

## RoHS Compliant 2x5 Small Form Factor Transceiver for Gigabit Ethernet



### FEATURES

- Compliant with SFF transceiver MSA specification
- Compliant with specifications for IEEE 802.3z/Gigabit Ethernet
- LC-1250BxQxRx compliant with the 1.0625GBd Fiber Channel 100-SM-LC-L FC-PI Rev.13
- LC-1250AxFxRx compliant with the 1.0625GBd Fiber Channel FC-PI 100-M5-SN-I Rev.13
- Single + 3.3V power supply
- Laser Class 1 product which comply with the requirements of IEC 60825-1 and IEC 60825-2
- Duplex LC connector interface
- TTL or PECL signal detect level
- RoHS Compliant per Directive 2002/95/EC

### Description

The LC-1250xxxxRx series are high performance, cost effective optical transceivers intended for 1250 Mb/s. They are designed to provide Gigabit Ethernet compliant link at 1250 Mb/s for short, intermediate and long reach links, respectively.

The LC-1250xxxxRx series provide with the LC receptacle those are compatible with the industry standard LC connector.

The LC-1250xxxxRx series are Class 1 eye safety product. The optical power levels, under normal operation, are at eye safe level.

### Applications

- Switch to switch interface
- Switched backplane applications
- File server interface

### Performance

#### LC-1250AxFxRx:

- 850nm VCSEL, up to 500m in 50/125  $\mu$  m MMF
- 850nm VCSEL, up to 220m in 62.5/125  $\mu$  m MMF

#### LC-1250BxQxRx:

- 1310nm FP laser, up to 10km in 9/125  $\mu$  m SMF
- 1310nm FP laser, up to 550m in 50/125  $\mu$  m MMF
- 1310nm FP laser, up to 550m in 62.5/125  $\mu$  m MMF

**Absolute Maximum Ratings**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	Ts	-40		85	°C	
Lead Soldering Temperature	TSOLD			260	°C	
Lead Soldering Time	tSOLD			10	Sec.	
Supply Voltage	VCC	0		5	V	

**Recommended Operating Conditions**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Ambient Operating Temperature	TA	0		70	°C	1
Supply Voltage	VCC	3.135		3.465	V	

Note: See ordering information for detail

**Electrical Characteristics**

(V<sub>CC</sub>=3.135 V to 3.465 V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
<b>Transmitter</b>						
Transmitter Data Input Voltage-Low	V <sub>IL-VCC</sub>	-1.81		-1.48	V	
Transmitter Data Input Voltage-High	V <sub>IH-VCC</sub>	-1.16		-0.88	V	
Transmitter Disable Input-High	V <sub>DISH</sub>	2		V <sub>CC</sub> +0.3	V	
Transmitter Disable Input-Low	V <sub>DISL</sub>	0		0.8	V	
<b>Receiver</b>						
Data Output Voltage-Low	V <sub>OL-VCC</sub>	-1.95		-1.62	V	
Data Output Voltage-High	V <sub>OH-VCC</sub>	-1.045		-0.74	V	
SD Output Voltage-Low	V <sub>SDH-VCC</sub>	-1.95		-1.62	V	ECL Family
SD Output Voltage-High	V <sub>SDL-VCC</sub>	-1.05		-0.74	V	
SD Output Voltage-Low	V <sub>SDH-VCC</sub>			0.8	V	LVTTTL
SD Output Voltage-High	V <sub>SDL-VCC</sub>	2			V	

**Transmitter Optical Performance Specifications:**

 (V<sub>CC</sub>=3.135 V to 3.465 V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Supply Current	I <sub>CC</sub>			150	mA	
Average Launched Power LC-1250AxFxRx LC-1250BxQxRx	P <sub>O</sub>	-9.5 -9.5		-4 -3	dBm	
Optical extinction ratio	ER	9			dB	
Center wavelength LC-1250AxFxRx LC-1250BxQxRx	c	830 1274		860 1355	nm	
Spectral Width LC-1250AxFxRx (RMS) LC-1250BxQxRx (RMS)	σ			0.85 2.8	nm	
Relative Intensity Noise	RIN			-116	dB/Hz	
Optical Rise/Fall Time	t <sub>r</sub> /t <sub>f</sub>			260	ps	1
Output Eye	Complies with the IEEE 802.3z/D2 specification, and is class 1 laser eye safety					

**Receiver Optical Performance Specifications:**

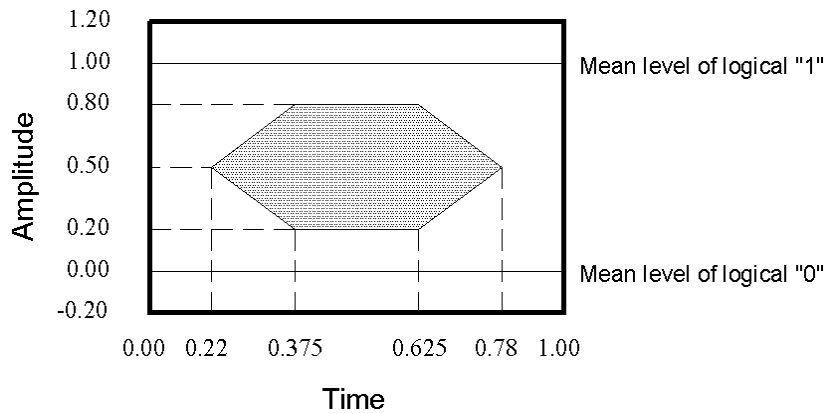
 (V<sub>CC</sub>=3.135 V to 3.465 V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Supply Current	I <sub>CC</sub>			120	mA	
Optical input sensitivity (avg.) LC-1250AxFxRx LC-1250BxQxRx	P <sub>IN</sub>			-17 -19	dBm	2
Optical input saturation (avg.) LC-1250AxFxRx LC-1250BxQxRx	P <sub>SAT</sub>	-3 -3			dBm	
Optical Wavelength LC-1250AxFxRx LC-1250BxQxRx		830 1274		860 1355	nm	
Output Data risetime	t <sub>r</sub>			0.35	ns	1
Output Data falltime	t <sub>f</sub>			0.35	ns	1
SD-Asserted Level (Avg.) LC-1250AxFxRx LC-1250BxQxRx	P <sub>A</sub>			-17 -19	dBm	
SD-Deasserted Level (Avg.) LC-1250AxFxRx LC-1250BxQxRx	P <sub>D</sub>	-30 -30			dBm	
Signal detect- Hysteresis	P <sub>A</sub> -P <sub>D</sub>	0.5			dB	

**Notes:**

- These are unfiltered 20%~80% values.
- The sensitivity is provided at a BER of  $1 \times 10^{-10}$  or better with an input signal consisting of 1250 Mb/s,

$2^7-1$  PRBS and ER=9dB.

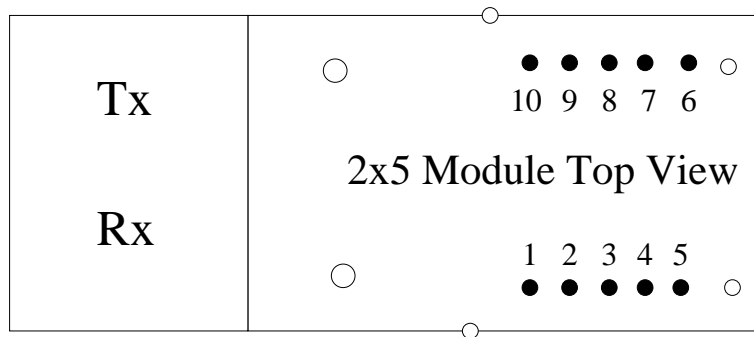


**Mask of the eye diagram for the optical transmit signal**

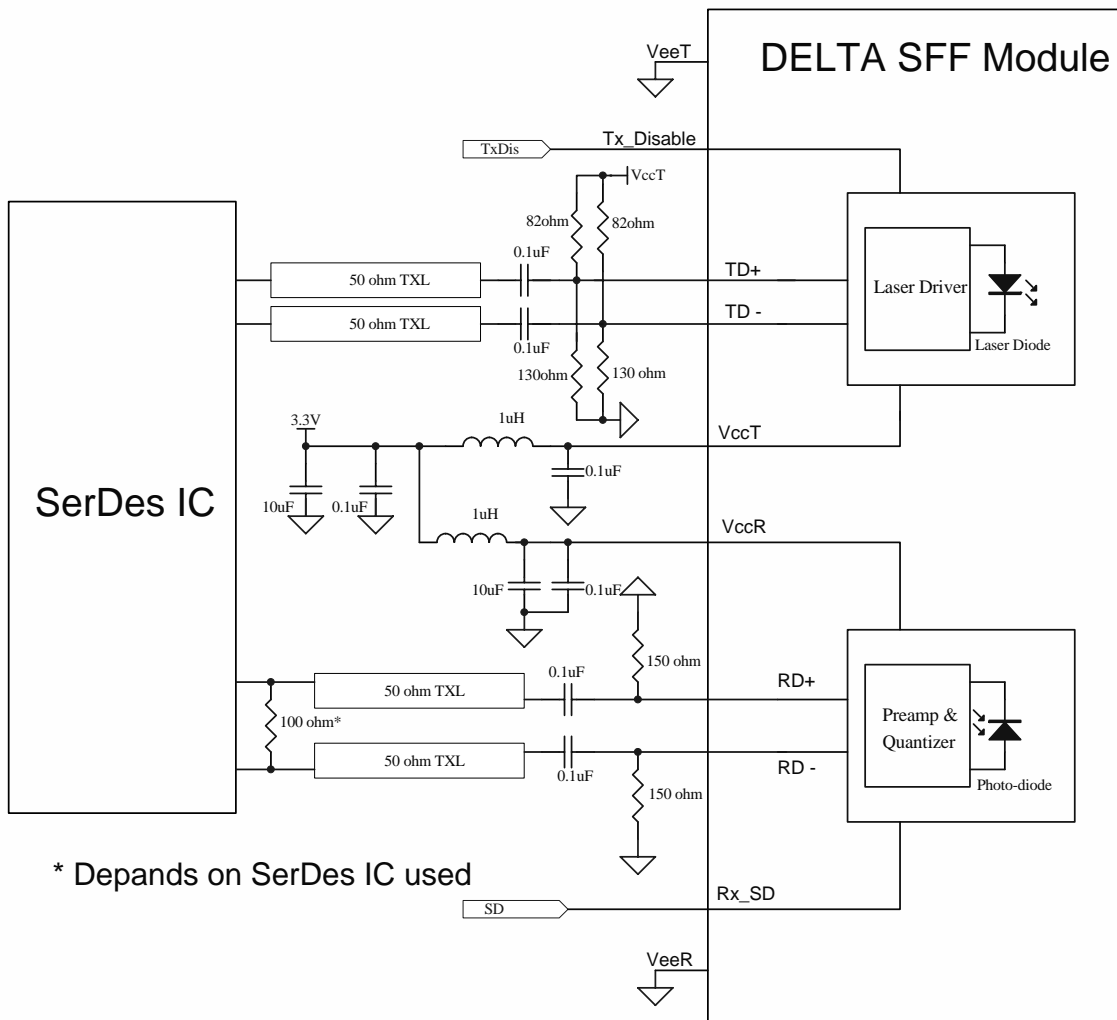
**Pin Out Table:**

PIN (2X5)	Symbol	Functional description
1	GND	Receiver Signal Ground
2	RXV <sub>CC</sub>	Receiver Power Supply
3	SD	Signal Detect
4	RD (-)	Receiver Data Out Bar (LVPECL)
5	RD (+)	Receiver Data Out (LVPECL)
6	TXV <sub>CC</sub>	Transmitter Power Supply
7	GND	Transmitter Signal Ground
8	Disable	Transmitter Disable (LVTTL)
9	TD (+)	Transmitter Data In (LVPECL)
10	TD (-)	Transmitter Data In Bar (LVPECL)

**Pin Out Drawing:**



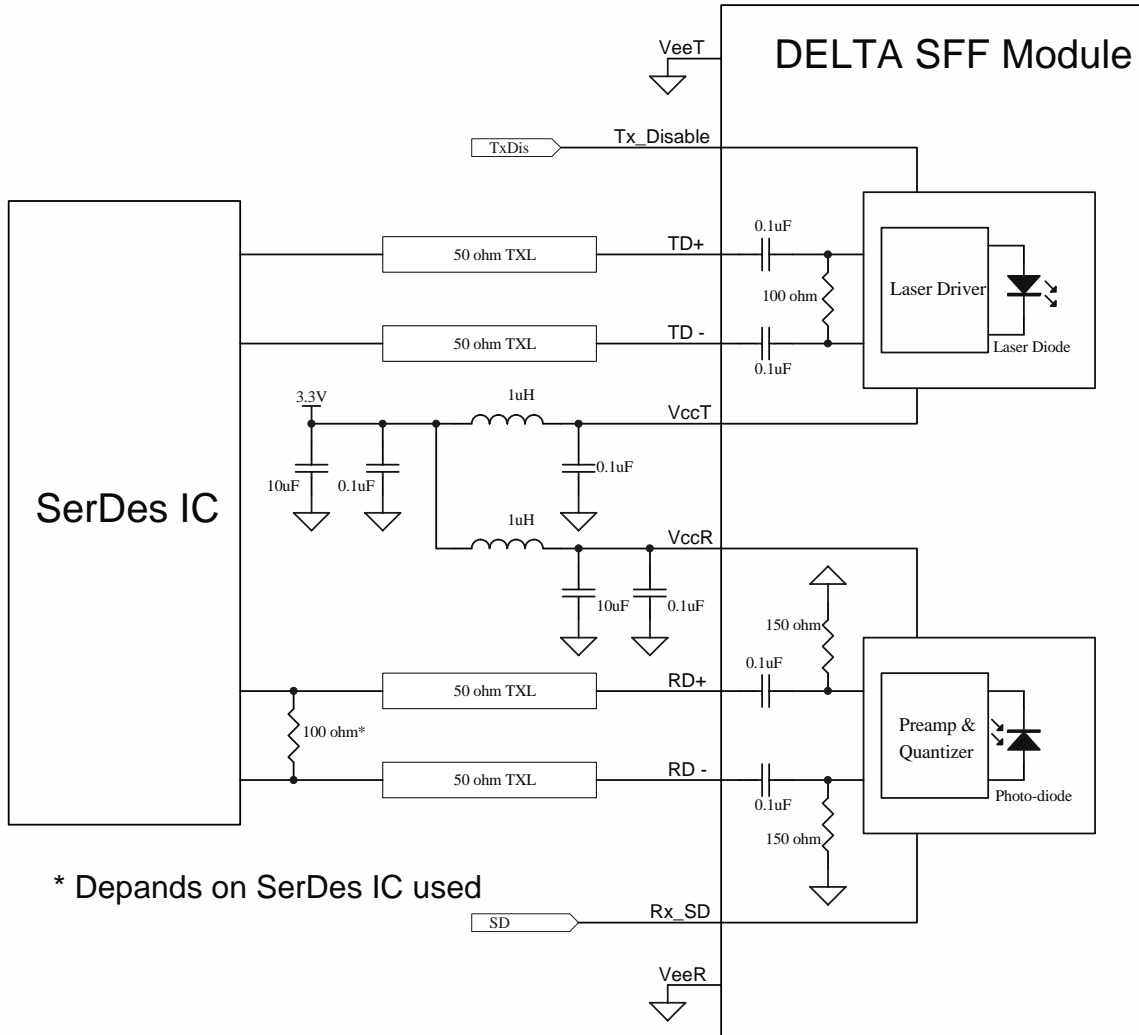
Recommend Circuit Schematic (LC-1250xxx1Rx)



Note:

1. 270 Ohm SD Output pull-down resistors required for LVPECL SD Output.
2. No connected for TTL SD Output.

Recommend Circuit Schematic (LC-1250xxx2Rx)



Note:

1. 270 Ohm SD Output pull-down resistors required for LVPECL SD Output.
2. No connected for TTL SD Output.



**Regulatory Compliance**

Feature	Reference	Performance
Electromagnetic Interference (EMI)	FCC Class B EN 55022 Class B (CISPR 22A)	(1) Satisfied with electrical characteristics of product spec.  (2) No physical damage
Radio Frequency Electromagnetic Field	EN 61000-4-3 IEC 1000-4-3	
Electrostatic Discharge to the Duplex LC Receptacle	EN 61000-4-2 IEC 1000-4-2 IEC 801.2	
Electrostatic Discharge to the Electrical Pins	MIL-STD-883E Method 3015.7	
Eye Safety	US FDA CDRH AEL Class 1 EN 60950: 2000 EN 60825-1: 1994+A11+A2 EN 60825-2: 2000	CDRH File # 0321539-00 TUV Certificate No. R50032471
Component Recognition	Underwriters Laboratories and Canadian Standards Association Joint Component Recognition for Information Technology Equipment Including Electrical Business Equipment	UL File # E239394



**Ordering information****LC-1250X<sub>1</sub>X<sub>2</sub>X<sub>3</sub>X<sub>4</sub>X<sub>5</sub>X<sub>6</sub>****X<sub>1</sub>: Light source types:**

A: 850nm Multi-mode  
B: 1310nm Single-mode

**X<sub>2</sub>: Power Supply Voltage**

2: 3.3V / PECL SD Level  
4: 3.3V / TTL SD Level

**X<sub>3</sub>: Distance:**

F: 500m, 50/125  $\mu$  m MMF  
Q: 10km, 9/125  $\mu$  m SMF

**X<sub>4</sub>: Pin-out / logic interface:**

1 = 2X5 / DC-coupled  
2 = 2X5 / AC-coupled

**X<sub>5</sub>: Blank: Non-RoHS Compliant  
R: RoHS Compliant****X<sub>6</sub>: Temperature**

**Blank:** 0 to +70 degree C  
**H:** -10 to +85 degree C  
**T:** -40 to +85 degree C