



RoHS compliant
1310 nm Single-mode Transceiver
Small Form Pluggable (SFP), 3.3V
1.0625Gbd Fiber Channel/1.25 Gigabit Ethernet



Description

- Up to 1.25Gb/s data links
- DFB laser transmitter and PIN photo-detector
- Up to 40km on 9/125µm SMF
- Hot-pluggable SFP footprint
- Duplex LC/UPC type pluggable optical interface
- Low power dissipation
- Metal enclosure, for lower EMI
- RoHS compliant and lead-free
- Single +3.3V power supply
- Compliant with SFF-8472
- Case operating temperature

Commercial: 0°C to +70°C

Extended: -10°C to +80°C

Industrial: -40°C to +85°C

Applications

- Switch to Switch Interface
- Gigabit Ethernet
- Switched Backplane Applications
- Router/Server Interface
- Other Optical Links

Ordering Information

PART NUMBER	TX/RX	INPUT/OUTPUT	SIGNAL DETECT	TEMPERATURE	LD Type	Distance
CL-SFP-LHX-40	1310	AC/AC	TTL	0°C to 70 °C	DFB	40km
CL-SFP-LHX-40i	1310	AC/AC	TTL	-40°C to 85 °C	DFB	40km



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Product Description

Carelink's CL-SFP-LHX-40 Small Form Factor Pluggable (SFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). The transceiver consists of four sections: the LD driver, the limiting amplifier, the DFB laser and the PIN photo-detector. The module data link up to 40KM in 9/125um single mode fiber.

The optical output can be disabled by a TTL logic high-level input of Tx Disable. Tx Fault is provided to indicate that degradation of the laser. Loss of signal (LOS) output is provided to indicate the loss of an input optical signal of receiver or the link status with partner.

I. Pin Descriptions

Pin	Symbol	Name/Description	NOTE
1	V _{EET}	Transmitter Ground (Common with Receiver Ground)	1
2	T _{FAULT}	Transmitter Fault.	
3	T _{DIS}	Transmitter Disable. Laser output disabled on high or open.	2
4	MOD_DEF(2)	Module Definition 2. Data line for Serial ID.	3
5	MOD_DEF(1)	Module Definition 1. Clock line for Serial ID.	3
6	MOD_DEF(0)	Module Definition 0. Grounded within the module.	3
7	Rate Select	No connection required	4
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	5
9	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
10	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
11	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
15	V _{CCR}	Receiver Power Supply	
16	V _{CCT}	Transmitter Power Supply	
17	V _{EET}	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	V _{EET}	Transmitter Ground (Common with Receiver Ground)	1



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Notes:

1. Circuit ground is internally isolated from chassis ground.
2. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
3. Should be pulled up with 4.7k - 10kohms on host board to a voltage between 2.0V and 3.6V. MOD_DEF (0) pulls line low to indicate module is plugged in.
4. This is an optional input used to control the receiver bandwidth for compatibility with multiple data rates (most likely Fiber Channel 1x and 2x Rates). If implemented, the input will be internally pulled down with > 30kΩ resistor. The input states are:
 - Low (0 – 0.8V): Reduced Bandwidth
 - (>0.8, < 2.0V): Undefined
 - High (2.0 – 3.465V): Full Bandwidth
 - Open: Reduced Bandwidth
5. LOS is open collector output should be pulled up with 4.7k - 10kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

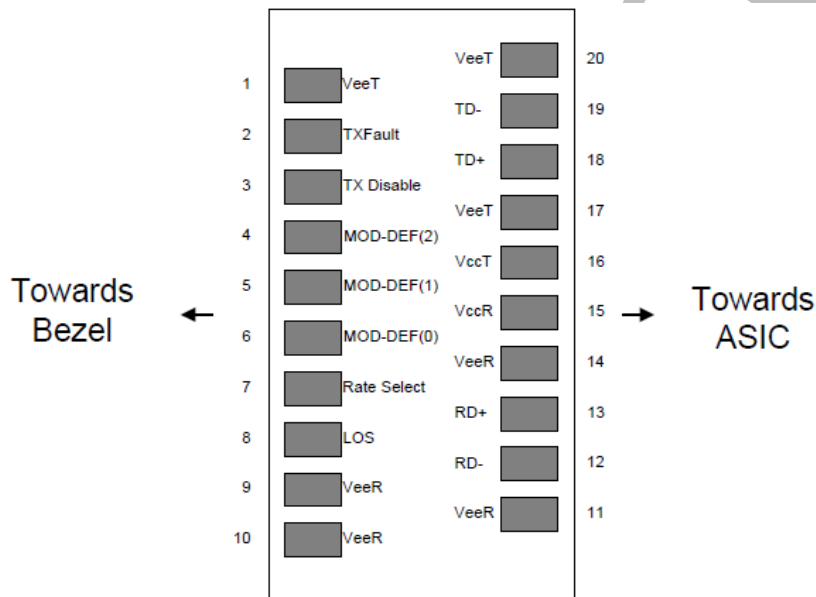


Figure2. Pin out of Connector Block on Host Board

II. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	Ts	-40		85	°C	
Relative Humidity	RH	5		95	%	
Power Supply Voltage	VCC	-0.5		4	V	
Signal Input Voltage		-0.3		Vcc+0.3	V	
Receiver Damage Threshold		+5			dBm	



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III. Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note	
Case Operating Temperature	T _{case}	0		70	°C	CL-SFP-LHX-40	
		-10		80		CL-SFP-LHX-40e	
		-40		85		CL-SFP-LHX-40j	
Power Supply Voltage	V _{CC}	3.13	3.3	3.47	V		
Power Supply Current	I _{CC}			280	mA		
Power Supply Noise Rejection				100	mVp-p	100Hz to 1MHz	
Data Rate			1250/1250		Mbps	TX Rate/RX Rate	
Transmission Distance				40	KM		
Coupled Fiber		Single mode fiber					9/125um SMF

IV. Specification of Transmitter

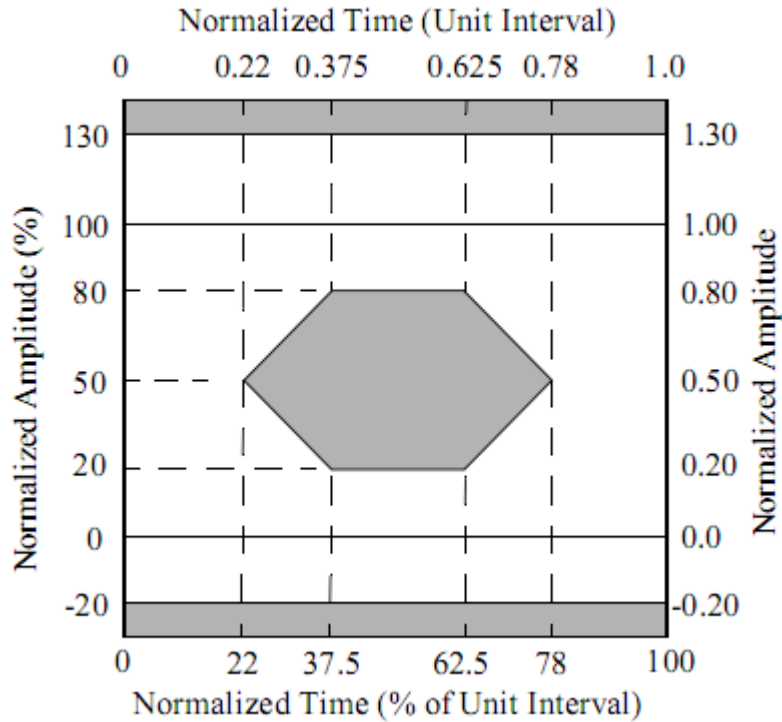
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Average Output Power	P _{OUT}	-5		0	dBm	Note (1)
Extinction Ratio	ER	9			dB	
Center Wavelength	λ_c	1290	1310	1330	nm	DFB Laser
Side Mode Suppression Ratio	SMSR	30			dB	
Spectrum Bandwidth(-20dB)	σ			1	nm	
Transmitter OFF Output Power	P _{OFF}			-45	dBm	
Differential Line Input Impedance	R _{IN}	90	100	110	Ohm	
Output Eye Mask	Compliant with	IEEE802.3 z (class 1 laser safety)				Note (2)

Note (1): Measure at 2⁷-1 NRZ PRBS pattern

Note (2): Transmitter eye mask definition



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V. Specification of Receiver

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Input Optical Wavelength	λ_{IN}	1270		1610	nm	PIN-TIA
Receiver Sensitivity	P_{IN}			-24	dBm	Note (1)
Input Saturation Power (Overload)	P_{SAT}	-1			dBm	
Los Of Signal Assert	P_A			-25	dBm	
Los Of Signal De-assert	P_D	-38			dBm	Note (2)
LOS Hysteresis	P_A-P_D	0.5	2	6	dB	

Note (1): Measured with Light source 1310nm, ER=9dB; BER =10^{-12} @PRBS=2⁷-1 NRZ

Note (2): When LOS de-asserted, the RX data+/- output is High-level (fixed)



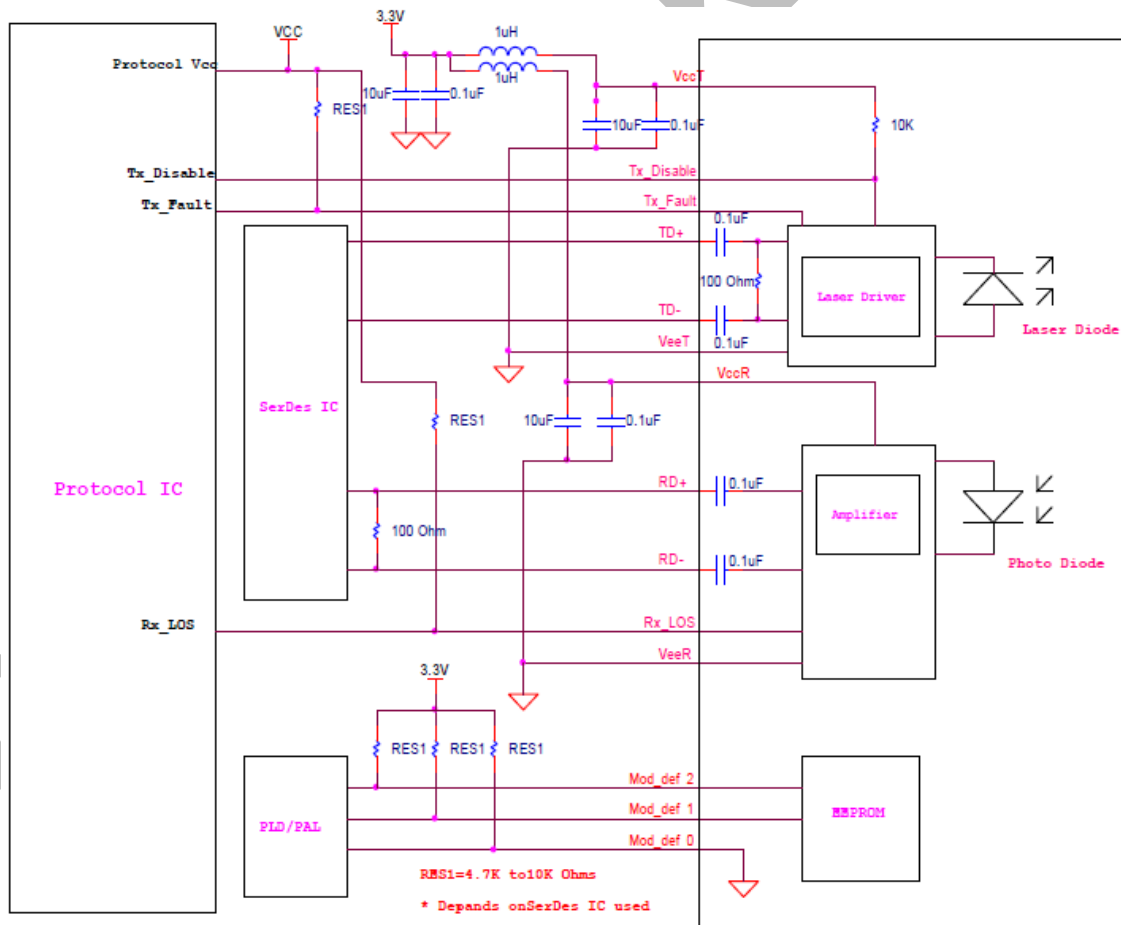
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VI. Electrical Interface Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Total Supply Current	I _{CC}			A	mA	Note (1)
Transmitter Disable Input-High	V _{DISH}	2		V _{CC} +0.3	V	
Transmitter Disable Input-Low	V _{DISL}	0		0.8	V	
Transmitter Fault Input-High	V _{TxFH}	2		V _{CC} +0.3	V	
Transmitter Fault Input-Low	V _{TxFL}	0		0.8	V	
Receiver						
Total Supply Current	I _{CC}			B	mA	Note (1)
LOSS Output Voltage-High	V _{LOSH}	2		V _{CC} +0.3	V	LVTTTL
LOSS Output Voltage-Low	V _{LOSL}	0		0.8	V	

Note (1): A (TX) + B (RX) = 280mA (Not include termination circuit)

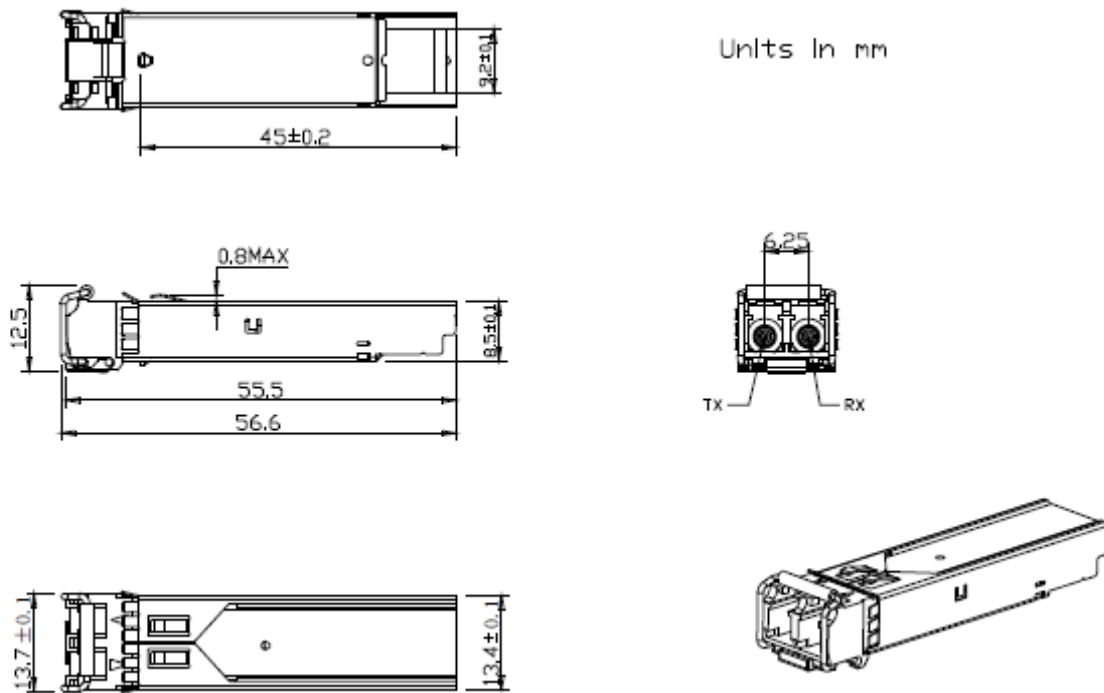
VII. Recommend Circuit Schematic





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VIII. Mechanical Specifications (Unit: mm)



Units In mm

IX. Regulatory Compliance

Feature	Reference	Performance
Electrostatic discharge (ESD)	IEC/EN 61000-4-2	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN 55022 Class B (CISPR 22A)	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10, 1040.11 IEC/EN 60825-1, 2	Class 1 laser product
Component Recognition	IEC/EN 60950 , UL	Compatible with standards
ROHS	2002/95/EC	Compatible with standards
EMC	EN61000-3	Compatible with standards