

Product Features

- Electrical interface specifications per SFF-8431
- Management interface specifications per SFF-8431 and SFF-8472
- SFP+ MSA package with duplex LC connector
- DWDM-rated EML Transmitter
- Up to 10.3Gb/s bi-directional data links
- 50GHz ITU Grid, C-Band
- Single +3.3V power supply
- Class 1 laser safety certified
- Commercial operating temperature: 0°C to +70°C
- Up to 80km on 9/125µm SMF
- RoHS Compliant



Applications

- 10G Ethernet 10GBASE-ZR/ZW
- 80km 10G DWDM Network

Descriptions

LX42xxxCDR 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 designed for DWDM 10G ethernet data communications up to 80km over single mode fiber. They are compliant with IEEE Std 802.3-2005 10Gb Ethernet 10GBase-ZR/ZW.

LX42xxxCDR are compliant with RoHS.

Ordering Information

Table 1. Ordering Information

Part Number	Transmitter	Output Power	Receiver	Sensitivity	Reach	Temp	DDM	RoHS
LX42xxxCDR	DWDM EML	0 ~ +4dBm	APD	< -23dBm	80km	0 ~ 70 °C	Available	Compliant

Notes: See Table 2 – Wavelength Guide for “xxx” value.

Table 2. Wavelength Guide for “xxx” value (50GHz ITU-T channel)

Channel #	Product Part Number	Frequency (THz)	Center Wavelength (nm)
170	LX42170CDR	191.70	1563.863
175	LX42175CDR	191.75	1563.455
180	LX42180CDR	191.80	1563.047
185	LX42185CDR	191.85	1562.640

LX42xxxCDR
10GEthernet 80km DWDM SFP+ Transceiver
10GBASE-ZR / 10GBASE-ZW

190	LX42190CDR	191.90	1562.233
195	LX42195CDR	191.95	1561.826
200	LX42200CDR	192.00	1561.419
205	LX42205CDR	192.05	1561.013
210	LX42210CDR	192.10	1560.606
215	LX42215CDR	192.15	1560.200
220	LX42220CDR	192.20	1559.794
225	LX42225CDR	192.25	1559.389
230	LX42230CDR	192.30	1558.983
235	LX42235CDR	192.35	1558.578
240	LX42240CDR	192.40	1558.173
245	LX42245CDR	192.45	1557.768
250	LX42250CDR	192.50	1557.364
255	LX42255CDR	192.55	1556.959
260	LX42260CDR	192.60	1556.555
265	LX42265CDR	192.65	1556.151
270	LX42270CDR	192.70	1555.747
275	LX42275CDR	192.75	1555.344
280	LX42280CDR	192.80	1554.940
285	LX42285CDR	192.85	1554.537
290	LX42290CDR	192.90	1554.134
295	LX42295CDR	192.95	1553.732
300	LX42300CDR	193.00	1553.329
305	LX42305CDR	193.05	1552.927
310	LX42310CDR	193.10	1552.525
315	LX42315CDR	193.15	1552.123
320	LX42320CDR	193.20	1551.721
325	LX42325CDR	193.25	1551.320
330	LX42330CDR	193.30	1550.918
335	LX42335CDR	193.35	1550.517
340	LX42340CDR	193.40	1550.116
345	LX42345CDR	193.45	1549.716
350	LX42350CDR	193.50	1549.315
355	LX42355CDR	193.55	1548.915
360	LX42360CDR	193.60	1548.515
365	LX42365CDR	193.65	1548.115
370	LX42370CDR	193.70	1547.716

LX42xxxCDR
10GEthernet 80km DWDM SFP+ Transceiver
10GBASE-ZR / 10GBASE-ZW

375	LX42375CDR	193.75	1547.316
380	LX42380CDR	193.80	1546.917
385	LX42385CDR	193.85	1546.518
390	LX42390CDR	193.90	1546.119
395	LX42395CDR	193.95	1545.721
400	LX42400CDR	194.00	1545.322
405	LX42405CDR	194.05	1544.924
410	LX42410CDR	194.10	1544.526
415	LX42415CDR	194.15	1544.128
420	LX42420CDR	194.20	1543.731
425	LX42425CDR	194.25	1543.333
430	LX42430CDR	194.30	1542.936
435	LX42435CDR	194.35	1542.539
440	LX42440CDR	194.40	1542.142
445	LX42445CDR	194.45	1541.746
450	LX42450CDR	194.50	1541.35
455	LX42455CDR	194.55	1540.953
460	LX42460CDR	194.60	1540.558
465	LX42465CDR	194.65	1540.162
470	LX42470CDR	194.70	1539.766
475	LX42475CDR	194.75	1539.371
480	LX42480CDR	194.80	1538.976
485	LX42485CDR	194.85	1538.581
490	LX42490CDR	194.90	1538.186
495	LX42495CDR	194.95	1537.792
500	LX42500CDR	195.00	1537.397
505	LX42505CDR	195.05	1537.003
510	LX42510CDR	195.10	1536.609
515	LX42515CDR	195.15	1536.216
520	LX42520CDR	195.20	1535.822
525	LX42525CDR	195.25	1535.429
530	LX42530CDR	195.30	1535.036
535	LX42535CDR	195.35	1534.643
540	LX42540CDR	195.40	1534.25
545	LX42545CDR	195.45	1533.858
550	LX42550CDR	195.50	1533.465
555	LX42555CDR	195.55	1533.073

560	LX42560CDR	195.60	1532.681
565	LX42565CDR	195.65	1532.290
570	LX42570CDR	195.70	1531.898
575	LX42575CDR	195.75	1531.507
580	LX42580CDR	195.80	1531.116
585	LX42585CDR	195.85	1530.725
590	LX42590CDR	195.90	1530.334
595	LX42595CDR	195.95	1529.944
600	LX42600CDR	196.00	1529.554
605	LX42605CDR	196.05	1529.163
610	LX42610CDR	196.10	1528.774

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 4.7KΩ 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.

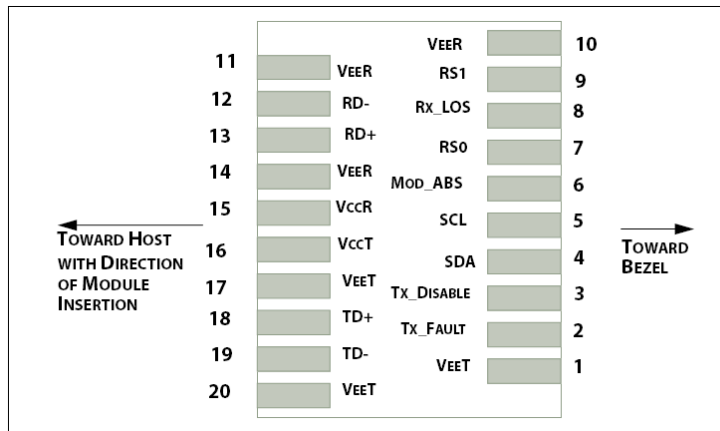


Figure 1. Host PCB SFP+ pad assignment top view

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 4. 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 5. Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Operating Case Temperature	T _c	0	25	70	°C
Supply Voltage	V _{cc}	3.135	3.3	3.465	V
Data Rate	-	-	10.3125	-	Gb/s

Transceiver Electrical Characteristics

Table 6. Transceiver Electrical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes	
Module Supply Current	I _{CC}	-	300	450	mA	-	
Power Dissipation	P _D	-	1.0	1.5	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 7. Transmitter Optical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Launch Optical Power	P _o	0	-	+4.0	dBm	1
Center Wavelength Range	λ _c	1528.77	-	1563.86	nm	-
Center Wavelength Spacing	-	-	50	-	GHz	-
Center Wavelength Tolerance	Δλ _c	-50	-	50	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	-	-	-	±3	dB	-
Eye Diagram	IEEE Std 802.3-2005 10Gb Ethernet 10GBASE-ZR compatible					

Notes:

1. The optical power is launched into 9/125μm SMF.
2. Measured with a PRBS 2³¹-1 test pattern @10.3125Gbps.

Receiver Optical Characteristics

Table 8. Receiver Optical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Center Wavelength	λ_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	-	-	-	± 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, 10.3125Gb/s, BER $<10^{-12}$.
2. Receiver power@ -7~-18dBm, 10.3125Gb/s, BER $<10^{-12}$.

Recommended Host Board Power Supply Filter Network

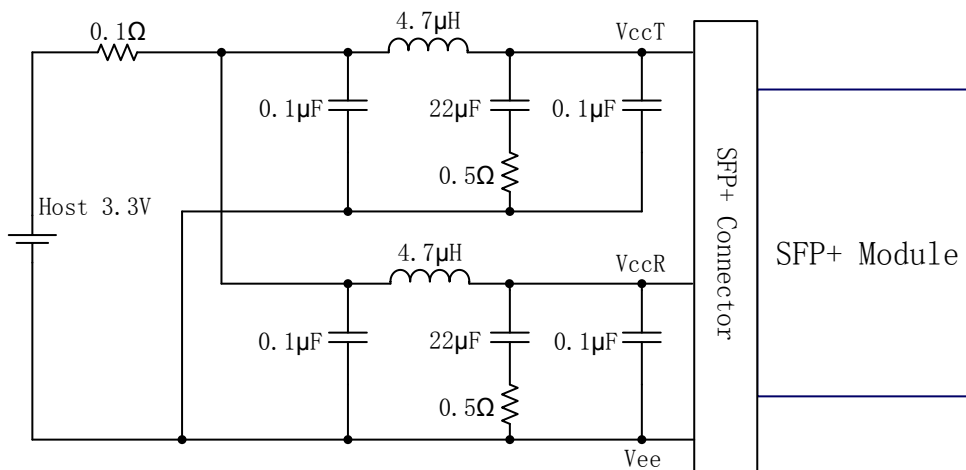


Figure 2. Recommended Host Board Power Supply Filter Network

Recommended Application Interface Block Diagram

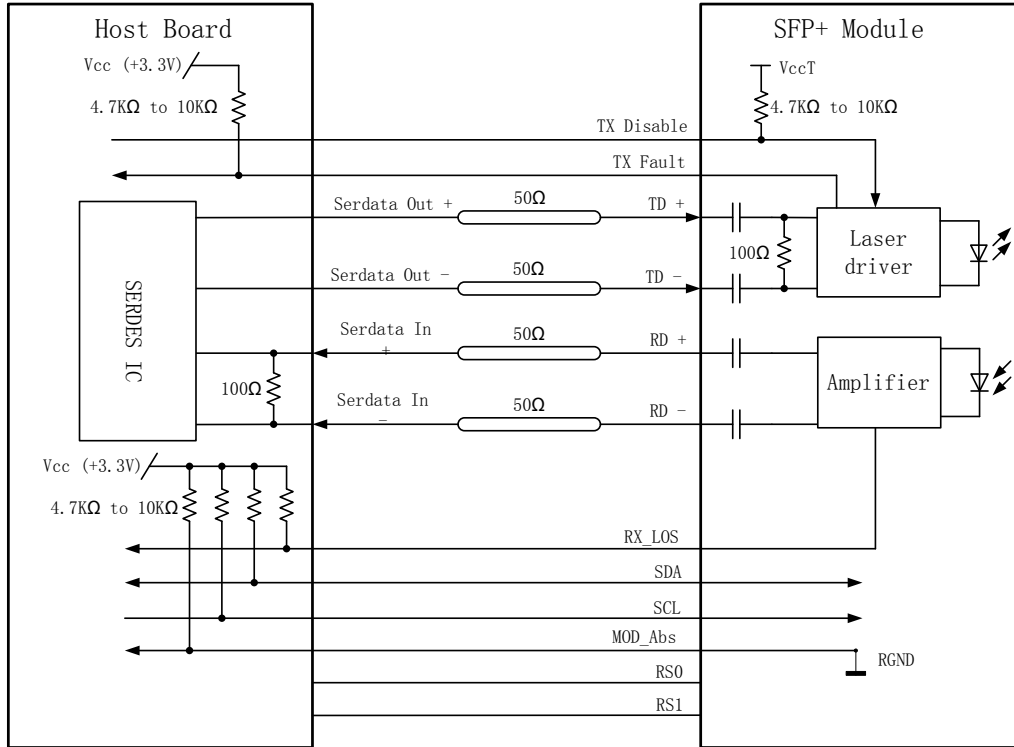


Figure 3. Recommended Application Interface Block Diagram

Mechanical specifications

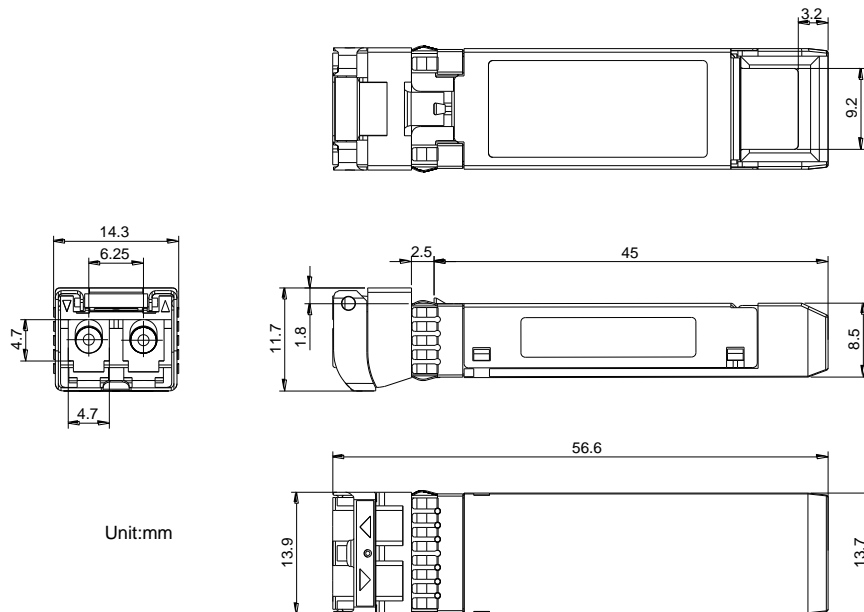


Figure 4. Outline Drawing

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

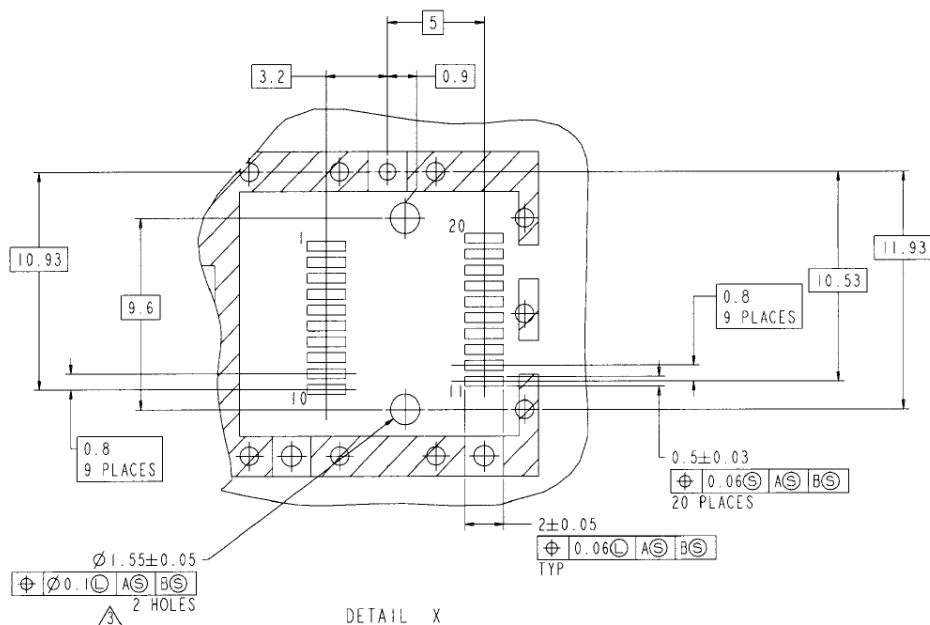
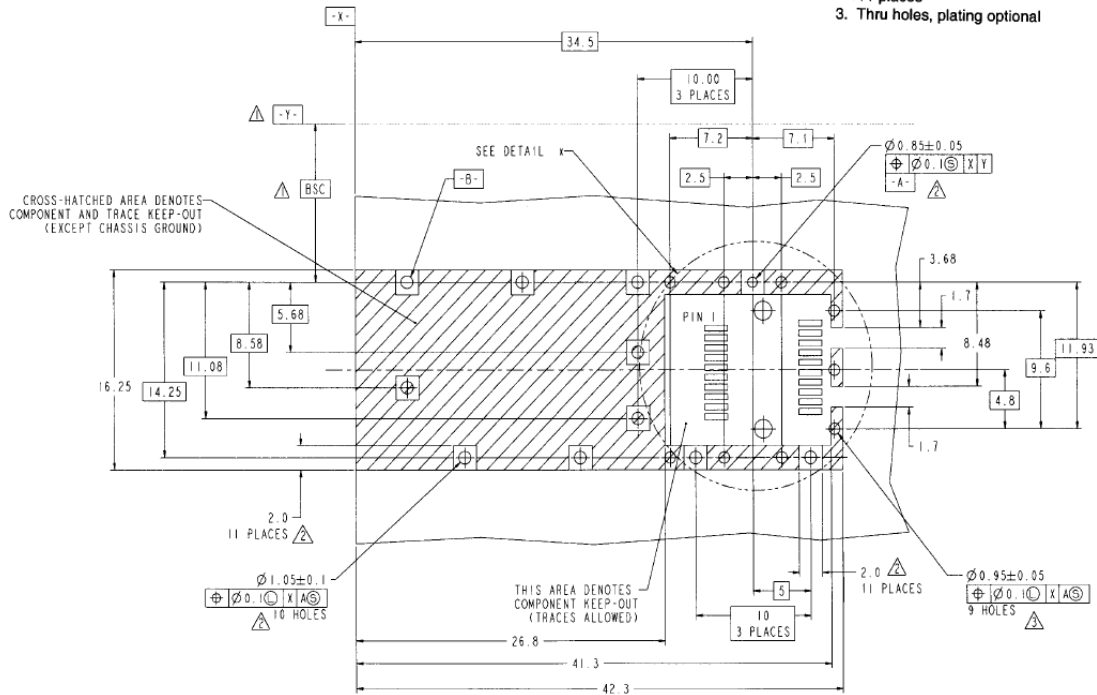


Figure 5. PCB layout recommendation

For More Information

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LX42xxxCDR
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10GBASE-ZR / 10GBASE-ZW

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