

## Product Features

- Compliant with FC-PI-4 800-SM-LC-L
- Digital Diagnostic Monitoring available
- SFP+ MSA package with duplex LC connector
- DWDM-rated EML Transmitter
- Dual 8.5Gb/s IDH bi-directional data links
- Single +3.3V DC power supply
- Class 1 laser safety certified
- Hot-pluggable SFP footprint
- Operating temperature: -40°C to +85°C
- Up to 80km on 9/125µm SMF
- RoHS Compliant



## Applications

- 8.5G Fiber channel

## Descriptions

LX47xxIDH SFP+ transceivers, according to Enhanced Small Form Factor Pluggable “SFP+” Multi-Sourcing Agreement (MSA) SFF-8431 and SFF-8472, revision 10.4, are designed for use in DWDM 8x Fiber channel application of links up to 80km over single mode fiber.

The product is RoHS compliant.

## Ordering Information

**Table 1. Ordering Information**

Part Number	Transmitter	Output Power	Receiver	Sensitivity	Reach	Temp	DDM	RoHS
LX47xxIDH	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	LX4717IDH	191.7	1563.86
18	LX4718IDH	191.8	1563.05
19	LX4719IDH	191.9	1562.23
20	LX4720IDH	192.0	1561.42
21	LX4721IDH	192.1	1560.61
22	LX4722IDH	192.2	1559.79
23	LX4723IDH	192.3	1558.98

24	LX4724IDH	192.4	1558.17
25	LX4725IDH	192.5	1557.36
26	LX4726IDH	192.6	1556.55
27	LX4727IDH	192.7	1555.75
28	LX4728IDH	192.8	1554.94
29	LX4729IDH	192.9	1554.13
30	LX4730IDH	193.0	1553.33
31	LX4731IDH	193.1	1552.52
32	LX4732IDH	193.2	1551.72
33	LX4733IDH	193.3	1550.92
34	LX4734IDH	193.4	1550.12
35	LX4735IDH	193.5	1549.32
36	LX4736IDH	193.6	1548.51
37	LX4737IDH	193.7	1547.72
38	LX4738IDH	193.8	1546.92
39	LX4739IDH	193.9	1546.12
40	LX4740IDH	194.0	1545.32
41	LX4741IDH	194.1	1544.53
42	LX4742IDH	194.2	1543.73
43	LX4743IDH	194.3	1542.94
44	LX4744IDH	194.4	1542.14
45	LX4745IDH	194.5	1541.35
46	LX4746IDH	194.6	1540.56
47	LX4747IDH	194.7	1539.77
48	LX4748IDH	194.8	1538.98
49	LX4749IDH	194.9	1538.19
50	LX4750IDH	195.0	1537.40
51	LX4751IDH	195.1	1536.61
52	LX4752IDH	195.2	1535.82
53	LX4753IDH	195.3	1535.04
54	LX4754IDH	195.4	1534.25
55	LX4755IDH	195.5	1533.47
56	LX4756IDH	195.6	1532.68
57	LX4757IDH	195.7	1531.90
58	LX4758IDH	195.8	1531.12
59	LX4759IDH	195.9	1530.33
60	LX4760IDH	196.0	1529.55

## Pin Description

**Table 3. 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 4.7K $\Omega$  to 10K $\Omega$  pull-up resistor to VccHost.
3. This input is internally biased high with a 4.7K $\Omega$  to 10K $\Omega$  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 4.7K $\Omega$  to 10K $\Omega$  pull-up resistor to VccHost.

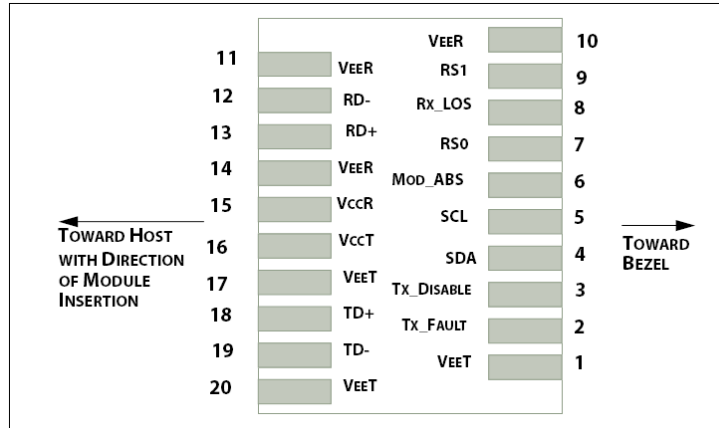


Figure 1. Host PCB SFP+ pad assignment top view

## 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 4. Absolute Maximum Ratings**

Parameter	Symbol	Minimum	Maximum	Unit
Storage Temperature	T <sub>s</sub>	-40	85	°C
Relative Humidity	RH	5	95	%
Supply Voltage	V <sub>cc</sub>	-0.5	4.0	V

## Recommended Operating Conditions

**Table 5. Recommended Operating Conditions**

Parameter	Symbol	Min	Typ	Max	Unit
Operating Case Temperature	T <sub>c</sub>	-40	25	85	°C
Supply Voltage	V <sub>cc</sub>	3.135	3.3	3.465	V
Data Rate	-	-	8.5	-	Gb/s

## Transceiver Electrical Characteristics

**Table 6. Transceiver Electrical Characteristics**

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Module Supply Current	I <sub>cc</sub>	-	-	660	mA	-
Power Dissipation	P <sub>D</sub>	-	1.0	2.2	W	-

Transmitter							
Input Differential Impedance		$Z_{IN}$	-	100	-	$\Omega$	-
Differential Data Input Swing		$V_{IN, P-P}$	180	-	700	mV <sub>P-P</sub>	-
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	-	$\Omega$	-
Differential Data Output Swing		$V_{OUT, P-P}$	300	-	850	mV <sub>P-P</sub>	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 $\Omega$  differential load termination.
2. 20–80%.
3. LOS is an open collector output. Should be pulled up with 4.7K $\Omega$  on the host board.

## Transmitter Optical Characteristics

**Table 7. Transmitter Optical Characteristics**

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Launch Optical Power	$P_o$	0	-	+4.0	dBm	1
Center Wavelength Range	$\lambda_c$	1528.77	-	1563.86	nm	-
Center Wavelength Spacing	-	-	100	-	GHz	-
Center Wavelength Tolerance	$\Delta\lambda_c$	-100	-	100	pm	-
Extinction Ratio	EX	9.0	-	-	dB	2
Side Mode Suppression Ratio	SMSR	30	-	-	dB	-
Spectral Width (-20dB)	-	-	-	1	nm	-
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
Tx Power Monitor Accuracy	-	-	-	$\pm 3$	dB	-

**Notes:**

1. The optical power is launched into 9/125 $\mu$ m SMF.
2. Measured with a PRBS 2<sup>31</sup>-1 test pattern @8.5Gbps.

## Receiver Optical Characteristics

**Table 8. Receiver Optical Characteristics**

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Center Wavelength	$\lambda_c$	1528	-	1565	nm	-
Receiver Sensitivity ( $P_{avg}$ )	S	-	-	-23	dBm	1
Receiver Overload ( $P_{avg}$ )	$P_{OL}$	-7.0	-	-	dBm	1
Optical Return Loss	ORL	-	-	-27	dB	-
Chromatic Dispersion	CD	-	-	1600	ps/nm	-
OSNR	-	27	-	-	dB	2
Max OSNR Path Penalty	-	-	-	4	dB	2
Optical Power Path Penalty	-	-	-	3	dB	-
Rx Power Monitor Accuracy	-	-	-	$\pm 3$	dB	-
Dispersion Limited Distance	-	-	-	80	Km	-
Attenuation Limited Distance	-	-	-	80	Km	-
LOS De-Assert	$LOS_D$	-	-	-25	dBm	-
LOS Assert	$LOS_A$	-35	-	-	dBm	-
LOS Hysteresis	-	0.5	-	-	dB	-

**Notes:**

1. Measured with PRBS  $2^{31}-1$  test pattern, 8.5Gb/s, BER $<10^{-12}$ .
2. Receiver power@ -7~-18dBm, 8.5Gb/s, BER $<10^{-12}$ .

## Recommended Host Board Power Supply Filter Network

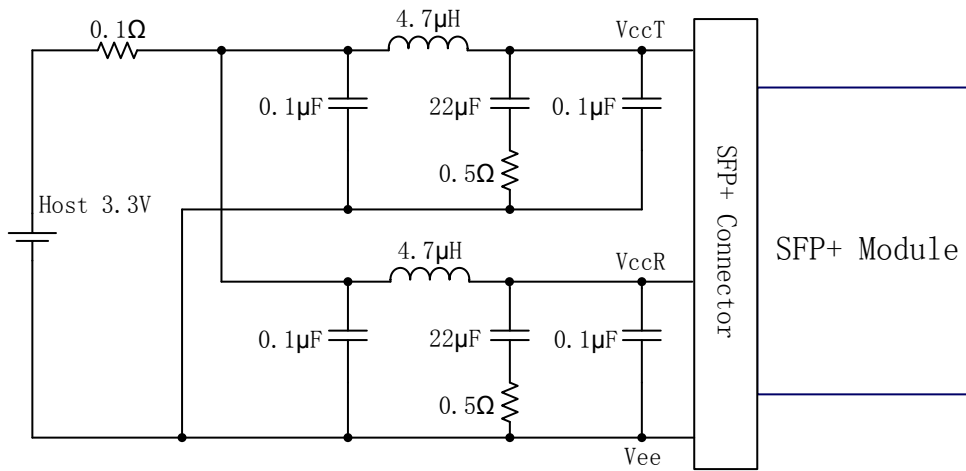


Figure 2. Recommended Host Board Power Supply Filter Network

## Recommended Application Interface Block Diagram

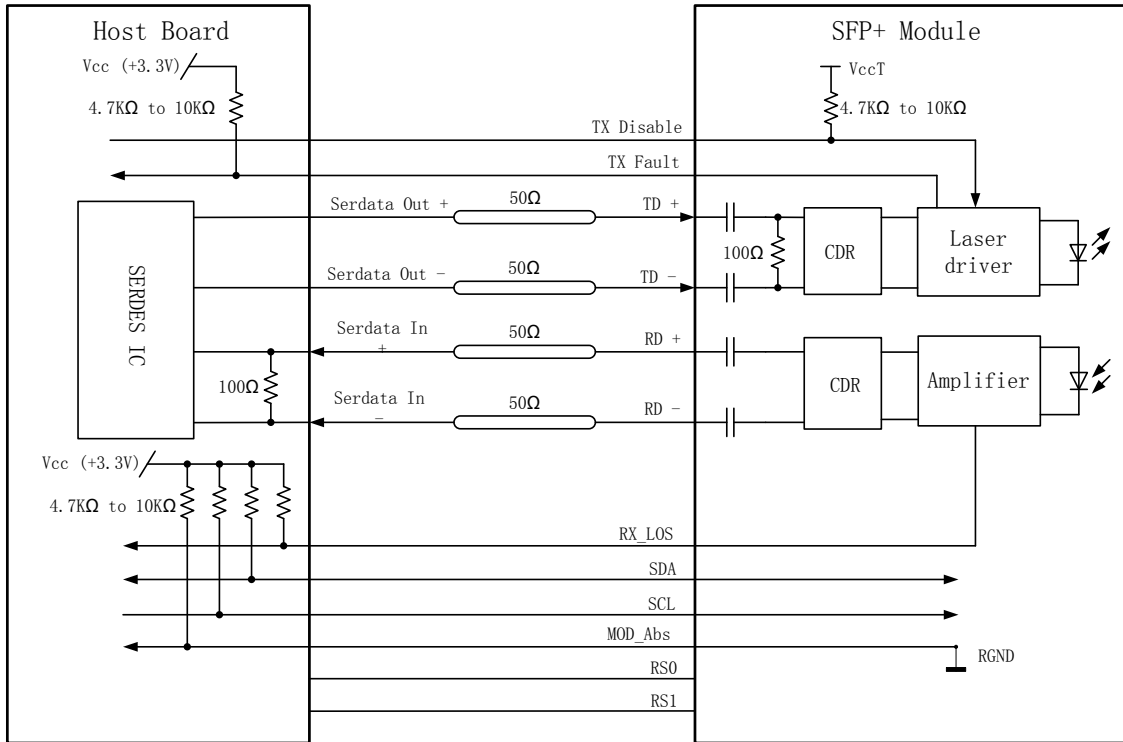


Figure 3. Recommended Application Interface Block Diagram

## Mechanical specifications

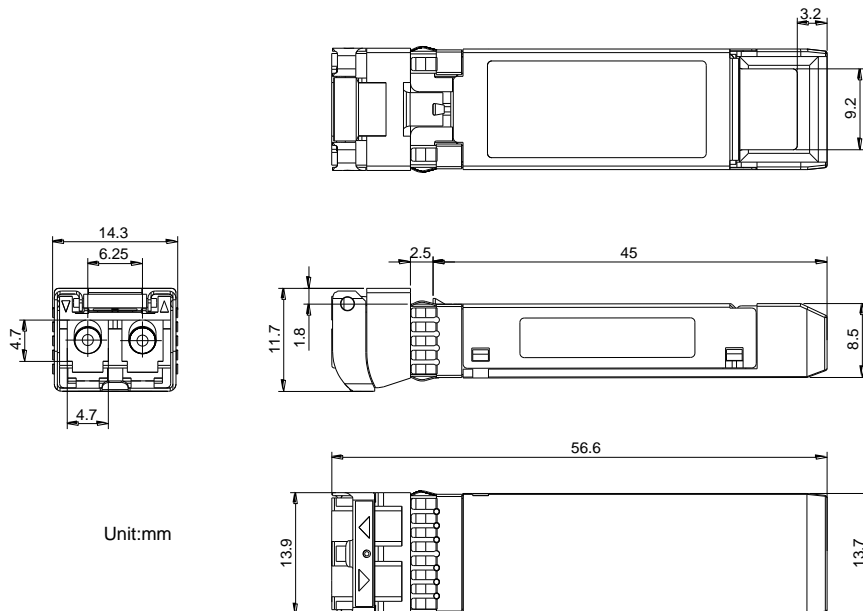


Figure 4. Outline Drawing

**PCB layout recommendation**

- Notes:
1. Datum and basic dimensions established by customer
  2. Pads and vias are chassis ground, 11 places
  3. Thru holes, plating optional

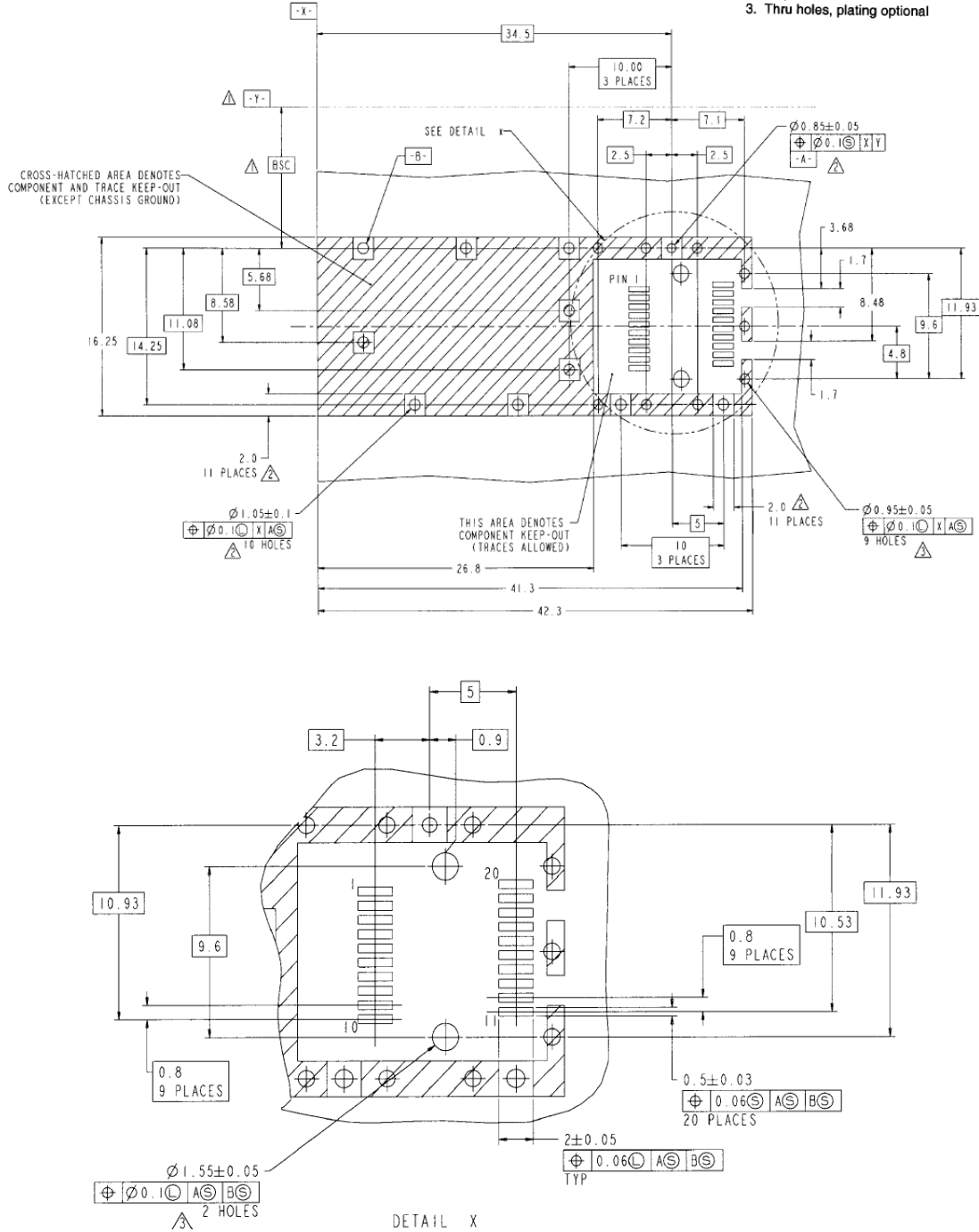


Figure 5. PCB layout recommendation

**For More Information**





**LX47xxIDH**  
**8.5G DWDM SFP+ Transceiver**  
**8G Fiber channel**

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