

## 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 DFB Laser
- Up to 10 km on 9/125um SMF
- Single +3.3V power supply
- Class 1 laser safety certified
- 1.2W maximum power consumption with established link
- Operating temperature Options:
  - (Commercial) 0°C to +70°C
- RoHS Compliant



## Applications

- High speed storage area networks
- 25G high speed interconnection
- 10km 25G CWDM Network
- CPRI & eCPRI

## Descriptions

LX651xCDH SFP28 transceivers, according to 25 Gigabit Small Form Factor Pluggable “SFP28” Multi-Sourcing Agreement (MSA) SFF-8431 Rev. 4.1 and SFF-8472 Rev. 12.0, are designed for use up to 25.78Gb/s CWDM 6x Fiber channel application of links up to 10km over single mode fiber .They are compatible with SFF-8432.

## Ordering Information

**Table 1. Ordering Information**

Part Number	Transmitter	Output Power	Receiver	Sensitivity @25.78G	Reach	Temp	DDM	RoHS
LX6511CDH	1271nm DFB	1 ~ 6dBm	PIN	<-12dBm	10km	0 ~ 70°C	Available	Compliant
LX6512CDH	1291nm DFB	1 ~ 6dBm	PIN	<-12dBm	10km	0 ~ 70°C	Available	Compliant
LX6513CDH	1311nm DFB	1 ~ 6dBm	PIN	<-12dBm	10km	0 ~ 70°C	Available	Compliant
LX6514CDH	1331nm DFB	1 ~ 6dBm	PIN	<-12dBm	10km	0 ~ 70°C	Available	Compliant
LX6515CDH	1351nm DFB	1 ~ 6dBm	PIN	<-12dBm	10km	0 ~ 70°C	Available	Compliant
LX6516CDH	1371nm DFB	1 ~ 6dBm	PIN	<-12dBm	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. 12.0, 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.

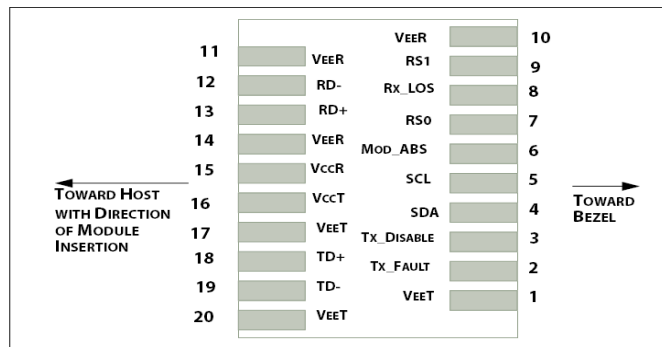


Figure 1. Host PCB SFP28 pad assignment top view

## 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	-	24.3	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>	-		360	mA	
Power Dissipation	P <sub>D</sub>	-	-	1200	mW	
<b>Transmitter</b>						
Input Differential Impedance	Z <sub>IN</sub>	-	100	-	Ω	

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	
<b>Receiver</b>							
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		$t_r, t_f$	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:**

- 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 6. Transmitter Optical Characteristics**

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Launch Optical Power	$P_o$	1	-	6	dBm	1
Extinction Ratio	ER	3.5	-	-	dB	
Center Wavelength Range	$\lambda_c$	1264.5	-	1377.5	nm	
Optical Modulation Amplitude	OMA	631	-	-	uW	
Spectral Width	$\Delta\lambda$	-	-	1	nm	2
Optical Return Loss Tolerance	ORLT	-	-	12	dB	
Pout @TX-Disable Asserted	$P_{off}$	-	-	-30	dBm	

**Notes:**

- Class 1 Laser Safety per FDA/CDRH and EN (IEC) 60825 regulations.
- 20dB spectral width.

## Receiver Optical Characteristics

**Table 7. Receiver Optical Characteristics**

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Center Wavelength	$\lambda_c$	1264.5	-	1377.5	nm	
Receiver Sensitivity( $P_{OMA}$ )	-	-	-	-12	dBm	1
Receiver Overload ( $P_{avg}$ )	$P_{OL}$	2	-	-	dBm	
Optical Return Loss	ORL	26	-	-	dB	
Receive Reflectance	-	-	-	-26	dB	
LOS De-Assert	$LOS_D$	-	-	-15	dBm	

LOS Assert	LOS <sub>A</sub>	-30	-	-	dBm
LOS Hysteresis	-	0.5	-	-	dB

**Notes:**

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

### Recommended Host Board Power Supply Filter Network

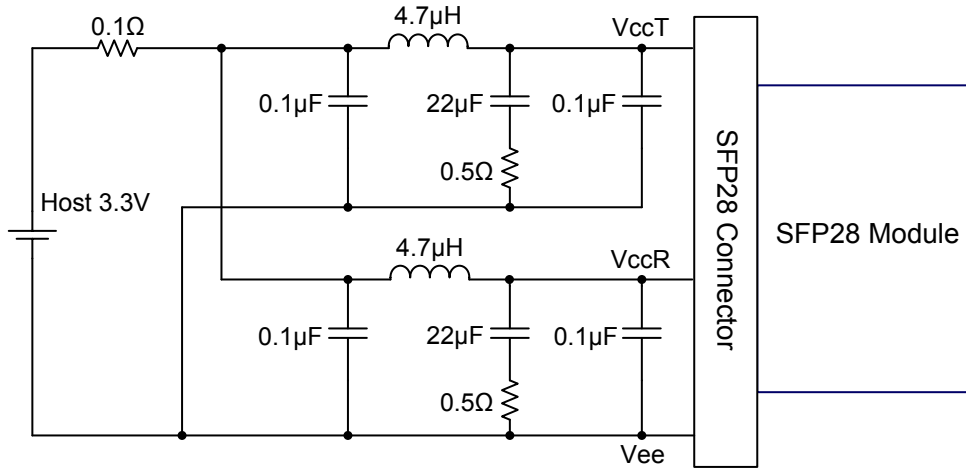


Figure 2. Recommended Host Board Power Supply Filter Network

### Recommended Application Interface Block Diagram

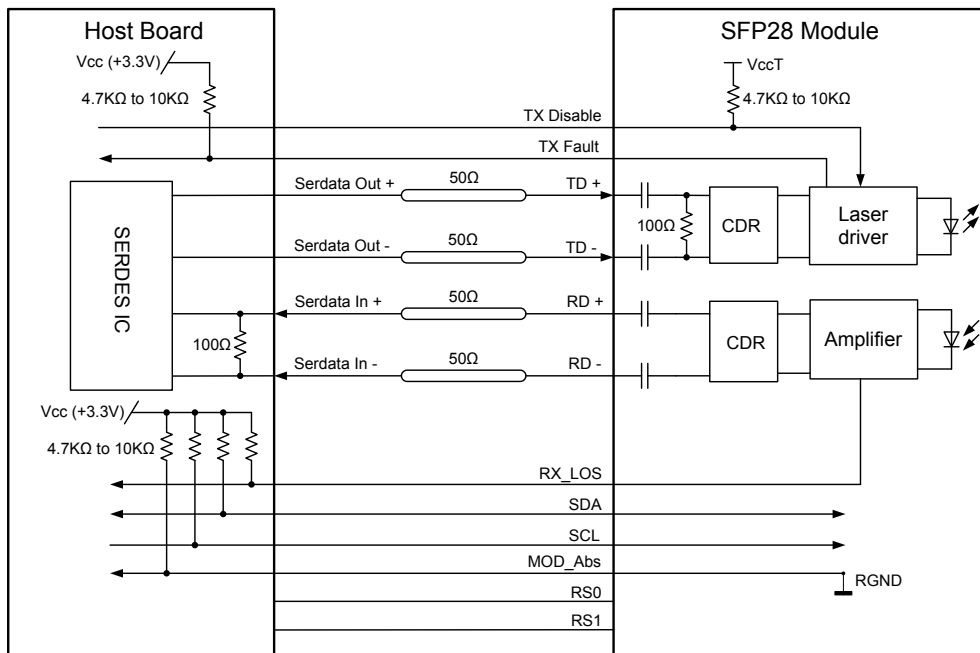


Figure 3. Recommended Application Interface Block Diagram

## Mechanical specifications

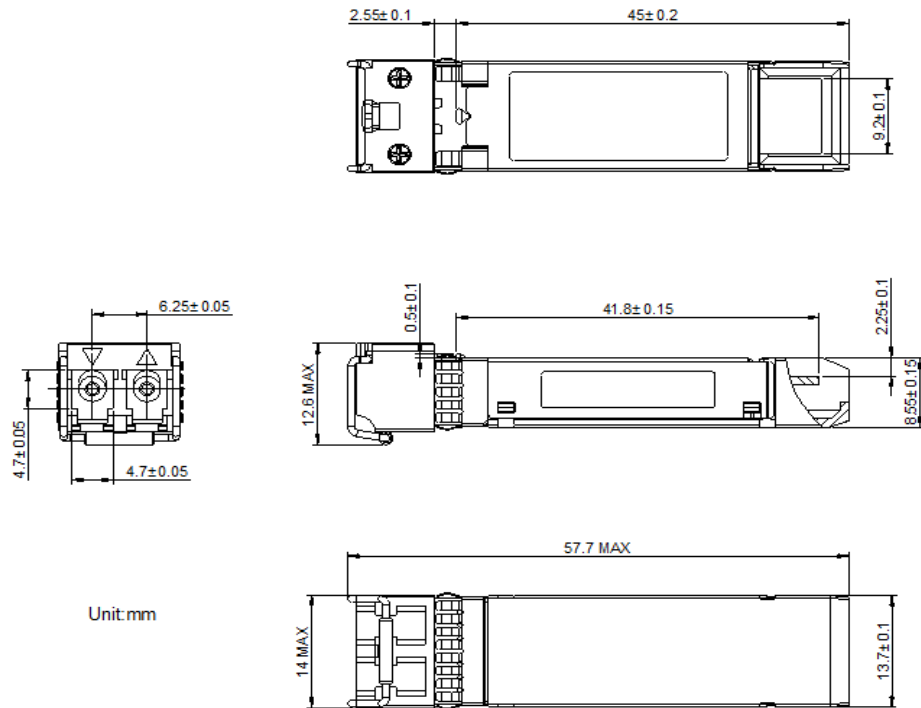
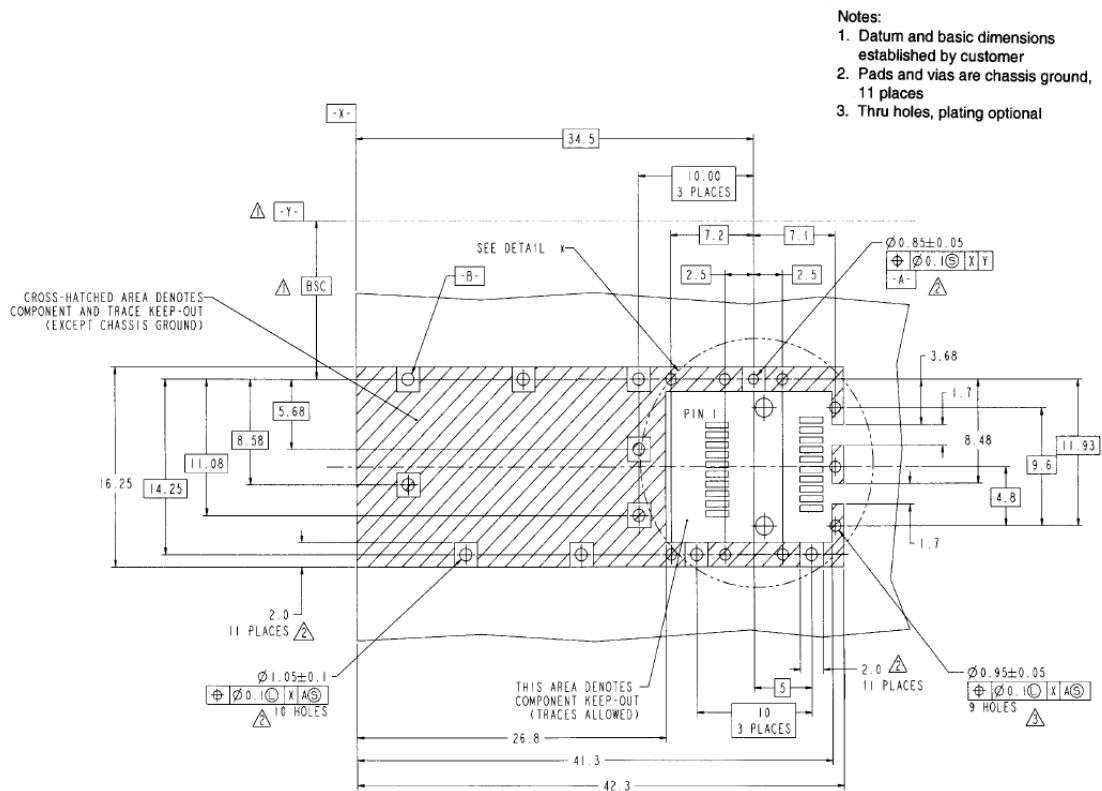


Figure 4. Outline Drawing

## PCB layout recommendation



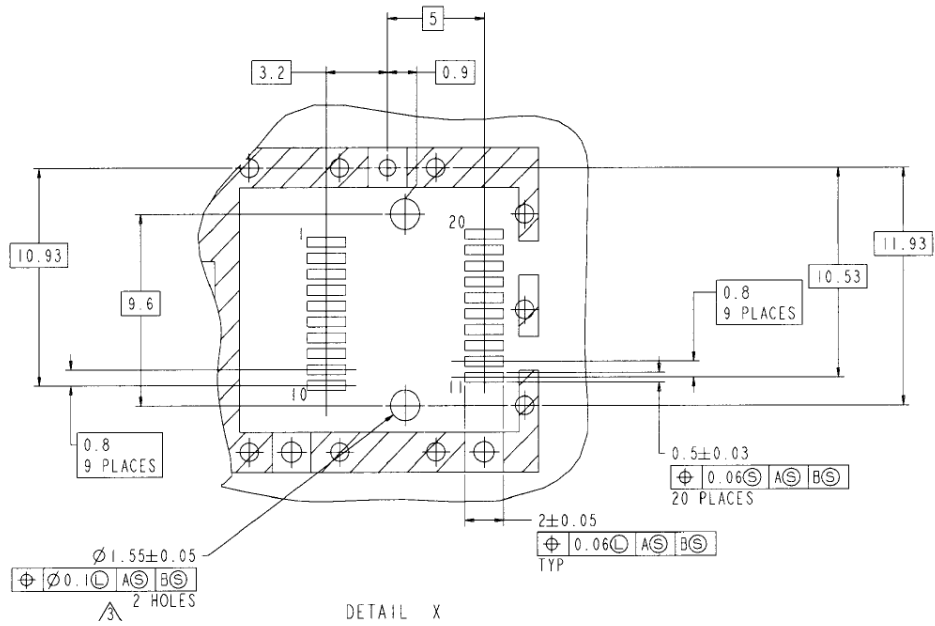


Figure 5. PCB layout recommendation

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## Revision History

<b>Date</b>	<b>Rev</b>	<b>Description</b>	<b>Modified By</b>
03/06/2019	V1.0	initial version	Guotao Huang
09/25/2020	V1.1	increased CPRI and eCPRI applications Change company address information	Menglei Chen



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