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
- Dual CDR from 9.95 to 11.3Gb/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 40km on 9/125μm SMF
- RoHS Compliant

Applications

- 10G Ethernet 10GBASE-ER/EW
- 40km 10G DWDM Network

Descriptions

LX41xxxCDH 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 40km over single mode fiber. They are compliant with IEEE Std 802.3-2005 10Gb Ethernet 10GBase-ER/EW.

LX41xxxCDH are compliant with RoHS.

Ordering Information

Table 1. Ordering Information

Part Number	Transmitter	Output Power	Receiver	Sensitivity	Reach	Temp	DDM	RoHS
LX41xxxCDH	DWDM EML	-1 ~ +2dBm	PIN	< -15.8dBm	40km	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	LX41170CDH	191.70	1563.863
175	LX41175CDH	191.75	1563.455
180	LX41180CDH	191.80	1563.047

185	LX41185CDH	191.85	1562.640
190	LX41190CDH	191.90	1562.233
195	LX41195CDH	191.95	1561.826
200	LX41200CDH	192.00	1561.419
205	LX41205CDH	192.05	1561.013
210	LX41210CDH	192.10	1560.606
215	LX41215CDH	192.15	1560.200
220	LX41220CDH	192.20	1559.794
225	LX41225CDH	192.25	1559.389
230	LX41230CDH	192.30	1558.983
235	LX41235CDH	192.35	1558.578
240	LX41240CDH	192.40	1558.173
245	LX41245CDH	192.45	1557.768
250	LX41250CDH	192.50	1557.364
255	LX41255CDH	192.55	1556.959
260	LX41260CDH	192.60	1556.555
265	LX41265CDH	192.65	1556.151
270	LX41270CDH	192.70	1555.747
275	LX41275CDH	192.75	1555.344
280	LX41280CDH	192.80	1554.940
285	LX41285CDH	192.85	1554.537
290	LX41290CDH	192.90	1554.134
295	LX41295CDH	192.95	1553.732
300	LX41300CDH	193.00	1553.329
305	LX41305CDH	193.05	1552.927
310	LX41310CDH	193.10	1552.525
315	LX41315CDH	193.15	1552.123
320	LX41320CDH	193.20	1551.721
325	LX41325CDH	193.25	1551.320
330	LX41330CDH	193.30	1550.918
335	LX41335CDH	193.35	1550.517
340	LX41340CDH	193.40	1550.116
345	LX41345CDH	193.45	1549.716
350	LX41350CDH	193.50	1549.315
355	LX41355CDH	193.55	1548.915
360	LX41360CDH	193.60	1548.515
365	LX41365CDH	193.65	1548.115

370	LX41370CDH	193.70	1547.716
375	LX41375CDH	193.75	1547.316
380	LX41380CDH	193.80	1546.917
385	LX41385CDH	193.85	1546.518
390	LX41390CDH	193.90	1546.119
395	LX41395CDH	193.95	1545.721
400	LX41400CDH	194.00	1545.322
405	LX41405CDH	194.05	1544.924
410	LX41410CDH	194.10	1544.526
415	LX41415CDH	194.15	1544.128
420	LX41420CDH	194.20	1543.731
425	LX41425CDH	194.25	1543.333
430	LX41430CDH	194.30	1542.936
435	LX41435CDH	194.35	1542.539
440	LX41440CDH	194.40	1542.142
445	LX41445CDH	194.45	1541.746
450	LX41450CDH	194.50	1541.35
455	LX41455CDH	194.55	1540.953
460	LX41460CDH	194.60	1540.558
465	LX41465CDH	194.65	1540.162
470	LX41470CDH	194.70	1539.766
475	LX41475CDH	194.75	1539.371
480	LX41480CDH	194.80	1538.976
485	LX41485CDH	194.85	1538.581
490	LX41490CDH	194.90	1538.186
495	LX41495CDH	194.95	1537.792
500	LX41500CDH	195.00	1537.397
505	LX41505CDH	195.05	1537.003
510	LX41510CDH	195.10	1536.609
515	LX41515CDH	195.15	1536.216
520	LX41520CDH	195.20	1535.822
525	LX41525CDH	195.25	1535.429
530	LX41530CDH	195.30	1535.036
535	LX41535CDH	195.35	1534.643
540	LX41540CDH	195.40	1534.25
545	LX41545CDH	195.45	1533.858
550	LX41550CDH	195.50	1533.465

555	LX41555CDH	195.55	1533.073
560	LX41560CDH	195.60	1532.681
565	LX41565CDH	195.65	1532.290
570	LX41570CDH	195.70	1531.898
575	LX41575CDH	195.75	1531.507
580	LX41580CDH	195.80	1531.116
585	LX41585CDH	195.85	1530.725
590	LX41590CDH	195.90	1530.334
595	LX41595CDH	195.95	1529.944
600	LX41600CDH	196.00	1529.554
605	LX41605CDH	196.05	1529.163
610	LX41610CDH	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 (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.

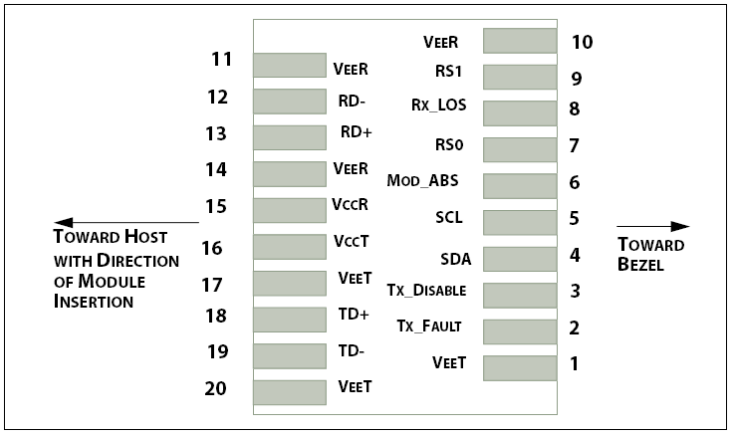

Figure 1. Host PCB SFP+ pad assignment top view

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 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	-	9.95	10.3125	11.3	Gb/s

Transceiver Electrical Characteristics

Table 6. Transceiver Electrical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes

Module Supply Current		Icc	-	-	550	mA	-
Power Dissipation		P_D	-	-	1.8	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	Po	-1	-	+2.0	dBm	1
Center Wavelength Range	λc	1528.77	-	1563.86	nm	-
Center Wavelength Spacing	-	-	50	-	GHz	
Center Wavelength Tolerance	Δλc	-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-ER compatible					

Notes:
1. The optical power is launched into 9/125μm SMF.
2. Measured with a PRBS 2^{31}-1 test pattern @10.3125Gbps.

Receiver Optical Characteristics

Table 8. Receiver Optical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Center Wavelength	λc	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		-	-27	dB	-
Chromatic Dispersion	CD			800	ps/nm	
OSNR	-	27			dB	2
Rx Power Monitor Accuracy	-			±3	dB	
Dispersion Limited Distance	-			40	Km	
Attenuation Limited Distance	-			40	Km	
LOS De-Assert	LOS_D	-	-	-16	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@ -1~-16dBm, 10.3125Gb/s, BER<10^{-12}.

Recommended Host Board Power Supply Filter Network

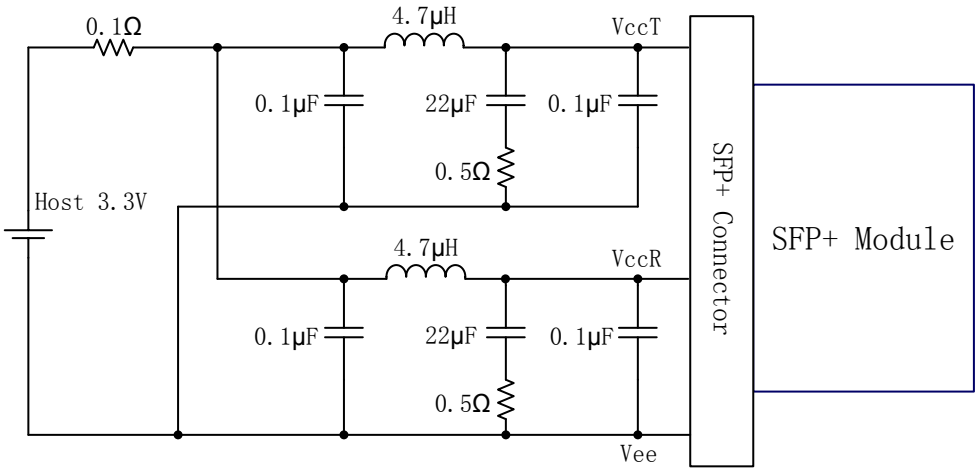

Figure 2. Recommended Host Board Power Supply Filter Network

Recommended Application Interface Block Diagram

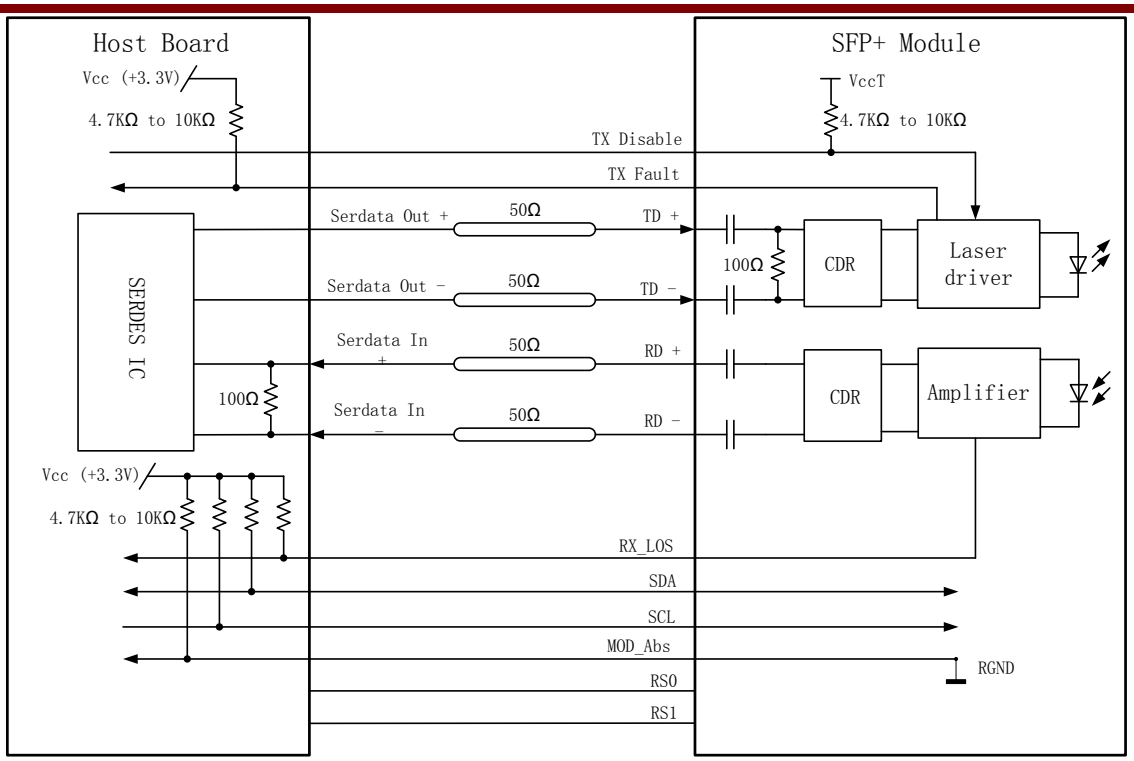

Figure 3. Recommended Application Interface Block Diagram

Mechanical specifications

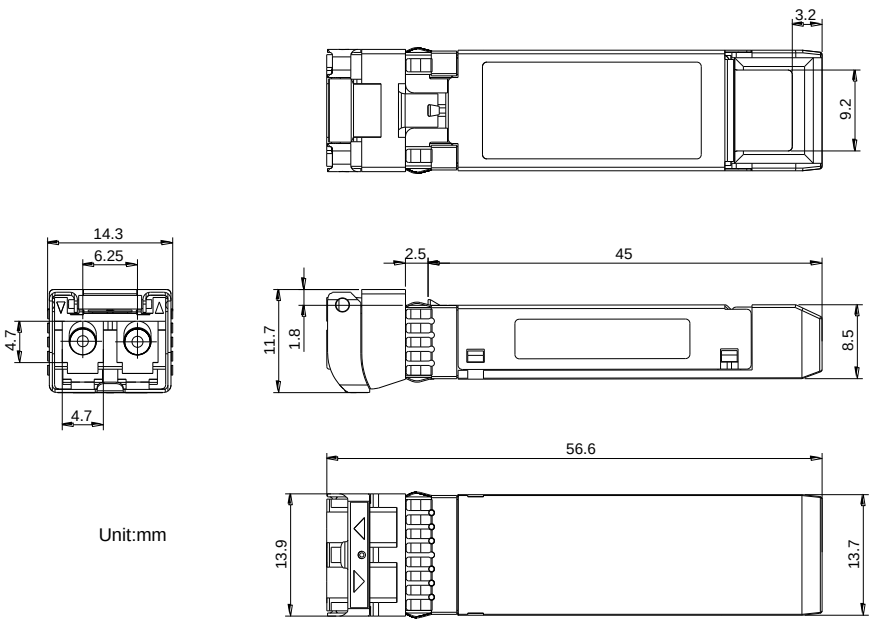

Figure 4. Outline Drawing

PCB layout recommendation

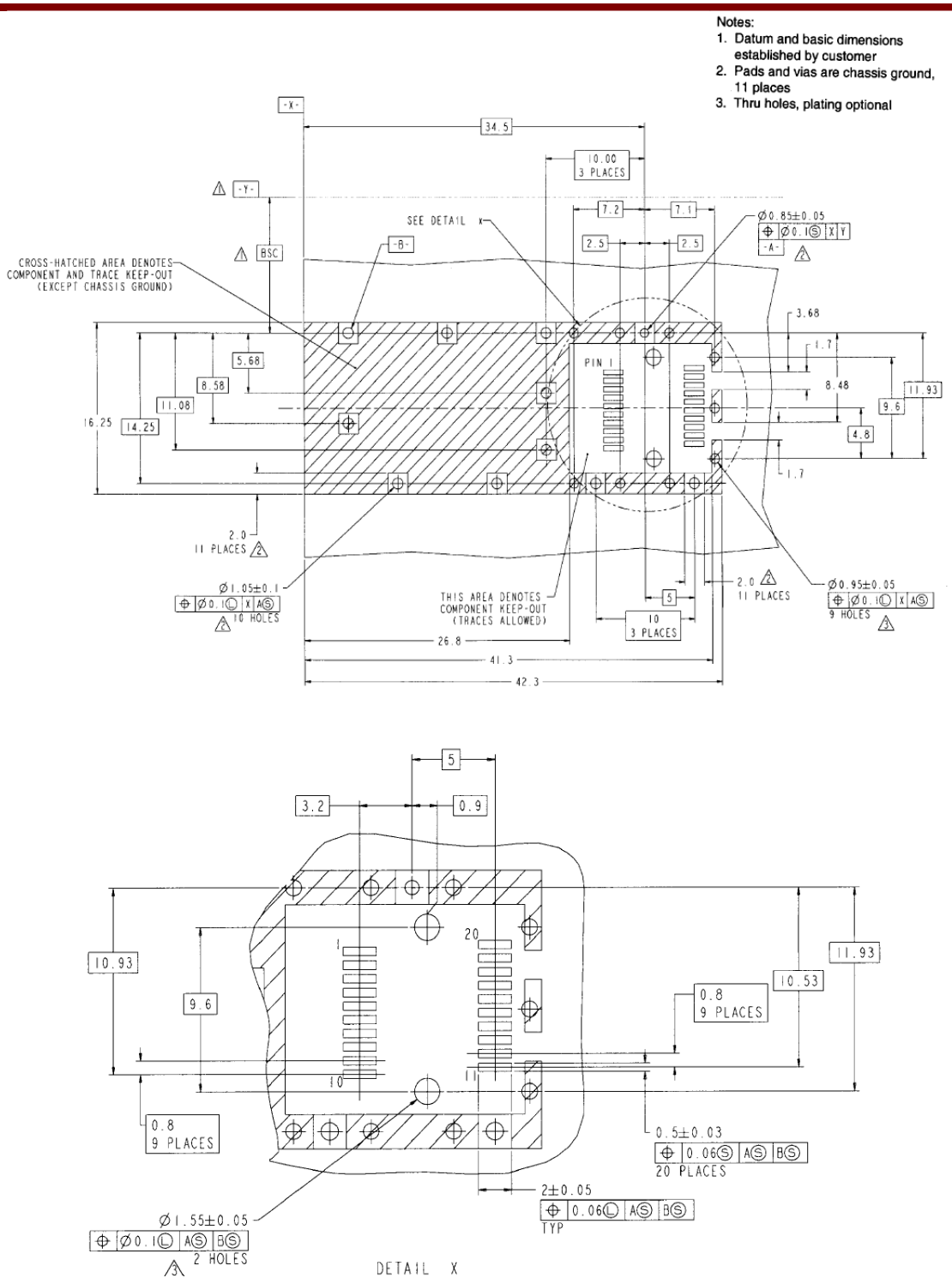

Figure 5. PCB layout recommendation

For More Information

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