



**RoHS compliant**  
**850 nm Multi-mode Transceiver**  
**Small Form Pluggable (SFP+), with Diagnostic Monitoring**  
**Fiber Channel 10G,8.5G,4.25G, 2.125G, 1.0625Gb/s,**  
**10G BASE-SW/SR,1000 Base-SX Ethernet**



### Features

- Compliant with IEEE802.3ae 10G BASE-SW/SR
- Compliant with 10G Fiber Channel 1200-M5-SN-I and 1200-M6-SN-I standard
- Compliant with 8.5G Fiber Channel 800-M5-SN-I and 800-M6-SN-I standard
- Compliant with 4.25G Fiber Channel 400-M5-SN-I and 400-M6-SN-I standard
- Compliant with 2.125G Fiber Channel 200-M5-SN-I and 200-M6-SN-I standard
- Compliant with 1.0625G Fiber Channel 100-M5-SN-I and 100-M6-SN-I standard
- Compliant with IEEE802.3z Gigabit Ethernet standard
- Compliant with SFF8472 diagnostic monitoring interface Duplex LC connector
- Differential LVPECL inputs and CML outputs
- Single power supply 3.3V
- TTL signal detect indicator
- Hot Pluggable
- Distance up to 300m on 50/125um MMF
- Class 1 laser product complies with EN 60825-1

### Ordering Information

PART NUMBER	INPUT/OUTPUT	SIGNAL DETECT	VOLTAGE	TEMPERATURE
CL-SFP+_300	AC/AC	TTL	3.3V/5V	-5°C to 70 °C
CL-SFP+_300i	AC/AC	TTL	3.3V/5V	-30°C to 70 °C
CL-SFP+_300i	AC/AC	TTL	3.3V/5V	-40°C to 85 °C

### 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	$T_c$	-10	70	°C	$T_c = -40^{\circ}\text{C}$ to $85^{\circ}\text{C}$ for CL-SFP+_300
Supply Voltage	$V_{cc}$	3.1	3.5	V	
Supply Current	$I_{TX} + I_{RX}$	---	200	mA	

### Transmitter Electro-optical Characteristics

$V_{cc} = 3.1\text{ V}$  to  $3.5\text{ V}$ ,  $T_c = -10^{\circ}\text{C}$  to  $70^{\circ}\text{C}$  &  $T_c = -40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$  for CL-SFP+\_300

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTE
Output Optical Power (50/125 $\mu\text{m}$ fiber, NA=0.20) (62.5/125 $\mu\text{m}$ fiber, NA=0.275)	$P_{out}$	-7	---	-3	dBm	
Optical Modulation Amplitude	$OMA$	-4.3			dBm	
Center Wavelength	$\lambda_c$	840	850	860	nm	
Spectral Width (RMS)	$\Delta\lambda$	---	---	0.45	nm	
Relative Intensity Noise	$RIN$	---	---	-128	dB/Hz	
Output Eye						Compliant with fiber channel 8x
Max. $P_{out}$ TX-DISABLE Asserted	$P_{OFF}$	---	---	-35	dBm	
Differential Input Voltage	$V_{DIFF}$	0.35	---	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	$\mu\text{s}$	
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	$\mu\text{s}$	
TX_DISABLE time to start reset	$t_{reset}$	10	---	---	$\mu\text{s}$	



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**Receiver Electro-optical Characteristics**

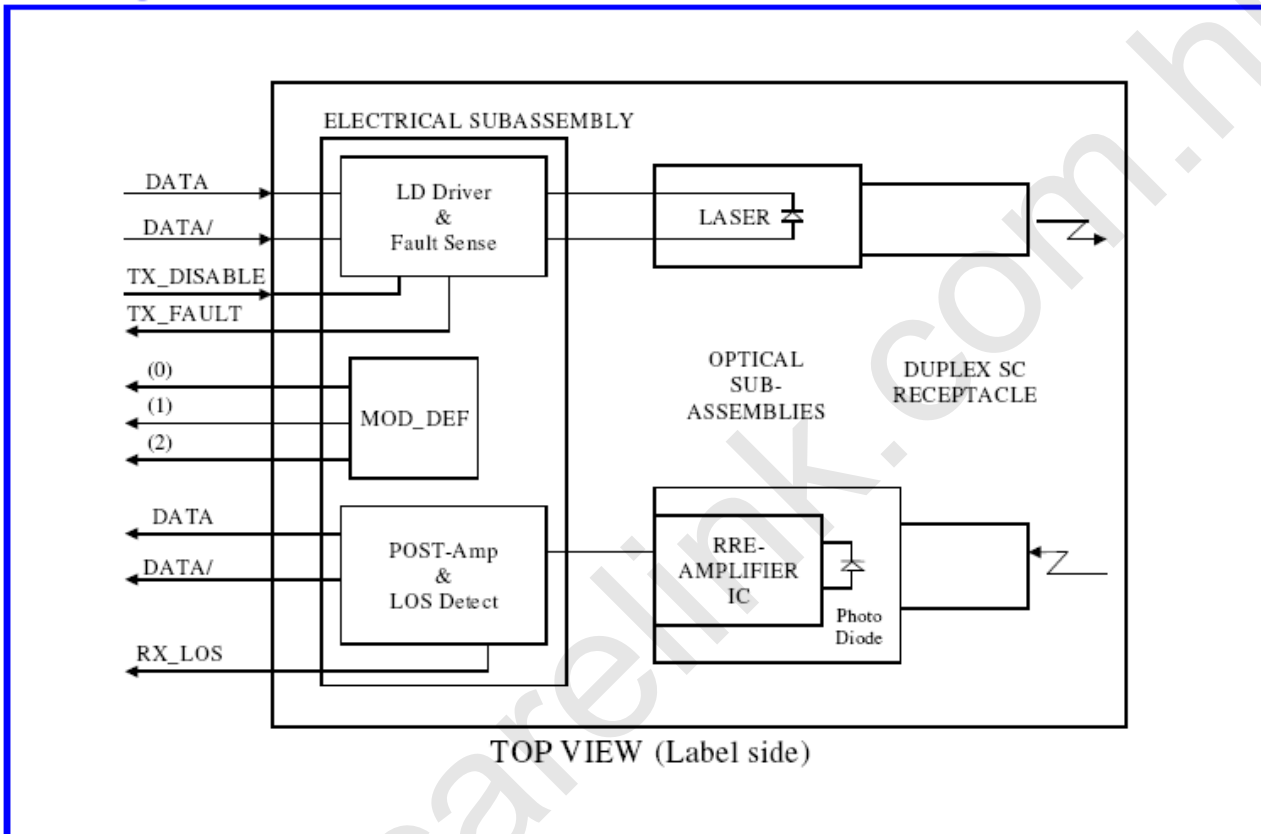
$V_{CC} = 3.1\text{ V to }3.5\text{ V}$ ,  $T_C = -10\text{ }^\circ\text{C to }70\text{ }^\circ\text{C}$  &  $T_C = -40\text{ }^\circ\text{C to }85\text{ }^\circ\text{C}$  for CL-SFP+\_300

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTE
Optical Input Power-maximum	$P_{IN}$	-1	---	---	dBm	BER < $10^{-12}$
Receiver Sensitivity(@10.3GBps)	$P_{IN}$	---	---	-10	dBm	BER < $10^{-12}$
Receiver Sensitivity(@10.3GBps)	$P_{IN}$	---	---	-11.1	dBm	OMA, BER < $10^{-12}$
Operating Center Wavelength	$\lambda_C$	840	---	860	nm	
Optical Return Loss	ORL	12	---	---	dB	
Loss of Signal-Asserted	$P_A$	-12	---	---	dBm	
Loss of Signal-Deasserted	$P_D$	---	---	-20	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	
Receiver Loss of Signal Assert Time (off to on)	$t_{A,RX\_LOS}$	---	---	100	$\mu\text{s}$	
Receiver Loss of Signal Assert Time (on to off)	$t_{D,RX\_LOS}$	---	---	100	$\mu\text{s}$	



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### Block Diagram of Transceiver



#### Transmitter Section

The transmitter section consists of a 850 nm VCSEL 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 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. The laser will turn on within 1ms when



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TX\_DISABLE is low (TTL logic "0").

#### **Receiver Section**

The receiver utilizes a MSM detector integrated with a trans-impedance preamplifier in an OSA. This OSA is connected to a circuit providing post-amplification quantization, and optical signal detection.

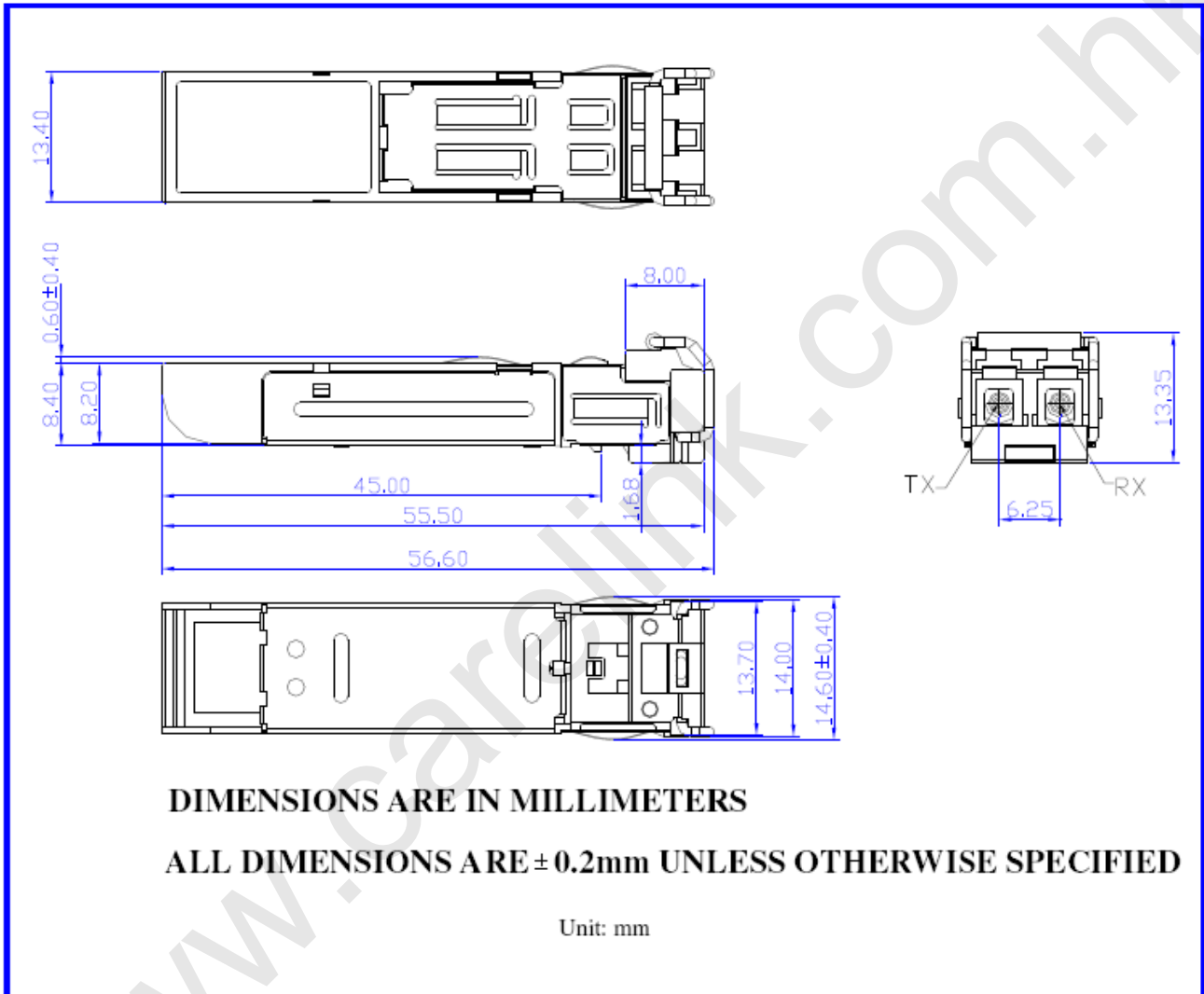
#### **Receive Loss (RX\_LOS)**

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

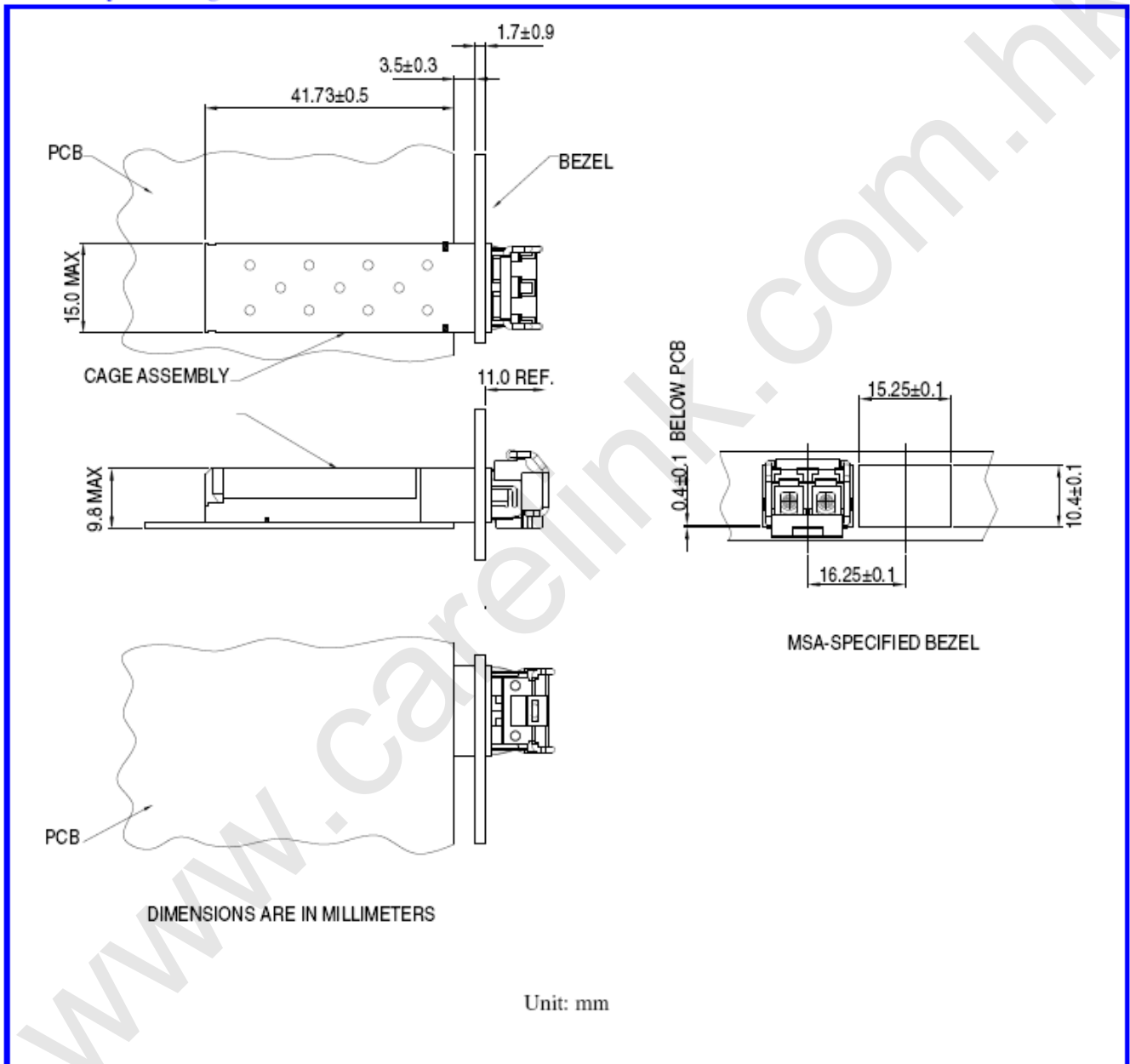






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Assembly drawing



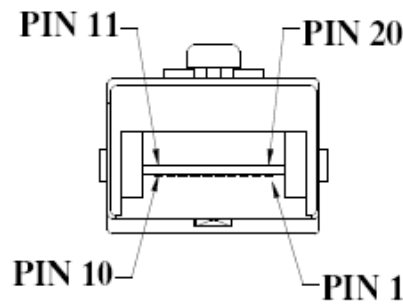




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### Pin Assignment

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	$RS0$	RX Rate Select
8	$RX\_LOS$	Receiver Loss of Signal, TTL High, open collector
9	$RS1$	TX Rate Select
10	$R_{GND}$	Receiver Ground
11	$R_{GND}$	Receiver Ground
12	$RX-$	Receive Data out Bar, ac coupled
13	$RX+$	Receive Data out, 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 in, ac coupled
19	$TX-$	Transmit Data in Bar, ac coupled
20	$T_{GND}$	Transmitter Ground



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### Eye Safety Mark

The LM2 series multimode 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.