Product Features

- Electrical interface specifications per SFF-8431
- Management interface specifications per SFF-8431 and SFF-8472
- SFP+ MSA package with Single LC receptacle
- 1270nm DFB Laser, PIN photo-detector
- Up to 10.5G bi-directional data links
- Single +3.3V power supply
- Class 1 laser safety certified
- Operating temperature Options
  - (Commercial) 0ºC to +70ºC
  - (Industrial) -40ºC to +85ºC
- Up to 40km on 9/125μm SMF
- RoHS Compliant

Applications

- 10GBASE-BX Ethernet
- Other high speed data connections

Descriptions

LX4421C(I)DR are designed for Single Fiber Bidirectional serial optical data communications up to 10.5 Gb/s. The electrical interface is compliant with SFI specifications of SFF-8431. The transceiver consists of 10Gbit/s 1270nm DFB optical transmitter and PIN receiver, and transmission distance up to 40Km on single mode fiber.

LX4421C(I)DR offer commercial and industrial operating temperature options.

Ordering Information

Table 1. Ordering Information

Part Number	Transmitter	Output Power	Receiver	Sensitivity	Reach	Temp	DDM	RoHS
LX4421CDR	1270nm DFB	-1 ~ +4dBm	1330nm PIN	< -15dBm	40km	0 ~ 70 ºC	Available	Compliant
LX4421IDR	1270nm DFB	-1 ~ +4dBm	1330nm PIN	< -15dBm	40km	-40 ~ 85 ºC	Available	Compliant

Pin Description

Table 2. 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	Internal 33K pull-down to ground	-
8	RX_LOS	Receiver Loss of Signal (LVTTL-O)	2
9	RS1	Internal 33K pull-down to ground	-
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.

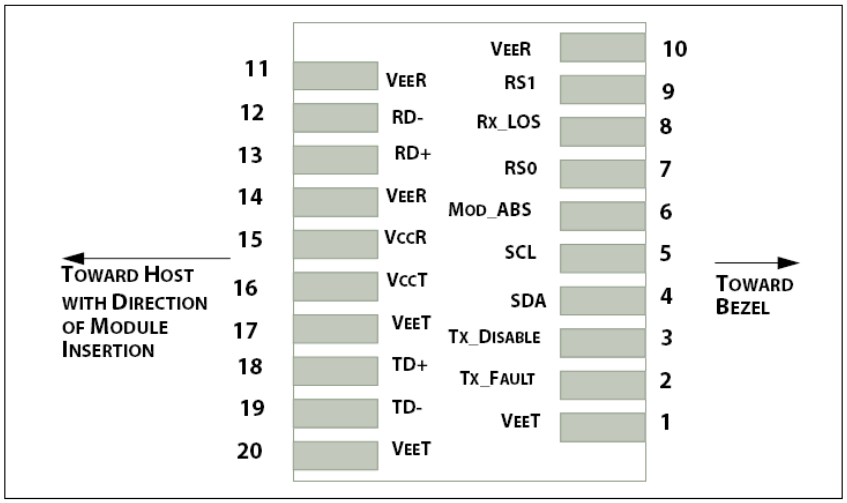


Figure 1. Host PCB SFP+ pad assignment top view

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}	-0.3	4.0	V

Recommended Operating Conditions

Table 4. Recommended Operating Conditions

Parameter		Symbol	Min	Typ	Max	Unit
Operating Case Temperature	LX4421CDR	T_C	0	25	70	°C
	LX4421IDR	T_C	-40	25	85	°C
Supply Voltage		V_{CC}	3.135	3.3	3.465	V
Data Rate		-	9.95	-	10.52	Gb/s

Transceiver Electrical Characteristics

Table 5. Transceiver Electrical Characteristics

Parameter		Symbol	Minimum	Typical	Maximum	Unit	Notes
Module Supply Current		Icc	-	-	450	mA	-
Power Dissipation		P_D	-	-	1200	mW	-
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		$V_{OUT, P-P}$	400	-	850	mV_{P-P}	1

Data Output Rise Time, Fall Time		t_r, t_f		-	60	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 6. Transmitter Optical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Launch Optical Power	Po	-1	-	+4	dBm	1
Center Wavelength Range	λc	1263	1270	1277	nm	-
Extinction Ratio	EX	3.5	-	-	dB	2
Optical Modulation Amplitude	OMA	-5.2	-	-	dBm	
Spectral Width (-20dB)	Δλ	-	-	1	nm	-
Side Mode Suppression Ratio	SMSR	30	-	-	dB	-
Relative Intensity Noise	RIN			-128	dB/Hz	
Pout @TX-Disable Asserted	P_{off}	-	-	-35	dBm	1

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 7. Receiver Optical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Center Wavelength	λc	1323	1330	1337	nm	-
Receiver Sensitivity (P_{avg})	S	-	-	-15.0	dBm	1
Receiver Overload (P_{avg})	P_{OL}	0.5	-	-	dBm	1
Optical Return Loss	ORL	12	-	-	dB	-
LOS De-Assert	LOS_D	-	-	-17	dBm	-
LOS Assert	LOS_A	-30	-	-	dBm	-
LOS Hysteresis	-	0.5	-	-	dB	-

Notes:
1. Measured with PRBS 2^{31}-1 test pattern, 10.3125Gb/s, BER<10^{-12}.

Recommended Host Board Power Supply Filter Network

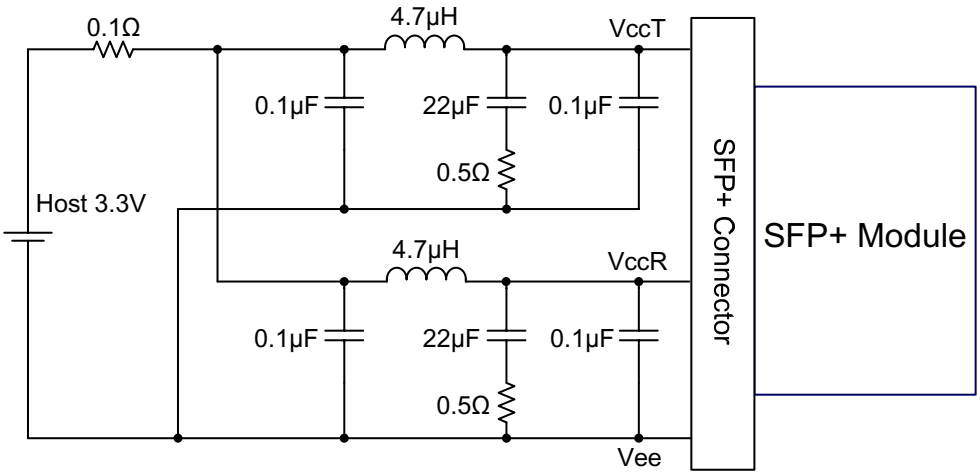


Figure 2. Recommended Host Board Power Supply Filter Network

Recommended Application Interface Block Diagram

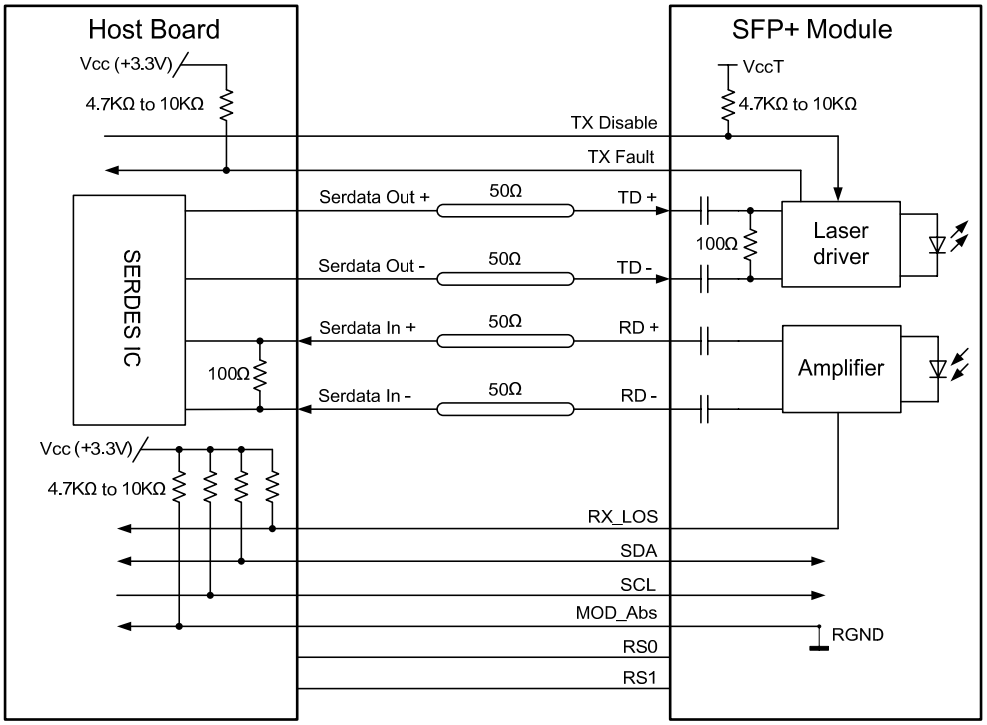


Figure 4. Recommended Application Interface Block Diagram

Mechanical specifications

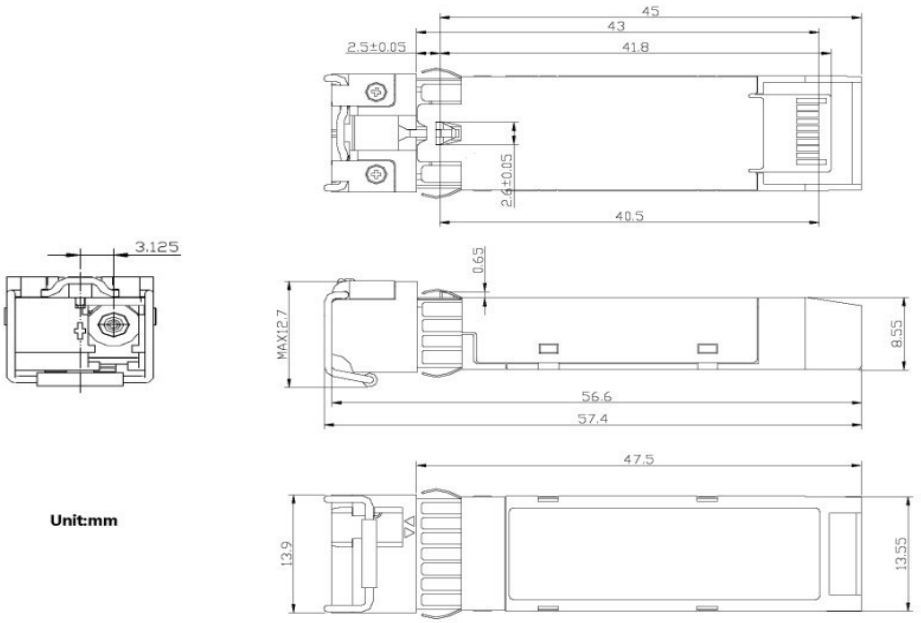
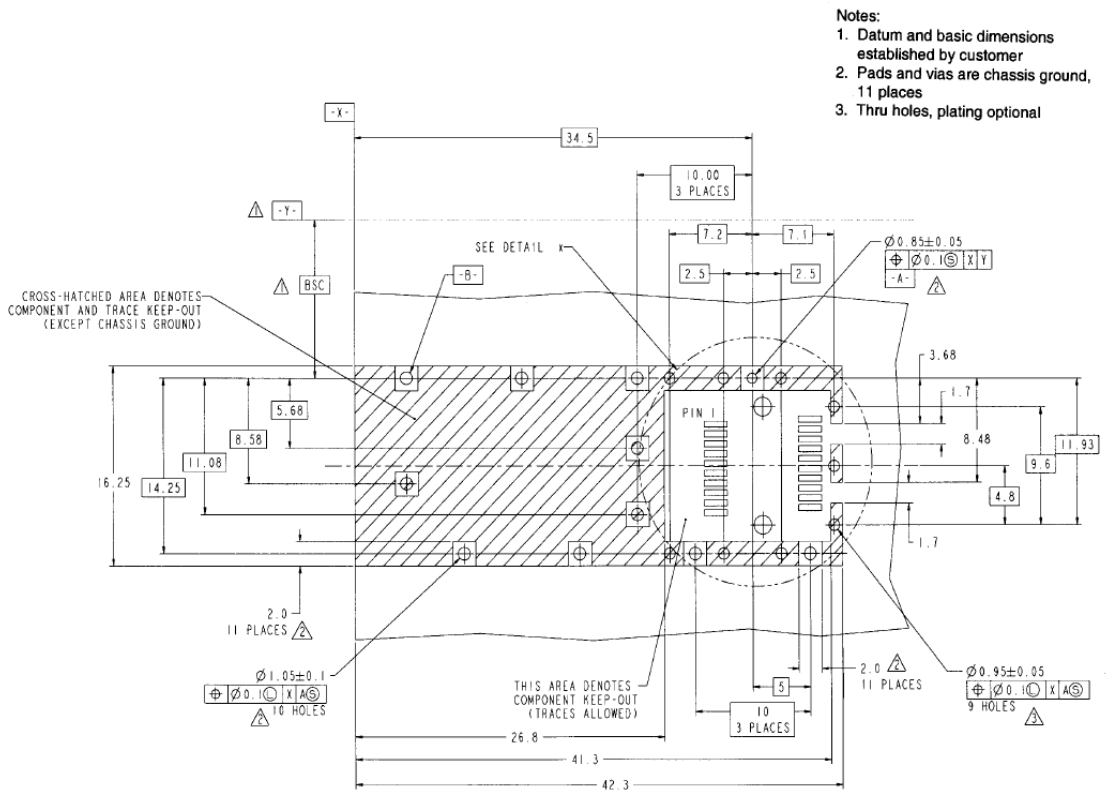


Figure 5. Outline Drawing

PCB layout recommendation



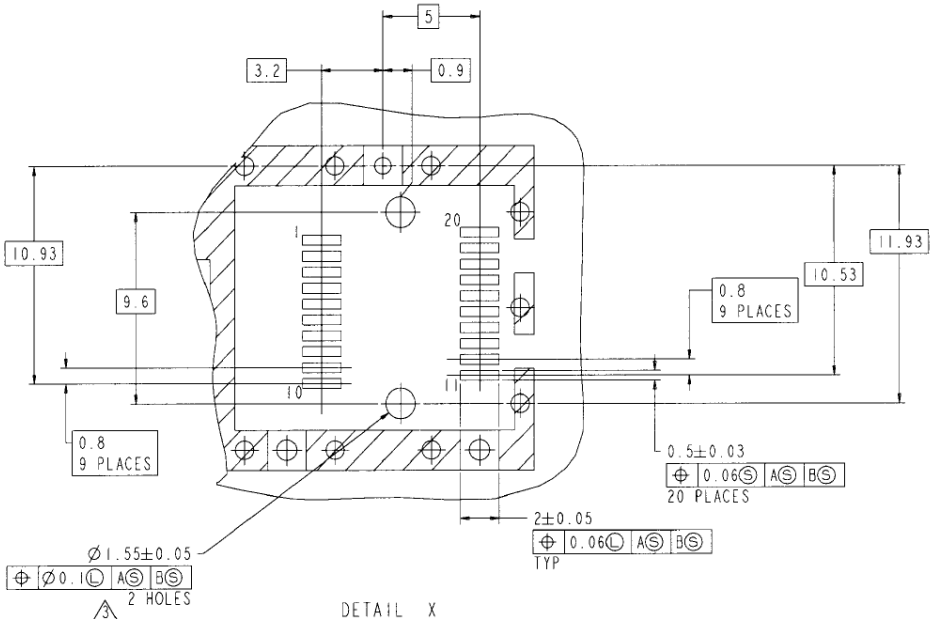


Figure 6. PCB layout recommendation

For More Information

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