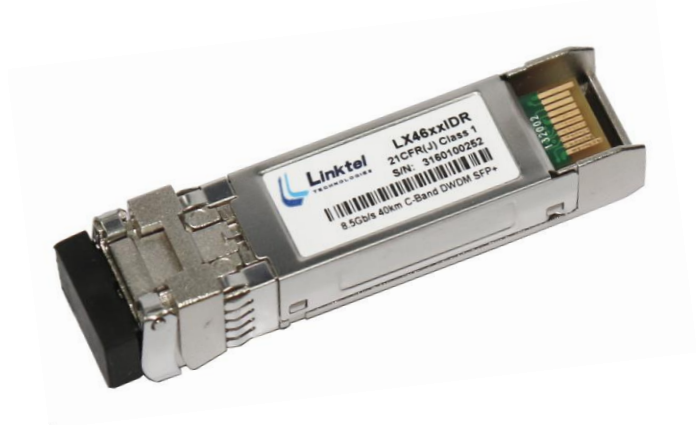


## Product Features

- Compliant with FC-PI-4 800-SM-LC-L
- Digital Diagnostic Monitoring available
- SFP+ MSA package with duplex LC connector
- DWDM-rated EML Transmitter
- Up to 8.5Gb/s 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 40km on 9/125µm SMF
- RoHS Compliant



## Applications

- 8.5G Fiber channel

## Descriptions

LX46xxIDR 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 Fibre channel application of links up to 40km 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
LX46xxIDR	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	LX4617IDR	191.7	1563.86
18	LX4618IDR	191.8	1563.05
19	LX4619IDR	191.9	1562.23
20	LX4620IDR	192.0	1561.42
21	LX4621IDR	192.1	1560.61
22	LX4622IDR	192.2	1559.79
23	LX4623IDR	192.3	1558.98

24	LX4624IDR	192.4	1558.17
25	LX4625IDR	192.5	1557.36
26	LX4626IDR	192.6	1556.55
27	LX4627IDR	192.7	1555.75
28	LX4628IDR	192.8	1554.94
29	LX4629IDR	192.9	1554.13
30	LX4630IDR	193.0	1553.33
31	LX4631IDR	193.1	1552.52
32	LX4632IDR	193.2	1551.72
33	LX4633IDR	193.3	1550.92
34	LX4634IDR	193.4	1550.12
35	LX4635IDR	193.5	1549.32
36	LX4636IDR	193.6	1548.51
37	LX4637IDR	193.7	1547.72
38	LX4638IDR	193.8	1546.92
39	LX4639IDR	193.9	1546.12
40	LX4640IDR	194.0	1545.32
41	LX4641IDR	194.1	1544.53
42	LX4642IDR	194.2	1543.73
43	LX4643IDR	194.3	1542.94
44	LX4644IDR	194.4	1542.14
45	LX4645IDR	194.5	1541.35
46	LX4646IDR	194.6	1540.56
47	LX4647IDR	194.7	1539.77
48	LX4648IDR	194.8	1538.98
49	LX4649IDR	194.9	1538.19
50	LX4650IDR	195.0	1537.40
51	LX4651IDR	195.1	1536.61
52	LX4652IDR	195.2	1535.82
53	LX4653IDR	195.3	1535.04
54	LX4654IDR	195.4	1534.25
55	LX4655IDR	195.5	1533.47
56	LX4656IDR	195.6	1532.68
57	LX4657IDR	195.7	1531.90
58	LX4658IDR	195.8	1531.12
59	LX4659IDR	195.9	1530.33
60	LX4660IDR	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.

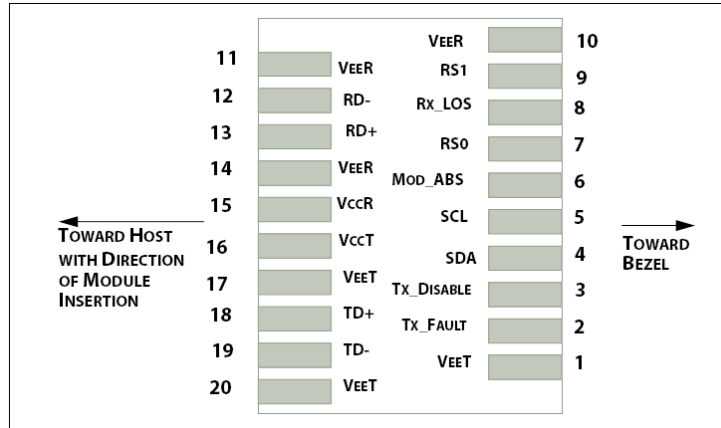


Figure 1. Host PCB SFP+ pad assignment top view

## 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>	-	-	550	mA	-
Power Dissipation	P <sub>D</sub>	-	-	1800	mW	-

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:**

- Internally AC coupled, but requires a external 100 $\Omega$  differential load termination.
- 20–80%.
- 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	$P_o$	-1	-	+2.0	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	8.2	-	-	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	IEEE Std 802.3-2005 10Gb Ethernet 10GBASE-ER compatible					

**Notes:**

- The optical power is launched into 9/125 $\mu$ m SMF.
- 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	-	-	-15.8	dBm	1
Receiver Overload ( $P_{avg}$ )	$P_{OL}$	-1.0	-	-	dBm	1
Optical Return Loss	ORL	26	-	-	dB	-
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. Comply with IEEE 802.3-2005.

**Recommended Host Board Power Supply Filter Network**

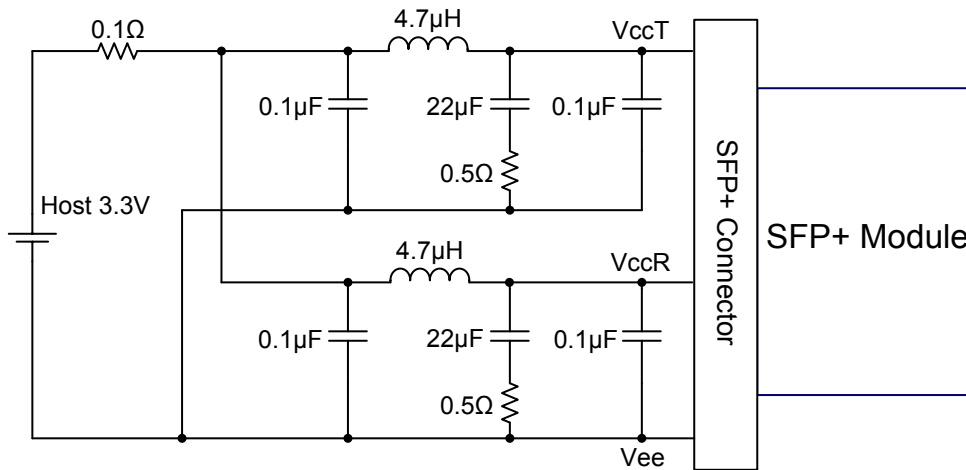


Figure 2. Recommended Host Board Power Supply Filter Network

**Recommended Application Interface Block Diagram**

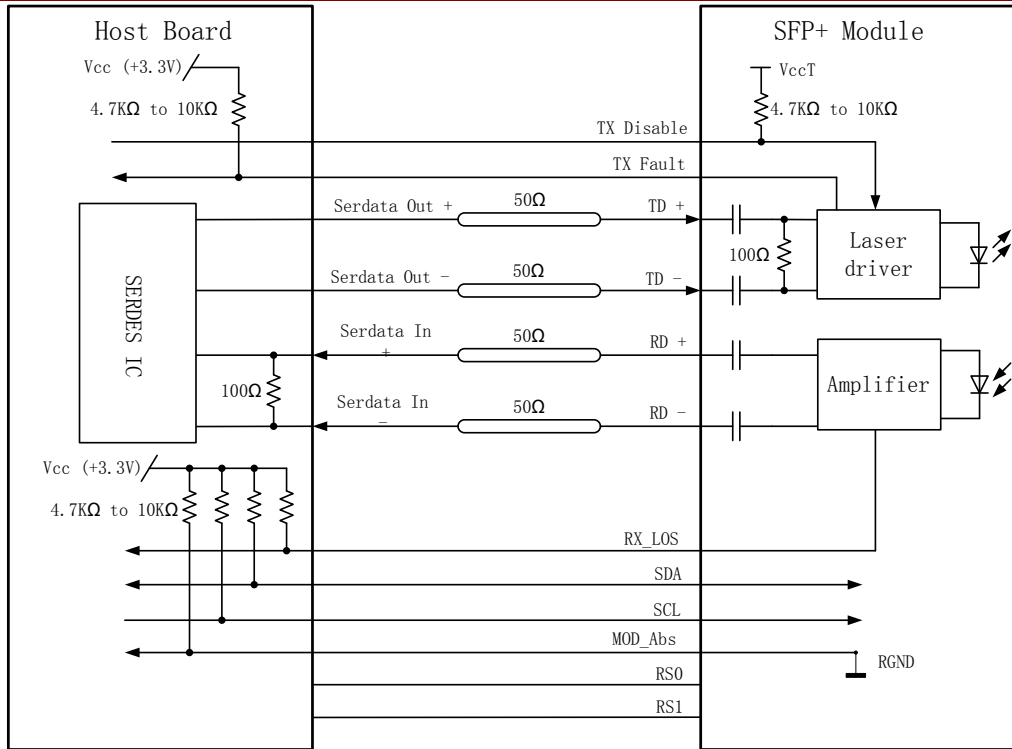


Figure 3. Recommended Application Interface Block Diagram

## Mechanical specifications

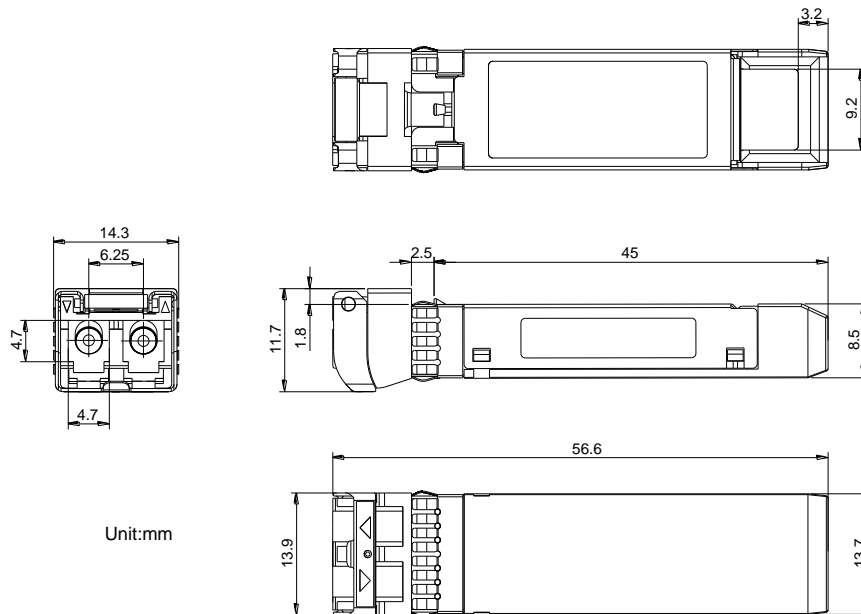


Figure 4. Outline Drawing

## PCB layout recommendation

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

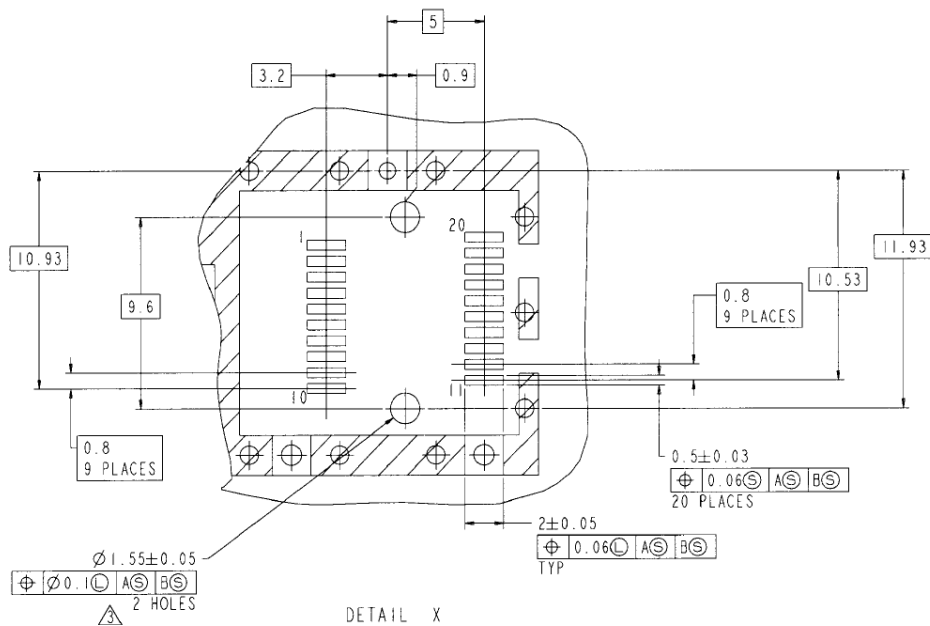
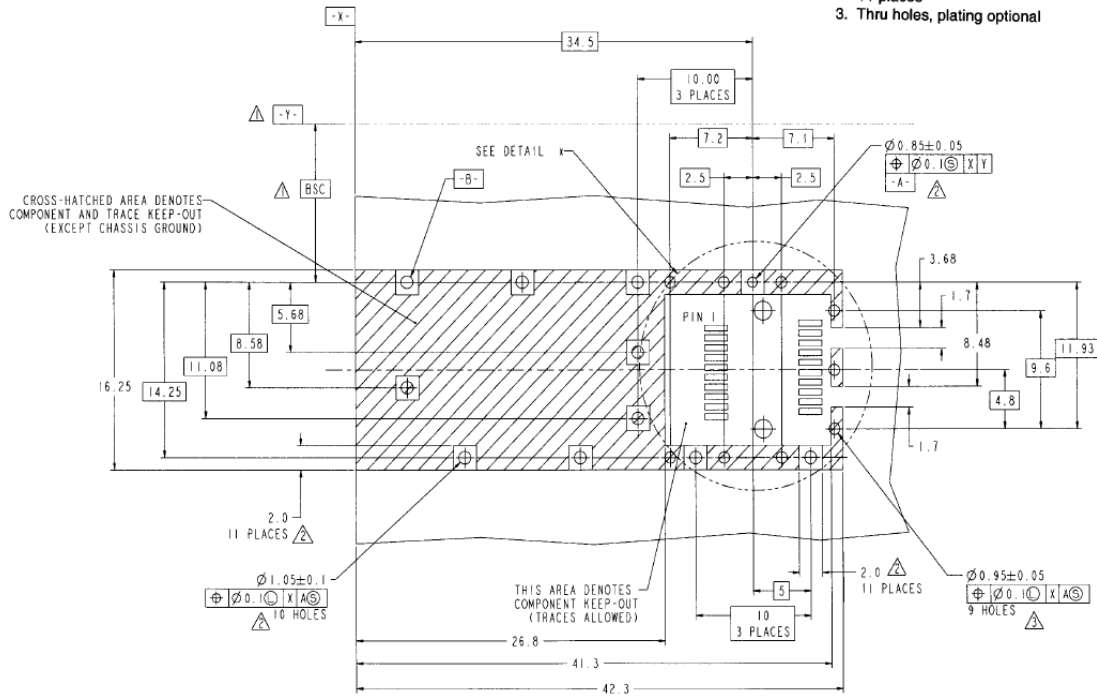


Figure 5. PCB layout recommendation

**For More Information**





**LX46xxIDR  
8.5G DWDM SFP+ Transceiver  
8G Fiber channel**

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