

Product Features

- Compliant with IEEE Std 802.3-2005
10G Ethernet 10GBase-ER/EW
- 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 40km on 9/125µm SMF
- RoHS Compliant



Applications

- 10G Ethernet 10GBASE-ER/EW
- 40km 10G Fiber Channel
- 40km 10Gb/s DWDM SONET/SDH

Descriptions

LX41xxIDH 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.691 S64.2, 40km DWDM 10G Ethernet 10GBase-ER/EW, and 40km 10G Fiber Channel.

LX41xxIDH are compliant with RoHS.

Ordering Information

Table 1. Ordering Information

Part Number	Transmitter	Output Power	Receiver	Sensitivity	Reach	Temp	DDM	RoHS
LX41xxIDH	DWDM EML	-1~ +2dBm	PIN	< -15.8dBm	40km	-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	LX4117IDH	191.7	1563.86
18	LX4118IDH	191.8	1563.05
19	LX4119IDH	191.9	1562.23
20	LX4120IDH	192.0	1561.42

LX41xxIDH

10G Ethernet 40km DWDM SFP+ Transceiver

10Gb DWDM SDH / 10GBASE-ER

21	LX4121IDH	192.1	1560.61
22	LX4122IDH	192.2	1559.79
23	LX4123IDH	192.3	1558.98
24	LX4124IDH	192.4	1558.17
25	LX4125IDH	192.5	1557.36
26	LX4126IDH	192.6	1556.55
27	LX4127IDH	192.7	1555.75
28	LX4128IDH	192.8	1554.94
29	LX4129IDH	192.9	1554.13
30	LX4130IDH	193.0	1553.33
31	LX4131IDH	193.1	1552.52
32	LX4132IDH	193.2	1551.72
33	LX4133IDH	193.3	1550.92
34	LX4134IDH	193.4	1550.12
35	LX4135IDH	193.5	1549.32
36	LX4136IDH	193.6	1548.51
37	LX4137IDH	193.7	1547.72
38	LX4138IDH	193.8	1546.92
39	LX4139IDH	193.9	1546.12
40	LX4140IDH	194.0	1545.32
41	LX4141IDH	194.1	1544.53
42	LX4142IDH	194.2	1543.73
43	LX4143IDH	194.3	1542.94
44	LX4144IDH	194.4	1542.14
45	LX4145IDH	194.5	1541.35
46	LX4146IDH	194.6	1540.56
47	LX4147IDH	194.7	1539.77
48	LX4148IDH	194.8	1538.98
49	LX4149IDH	194.9	1538.19
50	LX4150IDH	195.0	1537.40
51	LX4151IDH	195.1	1536.61
52	LX4152IDH	195.2	1535.82
53	LX4153IDH	195.3	1535.04
54	LX4154IDH	195.4	1534.25
55	LX4155IDH	195.5	1533.47
56	LX4156IDH	195.6	1532.68
57	LX4157IDH	195.7	1531.90

58	LX4158IDH	195.8	1531.12
59	LX4159IDH	195.9	1530.33
60	LX4160IDH	196.0	1529.55
61	LX4161IDH	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 (LVTTTL-O) - High indicates a fault condition	2
3	TX_Disable	Transmitter Disable (LVTTTL-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 (LVTTTL-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.

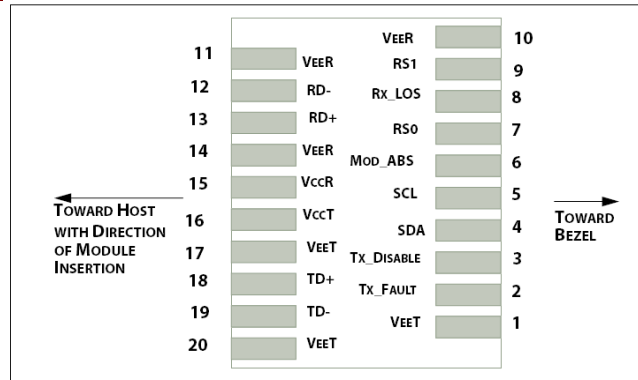


Figure 1. Host PCB SFP+ pad assignment top view

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	I _{cc}	-	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 100 Ω differential load termination.
2. 20–80%.
3. LOS is an open collector output. Should be pulled up with 4.7k Ω on the host board.

Transmitter Optical Characteristics

Table 6. Transmitter Optical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Launch Optical Power	P_o	-1	-	+2	dBm	1
Center Wavelength Range	λ_c	1528.77	-	1563.86	nm	-
Center Wavelength Spacing	-	-	100	-	GHz	
Center Wavelength Tolerance	$\Delta\lambda_c$	-100	-	100	pm	
Extinction Ratio	EX	8.2	-	-	dB	2
Side Mode Suppression Ratio	SMSR	30	-	-	dB	-
Transmitter and Dispersion Penalty	TDP	-	-	2.0	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 S-64.2 compatible

Notes:

1. The optical power is launched into 9/125 μ m SMF.
2. Measured with a PRBS 2³¹-1 test pattern @11.1Gbps.

Receiver Optical Characteristics

Table 7. Receiver Optical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Center Wavelength	λ_c	1260	-	1610	nm	-
Receiver Sensitivity (P_{avg} @9.95Gb/s)	S	-	-	-16	dBm	1

Receiver Sensitivity (P_{avg} @11.1Gb/s)	S			-15	dBm	1
Receiver Overload (P_{avg})	POL	-1.0	-	-	dBm	2
Optical Return Loss	ORL	26	-	-	dB	-
LOS De-Assert	LOS _D	-	-	-16	dBm	-
LOS Assert	LOS _A	-30	-	-	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

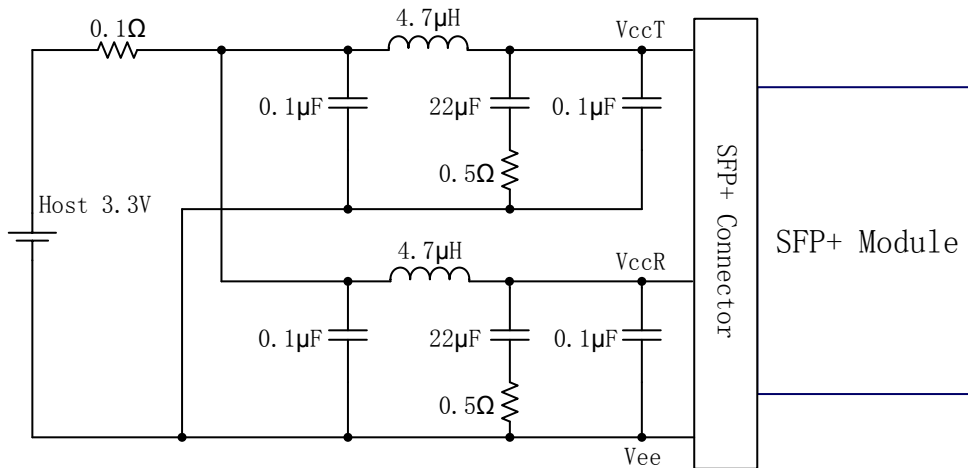


Figure 2. Recommended Host Board Power Supply Filter Network

Recommended Application Interface Block Diagram

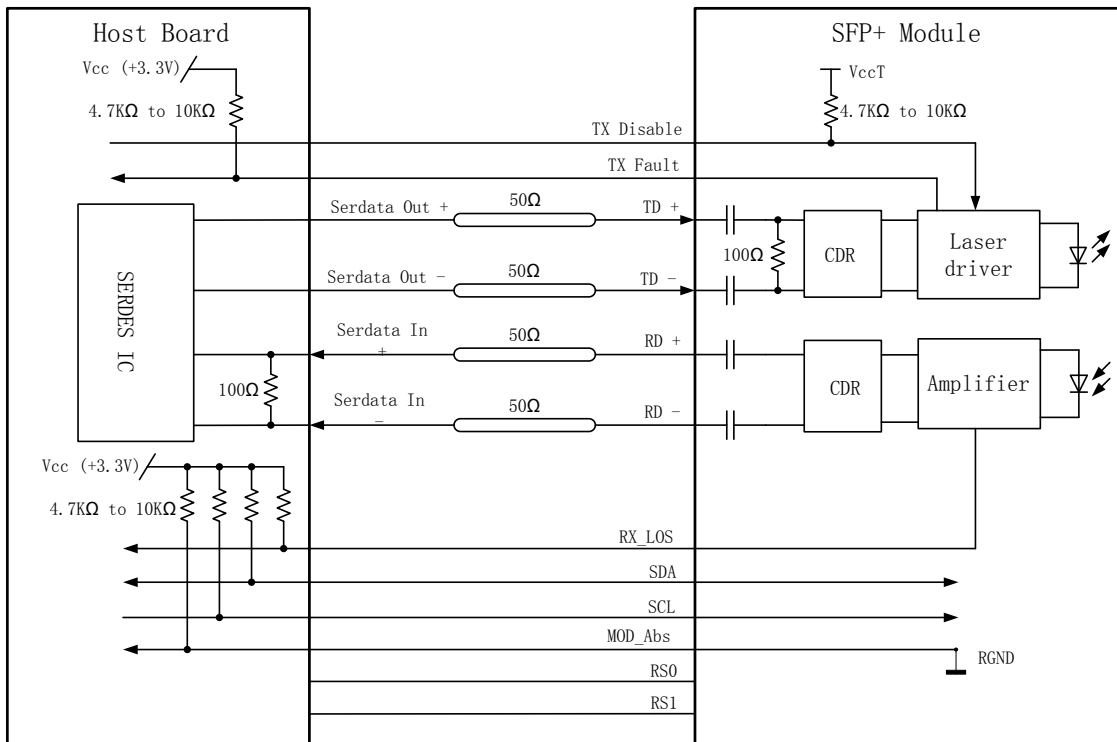


Figure 3. Recommended Application Interface Block Diagram

Mechanical specifications

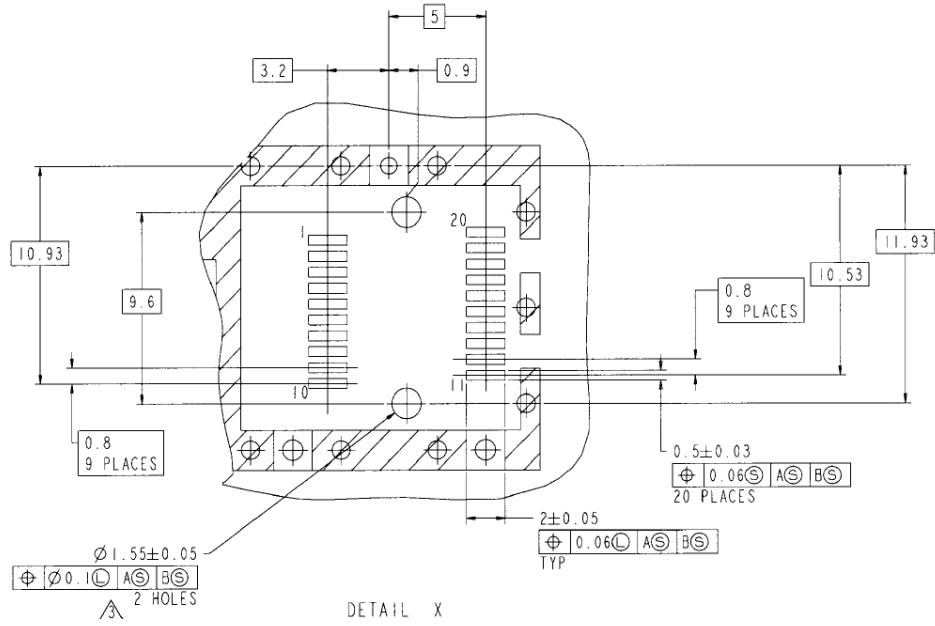


Figure 5. PCB layout recommendation



LX41xxIDH
10G Ethernet 40km DWDM SFP+ Transceiver
10Gb DWDM SDH / 10GBASE-ER

For More Information

Linktel Technologies Co., Ltd

sales@linkteltech.com

<http://www.linkteltech.com>

Linktel China

No.20 University Science Park Road, East-lake Hi-tech Development Zone, Wuhan, 430223, China

Tel: +86 27-87929302

Linktel USA

3311 Ingersoll Court, San Jose, CA 95148

Tel: +1(408)833-9142

linktelus@linkteltech.com