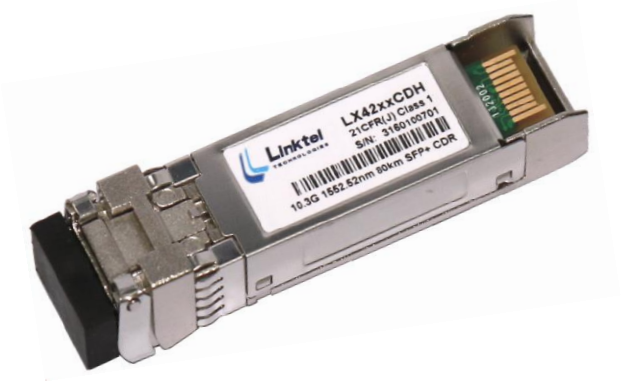
Product Features



- Compliant with IEEE Std 802.3-2005
  10G Ethernet 10GBase-ZR/ZW
- Electrical interface specifications per SFF-8431
- Management interface specifications per
  SFF-8431 and SFF-8472
- SFP+ MSA package with duplex LC connector
- Cooled EML Laser
- Dual CDR from 9.95 to 11.3Gb/s bi-directional data links
- Single +3.3V power supply
- Class 1 laser safety certified
- Operating temperature: -40°C to +85°C
- Up to 80km on 9/125μm SMF
- RoHS Compliant

Applications

- 10G Ethernet 10GBASE-ZR/ZW
- 80km 10G Fiber Channel
- 80km 10Gb/s DWDM SONET/SDH

Descriptions

LX42xxIDH SFP+ transceivers, according to Enhanced 8.5 and 10 Gigabit Small Form Factor Pluggable "SFP+" Multi-Sourcing Agreement (MSA) SFF-8431 and SFF-8472, revision 10.4, are high performance and cost effective transceivers. They meet the requirements for 10Gb/s DWDM SONET/SDH ITU-T G.959.1 PIL1-2D2, 80km DWDM 10G Ethernet 10GBase-ZR/ZW, and 80km 10G Fiber Channel.
LX42xxIDH are compliant with RoHS.

Ordering Information

Table 1. Ordering Information

Part Number	Transmitter	Output Power	Receiver	Sensitivity	Reach	Temp	DDM	RoHS
LX42xxIDH	DWDM EML	0 ~ +4dBm	APD	< -23dBm	80km	-40 ~ 85 °C	Available	Compliant

Notes: See Table 2 – Wavelength Guide for "xx" value.

Table 2. Wavelength Guide for "xx" value (100GHz ITU-T channel)

Channel #	Product Part Number	Frequency (THz)	Center Wavelength (nm)
17	LX4217IDH	191.7	1563.86
18	LX4218IDH	191.8	1563.05
19	LX4219IDH	191.9	1562.23
20	LX4220IDH	192.0	1561.42

21	LX4221IDH	192.1	1560.61
22	LX4222IDH	192.2	1559.79
23	LX4223IDH	192.3	1558.98
24	LX4224IDH	192.4	1558.17
25	LX4225IDH	192.5	1557.36
26	LX4226IDH	192.6	1556.55
27	LX4227IDH	192.7	1555.75
28	LX4228IDH	192.8	1554.94
29	LX4229IDH	192.9	1554.13
30	LX4230IDH	193.0	1553.33
31	LX4231IDH	193.1	1552.52
32	LX4232IDH	193.2	1551.72
33	LX4233IDH	193.3	1550.92
34	LX4234IDH	193.4	1550.12
35	LX4235IDH	193.5	1549.32
36	LX4236IDH	193.6	1548.51
37	LX4237IDH	193.7	1547.72
38	LX4238IDH	193.8	1546.92
39	LX4239IDH	193.9	1546.12
40	LX4240IDH	194.0	1545.32
41	LX4241IDH	194.1	1544.53
42	LX4242IDH	194.2	1543.73
43	LX4243IDH	194.3	1542.94
44	LX4244IDH	194.4	1542.14
45	LX4245IDH	194.5	1541.35
46	LX4246IDH	194.6	1540.56
47	LX4247IDH	194.7	1539.77
48	LX4248IDH	194.8	1538.98
49	LX4249IDH	194.9	1538.19
50	LX4250IDH	195.0	1537.40
51	LX4251IDH	195.1	1536.61
52	LX4252IDH	195.2	1535.82
53	LX4253IDH	195.3	1535.04
54	LX4254IDH	195.4	1534.25
55	LX4255IDH	195.5	1533.47
56	LX4256IDH	195.6	1532.68
57	LX4257IDH	195.7	1531.90

58	LX4258IDH	195.8	1531.12
59	LX4259IDH	195.9	1530.33
60	LX4260IDH	196.0	1529.55
61	LX4261IDH	196.1	1528.77

Pin Description

Table 2. Pin Description

Pin	Name	Function/Description	Notes
1	VeeT	Transmitter Ground	1
2	TX_Fault	Transmitter Fault (LVTTL-O) - High indicates a fault condition	2
3	TX_Disable	Transmitter Disable (LVTTL-I) – High or open disables the transmitter	3
4	SDA	Two wire serial interface Data Line (LVCMOS-I/O) (MOD-DEF2)	4
5	SCL	Two wire serial interface Clock Line (LVCMOS-I/O) (MOD-DEF1)	4
6	MOD_ABS	Module Absent (Output), connected to VeeT or VeeR in the module	5
7	RS0	Rate Select 0 – Not used, Presents high input impedance	-
8	RX_LOS	Receiver Loss of Signal (LVTTL-O)	2
9	RS1	Rate Select 1 – Not used, Presents high input impedance	-
10	VeeR	Receiver Ground	1
11	VeeR	Receiver Ground	1
12	RD-	Inverse Received Data out (CML-O)	-
13	RD+	Received Data out (CML-O)	-
14	VeeR	Receiver Ground	-
15	VccR	Receiver Power - +3.3V	-
16	VccT	Transmitter Power - +3.3 V	-
17	VeeT	Transmitter Ground	1
18	TD+	Transmitter Data In (CML-I)	-
19	TD-	Inverse Transmitter Data In (CML-I)	-
20	VeeT	Transmitter Ground	1

Notes:

1. The module signal grounds are isolated from the module case.
2. This is an open collector/drain output that on the host board requires a 4.7KΩ to 10KΩ pull-up resistor to VccHost.
3. This input is internally biased high with a 4.7KΩ to 10KΩ pull-up resistor to VccT.
4. Two-Wire Serial interface clock and data lines require an external pull-up resistor dependent on the capacitance load.
5. This is a ground return that on the host board requires a 4.7KΩ to 10KΩ pull-up resistor to VccHost.

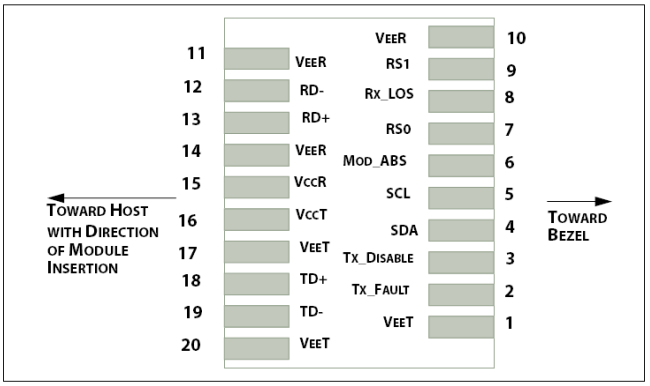


Figure 1. Host PCB SFP+ pad assignment top view

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

Table 3. Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Unit
Storage Temperature	T_S	-40	85	°C
Relative Humidity	RH	5	95	%
Supply Voltage	V_{CC}	-0.5	4.0	V

Recommended Operating Conditions

Table 4. Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Operating Case Temperature	T_C	-40	25	85	°C
Supply Voltage	V_{CC}	3.135	3.3	3.465	V
Data Rate	-	9.95	-	11.31	Gb/s

Transceiver Electrical Characteristics

Table 5. Transceiver Electrical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Module Supply Current	Icc	-	400	660	mA	-
Power Dissipation	P_D	-	1.3	2.2	W	-
Transmitter						
Input Differential Impedance	Z_{IN}	-	100	-	Ω	-

Differential Data Input Swing		$V_{IN, P-P}$	180	-	700	mV_{P-P}	-
TX_FAULT	Transmitter Fault	V_{OH}	2.0	-	V_{CCHOST}	V	-
	Normal Operation	V_{OL}	0	-	0.8	V	-
TX_DISABLE	Transmitter Disable	V_{IH}	2.0	-	V_{CCHOST}	V	-
	Transmitter Enable	V_{IL}	0	-	0.8	V	-
Receiver							
Output Differential Impedance		Z_O	-	100	-	Ω	-
Differential Data Output Swing		$V_{OUT, P-P}$	300	-	850	mV_{P-P}	1
Data Output Rise Time, Fall Time		t_r, t_f	28	-	-	ps	2
RX_LOS	Loss of signal (LOS)	V_{OH}	2.0	-	V_{CCHOST}	V	3
	Normal Operation	V_{OL}	0	-	0.8	V	3

Notes:
1. Internally AC coupled, but requires a external 100Ω differential load termination.
2. 20–80%.
3. LOS is an open collector output. Should be pulled up with 4.7kΩ on the host board.

Transmitter Optical Characteristics

Table 6. Transmitter Optical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Launch Optical Power	Po	0	-	+4.0	dBm	1
Center Wavelength Range	λc	1528.77	-	1563.86	nm	-
Center Wavelength Spacing	-	-	100	-	GHz	
Center Wavelength Tolerance	Δλc	-100	-	100	pm	
Extinction Ratio	EX	9.0	-	-	dB	2
Side Mode Suppression Ratio	SMSR	30	-	-	dB	-
Transmitter and Dispersion Penalty	TDP	-	-	3.0	dB	-
Relative Intensity Noise	RIN			-128	dB/Hz	
Optical Return Loss Tolerance	ORLT	-	-	21	dB	-
Pout @TX-Disable Asserted	P_{off}	-	-	-30	dBm	1
Eye Diagram	ITU-T G.691 SDH STM-64 L-64.2 compatible					

Notes:
1. The optical power is launched into 9/125μm SMF.
2. Measured with a PRBS 2^{31}-1 test pattern @10.3Gbps.

Receiver Optical Characteristics

Table 7. Receiver Optical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Center Wavelength	λc	1260	-	1610	nm	-
Receiver Sensitivity (P_{avg}@9.95Gb/s)	S	-	-	-24	dBm	1
Receiver Sensitivity (P_{avg}@11.1Gb/s)	S			-22	dBm	1
Receiver Overload (P_{avg})	P_{OL}	-7.0	-	-	dBm	2
Optical Return Loss	ORL	26	-	-	dB	-
LOS De-Assert	LOS_D	-	-	-25	dBm	-
LOS Assert	LOS_A	-37	-	-	dBm	-
LOS Hysteresis	-	0.5	-	-	dB	-

Notes:
1. Measured with PRBS 2^{31}-1 test pattern, BER<10^{-12}.
2. Comply with IEEE 802.3-2005.

Recommended Host Board Power Supply Filter Network

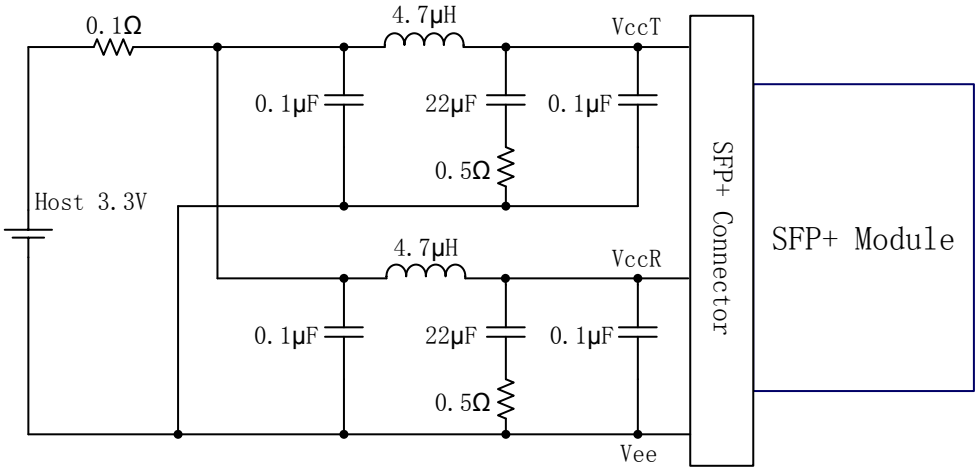


Figure 2. Recommended Host Board Power Supply Filter Network

Recommended Application Interface Block Diagram

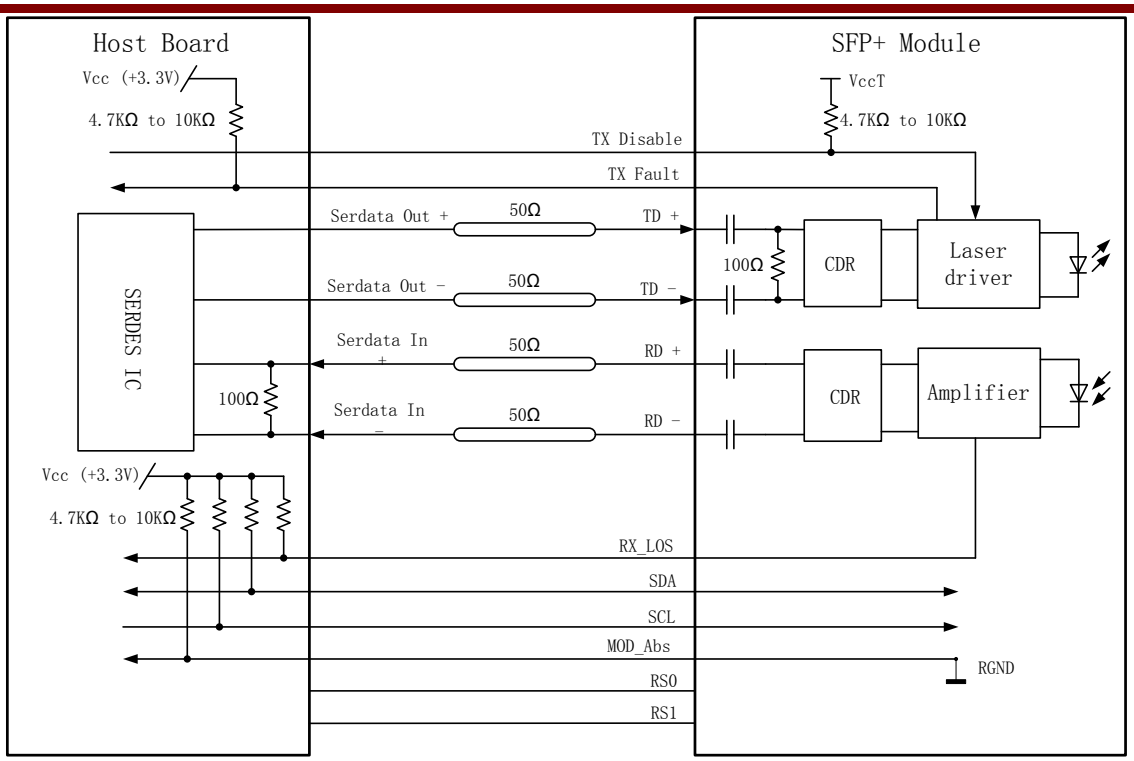


Figure 3. Recommended Application Interface Block Diagram

Mechanical specifications

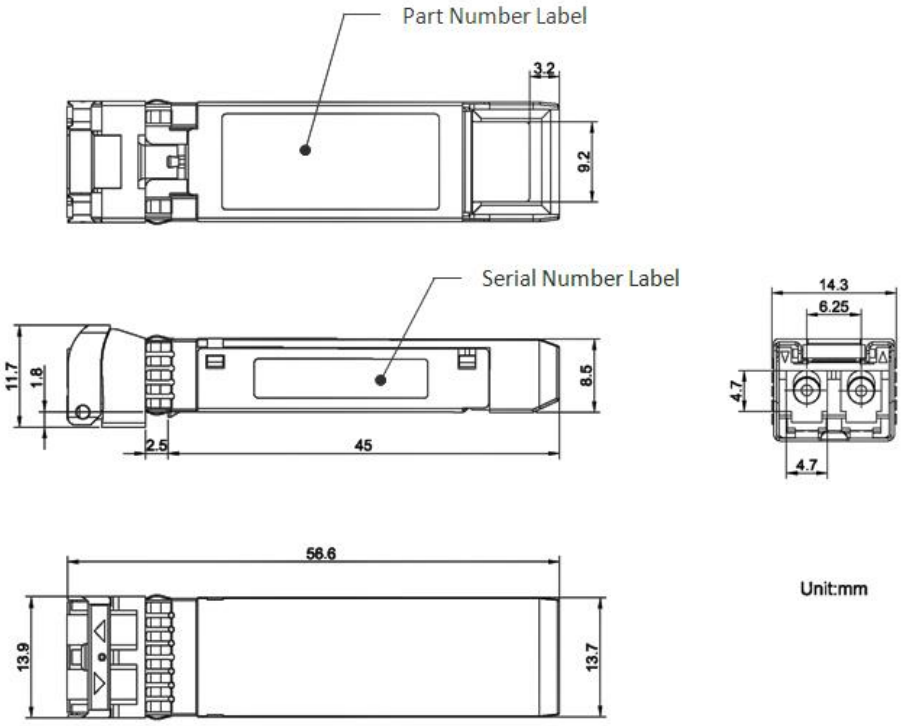


Figure 4. Outline Drawing

PCB layout recommendation

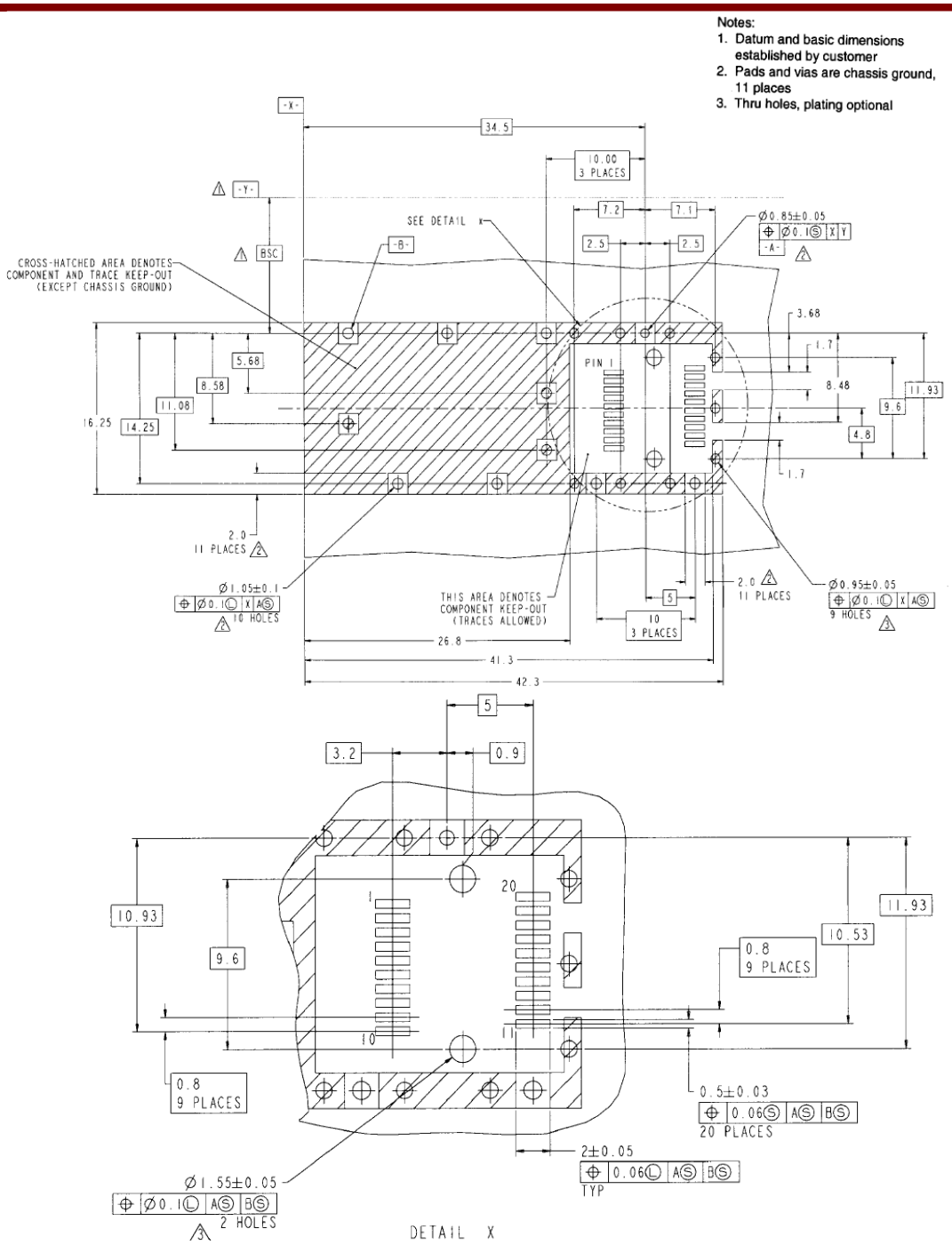


Figure 5. PCB layout recommendation

For More Information

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