

## Product Features

- Up to 25.78Gb/s bi-directional data links
- Electrical interface specifications per SFF-8431
- Management interface specifications per SFF-8432 and SFF-8472
- Build-in dual CDR with shut off control
- SFP28 MSA package with duplex LC connector
- Uncooled 1310nm DFB Laser
- Up to 10 km on 9/125um SMF
- Single +3.3V power supply
- Class 1 laser safety certified
- 1.5W maximum power consumption with established link
- Operating temperature Options: 0°C to +70°C
- RoHS Compliant



## Applications

- High speed storage area networks
- 25G high speed interconnection

## Descriptions

LX6502CDH SFP28 transceivers, according to 25 Gigabit Small Form Factor Pluggable “SFP28” Multi-Sourcing Agreement (MSA) SFF-8431 Rev. 4.1 and SFF-8472 Rev. 12.1, are designed for use up to 25.78Gb/s data rate and up to 10km link length. They are compatible with SFF-8432.

LX6502CDH offer commercial operating temperature options.

## Ordering Information

**Table 1. Ordering Information**

Part Number	Transmitter	Output Power	Receiver	OMA Sensitivity @25.78G	Reach	Temp	DDM	RoHS
LX6502CDH	1310nm DFB	-5 ~ +2dBm	PIN	<-11.4dBm	10km	0 ~ 70°C	Available	Compliant

## Pin Description

**Table 2. 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	NA	6
8	RX_LOS	Receiver Loss of Signal (LVTTTL-O)	2
9	RS1	NA	6
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.
6. Rate select can also be set through the 2-wire bus in accordance with SFF-8472 v. 12.1, Rx Rate Select is set at Bit 3, Byte 110, Address A2h. Tx Rate Select is set at Bit 3, Byte 118, Address A2h.

**Note:** writing a “1” selects maximum bandwidth operation. Rate select is the logic OR of the input state of Rate Select Pin and 2-wire bus.

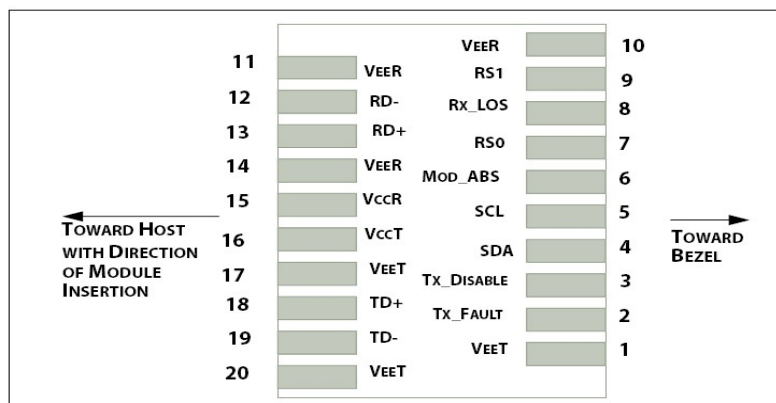


Figure 1. Host PCB SFP28 pad assignment top view

## 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 <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 4. Recommended Operating Conditions**

Parameter	Symbol	Min	Typ	Max	Unit
Operating Temperature	T <sub>C</sub>	0	25	70	°C
Supply Voltage	V <sub>CC</sub>	3.135	3.3	3.465	V
Data Rate	-	-	25.78	-	Gb/s

## Transceiver Electrical Characteristics

**Table 5. Transceiver Electrical Characteristics**

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Module Supply Current	I <sub>CC</sub>	-		450	mA	
Power Dissipation	P <sub>D</sub>	-	-	1500	mW	
<b>Transmitter</b>						
Input Differential Impedance	Z <sub>IN</sub>	-	100	-	Ω	
Differential Data Input Swing	V <sub>IN, P-P</sub>	180	-	700	mV <sub>P-P</sub>	
TX_FAULT	Transmitter Fault	V <sub>OH</sub>	2.0	-	V <sub>CCHOST</sub>	V
	Normal Operation	V <sub>OL</sub>	0	-	0.8	V
TX_DISABLE	Transmitter Disable	V <sub>IH</sub>	2.0	-	V <sub>CCHOST</sub>	V
	Transmitter Enable	V <sub>IL</sub>	0	-	0.8	V
<b>Receiver</b>						
Output Differential Impedance	Z <sub>O</sub>	-	100	-	Ω	
Differential Data Output Swing	V <sub>OUT, P-P</sub>	300	-	850	mV <sub>P-P</sub>	1
Data Output Rise Time, Fall Time	t <sub>r</sub> , t <sub>f</sub>	15	-	-	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	$P_o$	-5	-	2	dBm	1
Extinction Ratio	ER	4	-	-	dB	
Center Wavelength Range	$\lambda_c$	1295	1310	1325	nm	
Optical Modulation Amplitude	OMA	631	-	-	uW	
Transmitter and Dispersion Penalty	TDP	-	-	2.7	dB	
Spectral Width	$\Delta\lambda$	-	-	1	nm	2
Optical Rise/Fall Time @25.78Gb/s	tr/ta			15	ps	3
Optical Return Loss Tolerance	ORLT	-	-	12	dB	
Pout @TX-Disable Asserted	$P_{off}$	-	-	-30	dBm	

**Notes:**

1. Class 1 Laser Safety per FDA/CDRH and EN (IEC) 60825 regulations.
2. 20dB spectral width.
3. Unfiltered, 20-80%.

## Receiver Optical Characteristics

**Table 7. Receiver Optical Characteristics**

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Center Wavelength	$\lambda_c$	1260	1310	1370	nm	
Receiver OMA Sensitivity	RxSENS	-	-	-11.4	dBm	1
Receiver Overload ( $P_{avg}$ )	$P_{OL}$	2	-	-	dBm	
Optical Return Loss	ORL	26	-	-	dB	
LOS De-Assert	$LOS_D$	-	-	-13	dBm	
LOS Assert	$LOS_A$	-30	-	-	dBm	
LOS Hysteresis	-	0.5	-	-	dB	

**Notes:**

1. Measured with PRBS 2<sup>31</sup>-1 at 5 × 10<sup>-5</sup> BER.

## General Specifications

**Tale 8. General Specifications**

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Data Rate	BR		25.78		Gb/s	
Bit Error Rate	BER			$5 \times 10^{-5}$		1
Supported Link Length on 9/125um SMF, 25.78Gb/s	L	-	10		km	2

**Notes:**

1. Tested with a PRBS 2<sup>31</sup>-1 test pattern for 25.78Gb/s operation.
2. Distances are based on FC-PI-6 Rev. 3.1 and IEEE 802.3 standards.

## Recommended Host Board Power Supply Filter Network

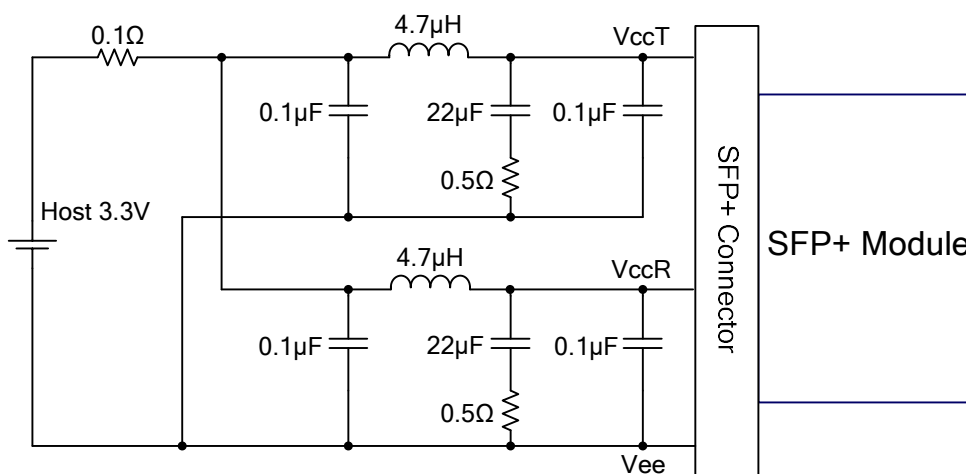


Figure 2. Recommended Host Board Power Supply Filter Network

## Recommended Application Interface Block Diagram

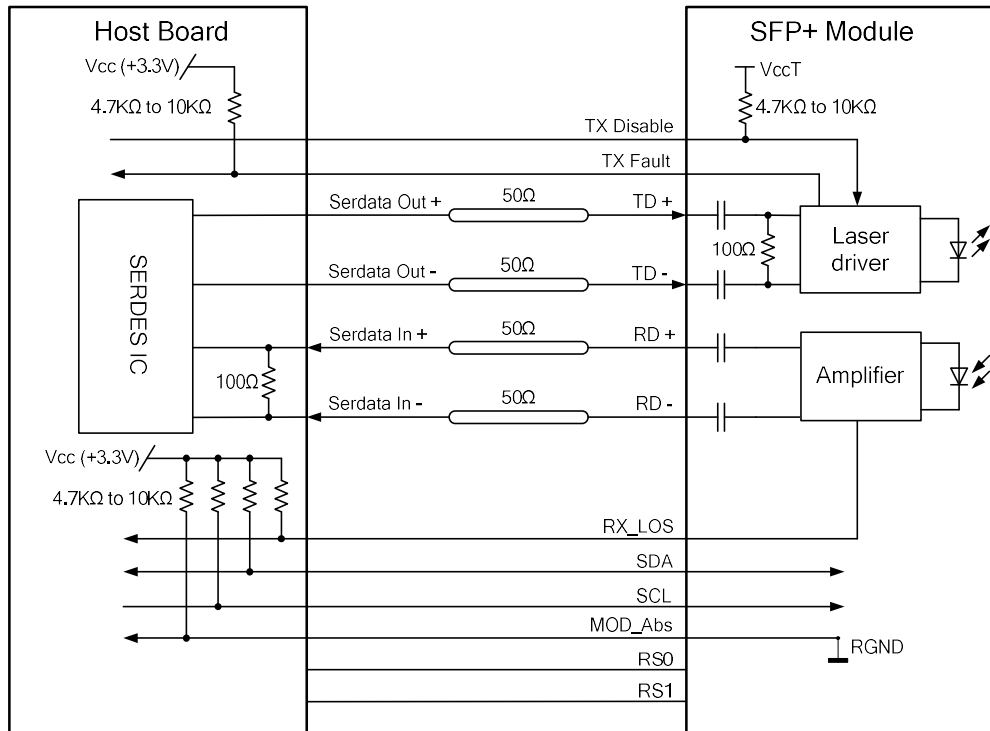


Figure 3. Recommended Application Interface Block Diagram

## Mechanical specifications

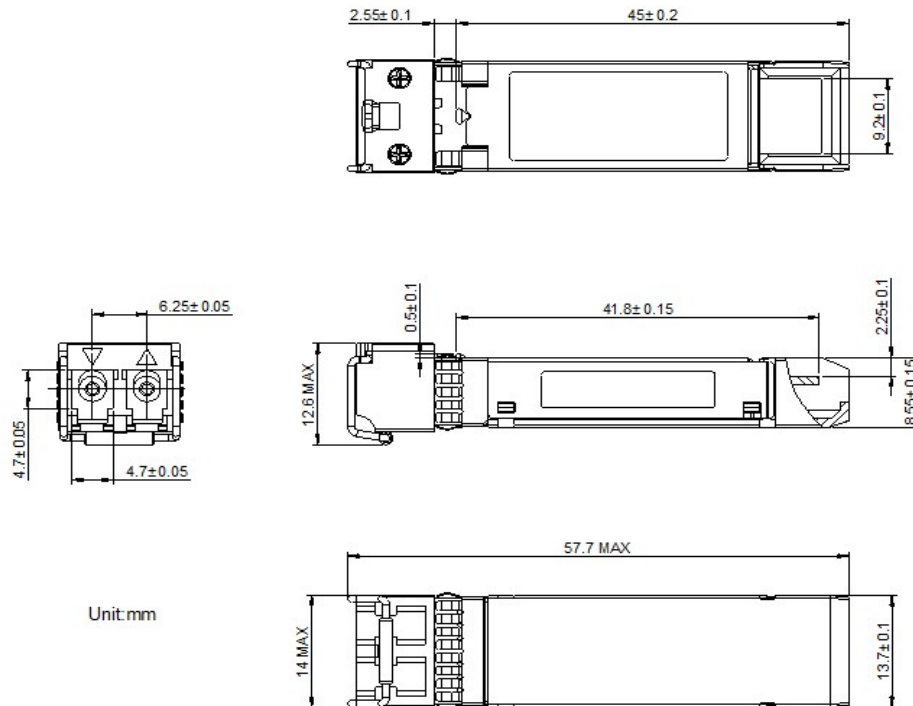


Figure 4. Outline Drawing

## PCB layout recommendation

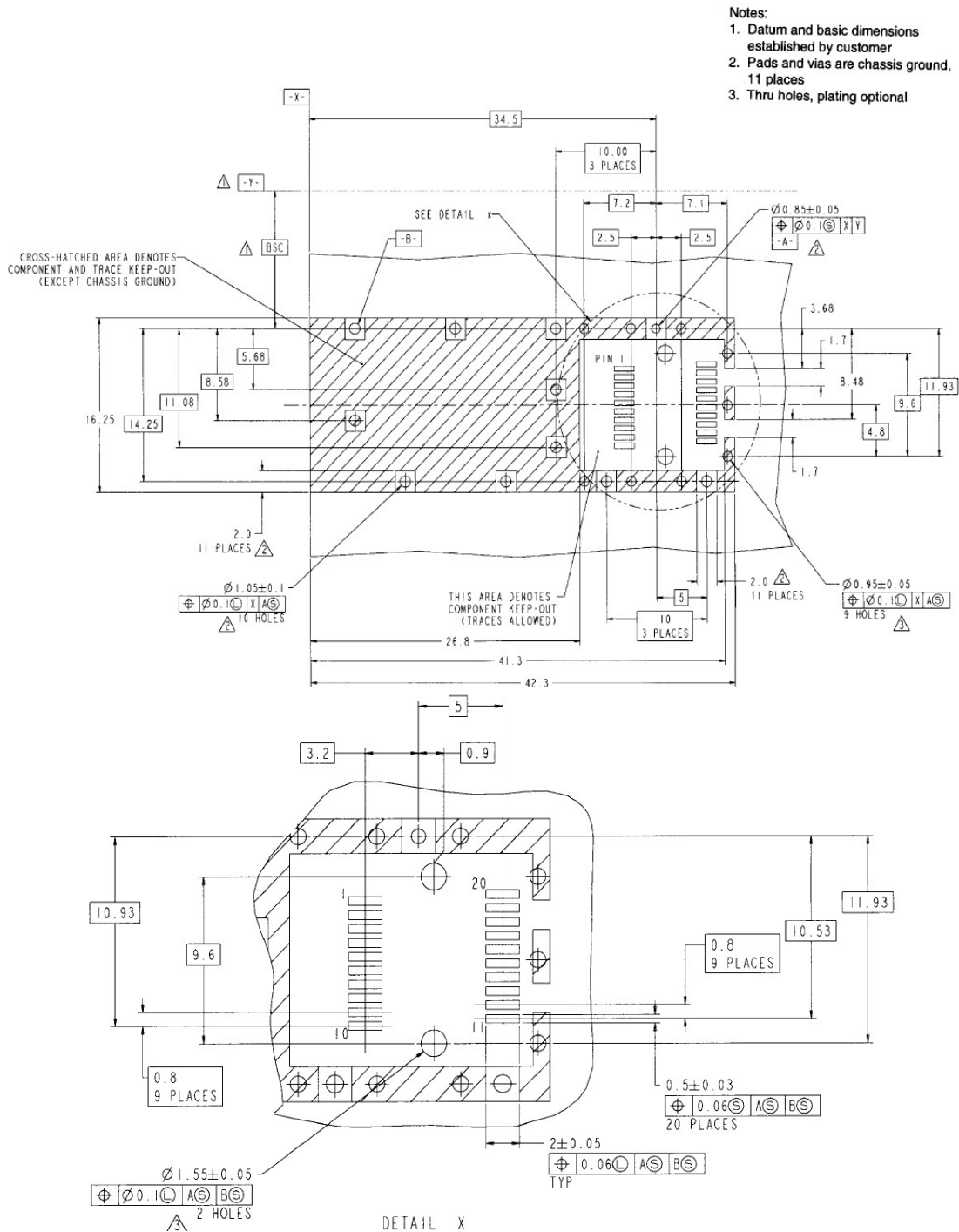


Figure 5. PCB layout recommendation



**LX6502CDH  
25G 10KM 25GBASE-LR  
SFP28 Transceiver**

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## **For More Information**

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