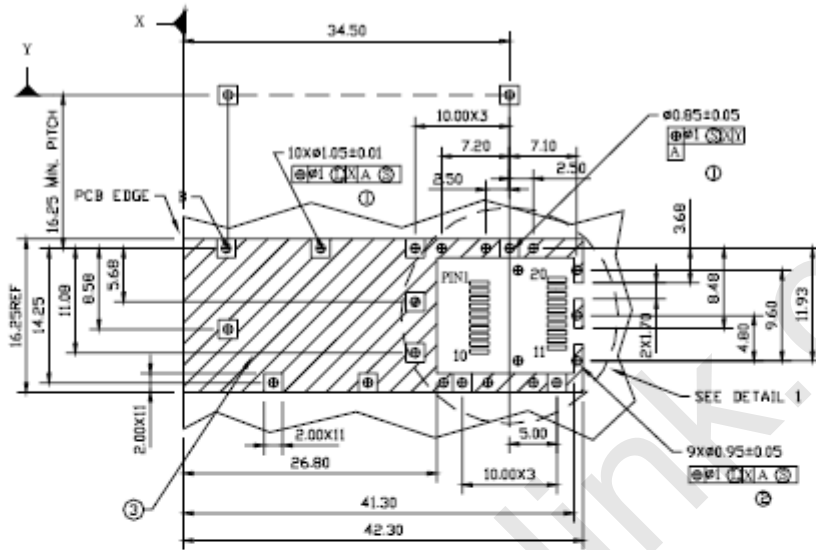
### Dimensions





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SFP host board mechanical layout



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)

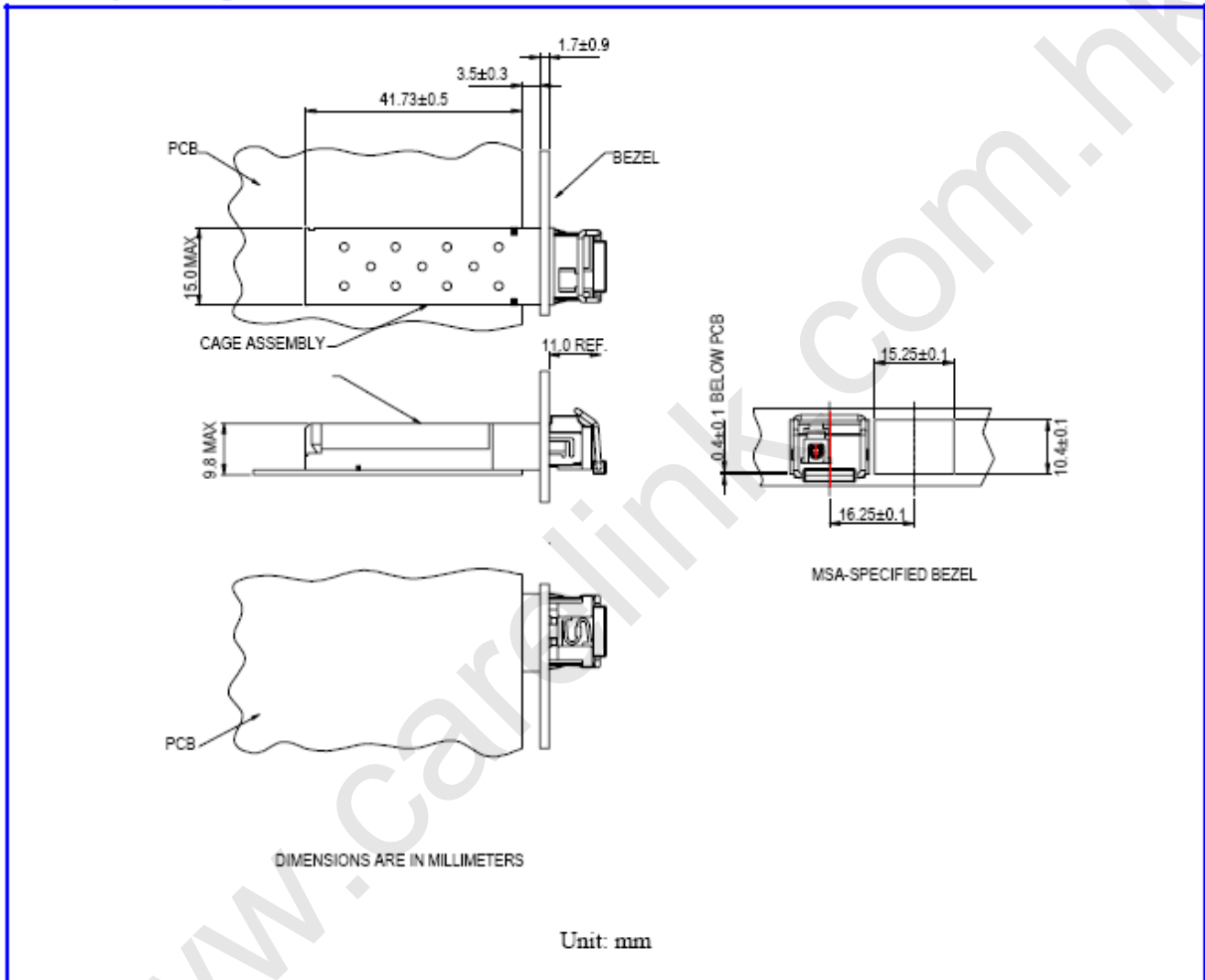
DIMENSIONS ARE IN MILLIMETERS

Unit: mm



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Assembly drawing

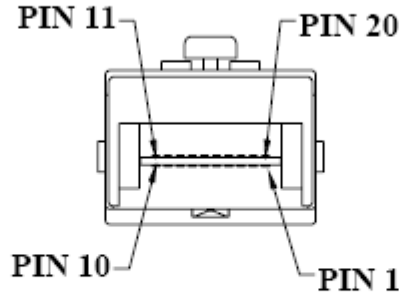




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**Pin Assignment**

Pin-Out



Pin	Signal Name	Description
1	<i>T<sub>GND</sub></i>	Transmit Ground
2	<i>TX_FAULT</i>	Transmit Fault
3	<i>TX_DISABLE</i>	Transmit Disable
4	<i>MOD_DEF (2)</i>	SDA Serial Data Signal
5	<i>MOD_DEF (1)</i>	SCL Serial Clock Signal
6	<i>MOD_DEF (0)</i>	TTL Low
7	<i>RATE_SELECT</i>	Open Circuit
8	<i>RX_LOS</i>	Receiver Loss of Signal, TTL High, open collector
9	<i>R<sub>GND</sub></i>	Receiver Ground
10	<i>R<sub>GND</sub></i>	Receiver Ground
11	<i>R<sub>GND</sub></i>	Receiver Ground
12	<i>RX-</i>	Receive Data Bar, Differential PECL, ac coupled
13	<i>RX+</i>	Receive Data, Differential PECL, ac coupled
14	<i>R<sub>GND</sub></i>	Receiver Ground
15	<i>V<sub>CCR</sub></i>	Receiver Power Supply
16	<i>V<sub>CCT</sub></i>	Transmitter Power Supply
17	<i>T<sub>GND</sub></i>	Transmitter Ground
18	<i>TX+</i>	Transmit Data, Differential PCEL, ac coupled
19	<i>TX-</i>	Transmit Data Bar, Differential PCEL, ac coupled
20	<i>T<sub>GND</sub></i>	Transmitter Ground

**Regulatory Compliance**

- ESD to the Electrical PINs: compatible with MIL-STD-883 Method 3015
- ESD to the Duplex LC Receptacle: compatible with IEC 61000-4-2
- Immunity compatible with IEC 61000-4-3
- EMI compatible with FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B
- Laser Eye Safety compatible with FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2
- RoHS compliant with 2002/95/EC 4.1&4.2 2005/747/EC





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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.