1.25Gbps Single Mode BIDI SFP Transceiver
HK-1.25G-20-1310

■ **Features**

  a. Single Power Supply 3.3V
  b. Small Form Factor Pluggable (SFP) MSA Compatible
  c. Single Fiber Bi-Direction LC Connector
  d. Hot Pluggable Capability
  e. Compliant With ROHS Standard

■ **Applications**

  a. Fiber Channel
  b. Gigabit Ethernet
  c. Switch to Switch Interface

■ **Absolute maximum ratings**

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T_S	-40	+85	℃
Supply Voltage	V_{CC}	-0.5	+3.6	V
Voltage at any Input Pin	V_{IN}	0	Vcc	V
Power supply current	I_{CC}	-	300	mA

■ **Recommended Operating Conditions**

Parameter	Symbol	Min.	Typ	Max.	Unit
Operating Temperature	T_{op1}	0	-	+70	℃
	T_{op2}	-40	-	+85	
Supply Voltage	V_{CC}	3.1	3.3	3.5	V
Data Rate	-	-	1250	-	Mb/s

■ **Operating Conditions**

Transmitter（**T=25℃, V_{CC} =3.1~3.5V**）

Parameter	Symbol		Min.	Typ.	Max.	Unit
Central Wavelength	λ_C		1280	1310	1360	nm
			1480	1490	1500	
			1520	1550	1580	
Spectral Width	$\Delta\lambda$	DFB@-20dB	-	-	1	nm
		FP@RMS	-	-	3	
Output Power	Po		Reference "Ordering Information"			
Extinction Ratio	ER		9	-	-	dB
Differential Input Voltage	V_{DIFF}		500	-	2400	mV
TX Disable Input Voltage Low	TX_DISABLEL		0	-	0.5	V
TX Disable Input Voltage High	TX_DISABLEH		2.0	-	V_{CC}	V

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Transmit Fault Output Low	TX_FAULTL	0	-	0.8	V
Transmit Fault Output High	TX_FAULTH	2.0	-	V_{CC}	V
Eye Diagram	Compliance with ITU-T G.957				

Receiver （T=25℃, Vcc=3.1~3.5V)

Parameter		Symbol	Min.	Typ.	Max.	Unit
Wavelength Range		λ	1260	1310	1360	nm
			1480	1490	1500	
			1520	1550	1580	
MIN. Input Power (Sensitivity)	10/20KM	P_{MIN}	-	-	-21	dBm
	30/40KM				-24	
	60KM				-26	
MAX. Input Power (Saturation)		P_{MAX}	-3	-	-	dBm
Signal Detect-Asserted		P_A	-	-	P_{MIN}	dBm
Signal Detect-Deasserted		P_D	-40	-	-	dBm
Signal Detect Hysteresis		P_{HYS}	1	-	5	dB
Receiver Loss of Signal Output Voltage-Low		RX_LOSL	0	-	0.8	V
Receiver Loss of Signal Output Voltage-High		RX_LOSH	2.0	-	V_{CC}	V

■ **EEPROM Description**

The SFP serial ID provides access to sophisticated identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information. The serial interface uses the 2-wire serial CMOS E^2PROM protocol defined for the ATMEL AT24C01A/02/04 family of components.

When the serial protocol is activated, the host generates the serial clock signal (SCL, Mod Def 1). The positive edge clocks data into those segments of the E^2PROM that are not write-protected within the SFP transceiver. The negative edge clocks data from the SFP transceiver.

The serial data signal (SDA, Mod Def 2) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

EEPROM Serial ID Memory Contents (A0h)

Address	Size (Bytes)	Name of Field	Hex	Description of Field
0	1	Identifier	03	SFP
1	1	Ext. Identifier	04	MOD4

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2	1	Connector	07	LC
3—10	8	Transceiver	xx xx xx xx xx xx xx xx	Transceiver Code
11	1	Encoding	01	8B10B
12	1	BR, nominal	0D	1.25Gbps
13	1	Reserved	00	
14	1	Length(9um)-km	XX	Units of km
15	1	Length (9um)	XX	Units of 100 m
16	1	Length (50um)	00	
17	1	Length (62.5um)	00	
18	1	Length (copper)	00	
19	1	Reserved	00	
20—35	16	Vendor name	41 4C 4C 52 41 59 20 49 4E 43 2E 20 20 20 20 20	"ALLRAY INC. "(ASCⅡ)
36	1	Reserved	00	
37—39	3	Vendor OUI	00 00 00	
40—55	16	Vendor PN	41 54 52 2D 53 xx xx xx xx 20 20 20 20 20 20 20	"ATR-S10XX " (ASCⅡ)
			41 54 52 2D 53 xx xx xx xx 54 20 20 20 20 20 20	"ATR-S10XXT " (ASCⅡ)
56—59	4	Vendor rev	31 2E 32 20	ASCⅡ ("31 2E 32 20" means 1.2 revision)
60-61	2	Wavelength	xx xx	Laser wavelength
62	1	Reserved	00	
63	1	CC BASE	xx	Check sum of bytes 0 - 62
64—65	2	Options	00 1A	LOS, TX_FAULT and TX_DISABLE
66	1	BR, max	00	
67	1	BR, min	00	
68—83	16	Vendor SN	xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx	SN：xxxxxxxxx (ASCⅡ)
84—91	8	Vendor date code	xx xx xx xx xx xx 20 20	Year (2 bytes), Month (2 bytes), Day (2 bytes) (ASCⅡ)
92—94	3	Reserved	00 00 00	
95	1	CC_EXT	xx	Check sum of bytes 64 - 94
96—127	32	Vendor specific		Vendor Specific EEPROM
128-255	128	Reserved		Reserved for future use.

Note：1.The "xx" byte should be filled in according to practical case.

2. Note that, A0H is readable and writeable.

■ **Block Diagram of Transceiver**
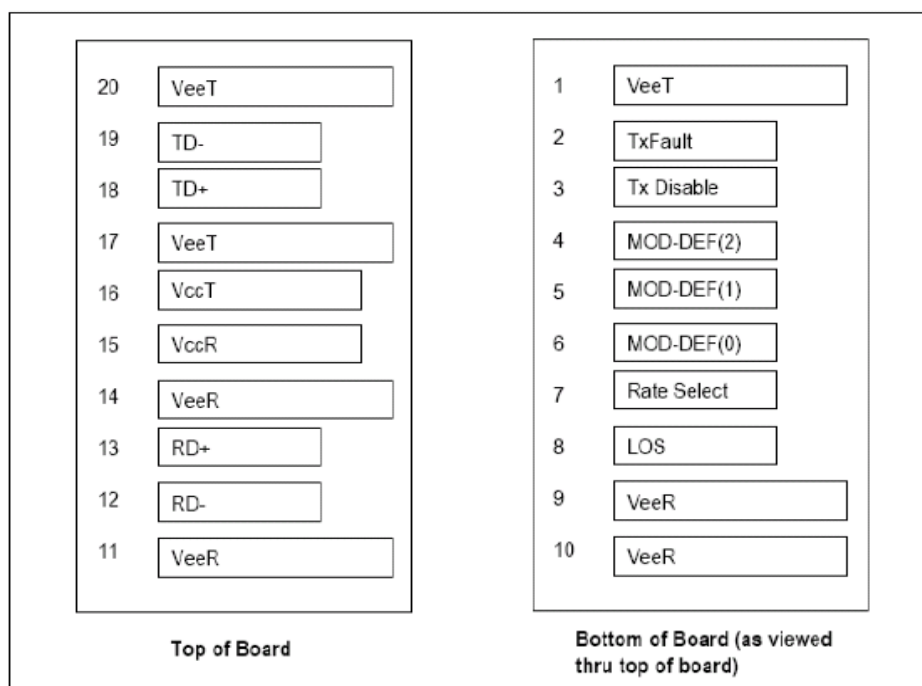
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TOP VIEW (Label side)
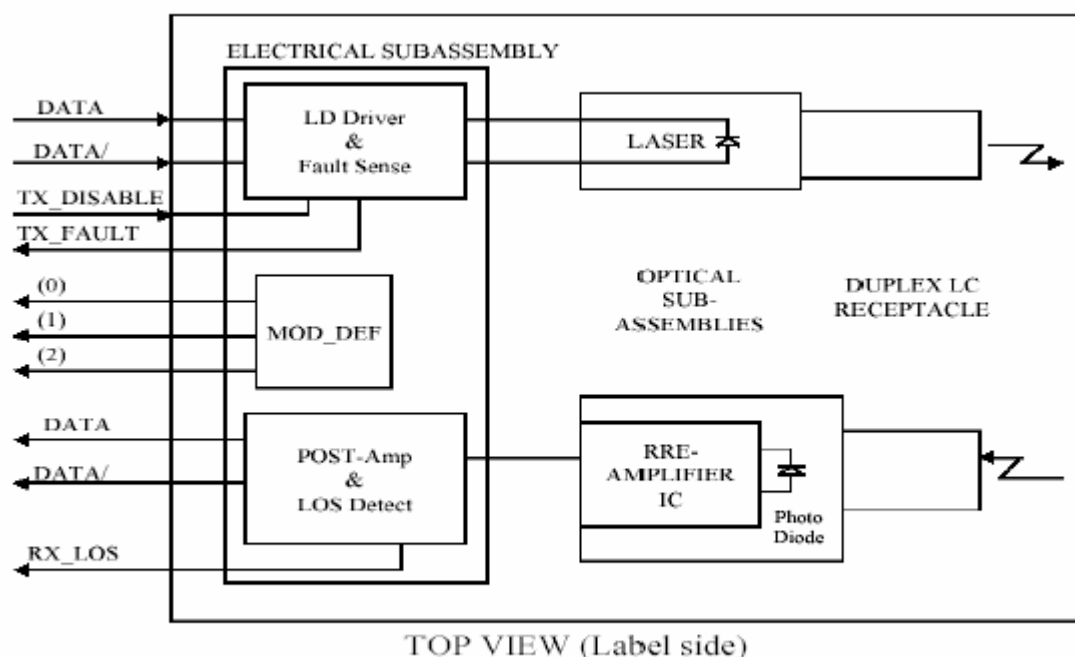
■ **Pin Assignment and Function Definitions**

It is the responsibility of the system integrator to assure that no thermal, energy, or voltage hazard exists during the hot-plug-unplug sequence. It is also the responsibility of the system integrator and end-user to minimize static electricity and the probability of ESD events by careful design.

Pins Assignment

Top of Board

Bottom of Board (as viewed thru top of board)

■ **Function definition**

Pin No.	Name	Function	Plug Seq.	Notes

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| 1	VeeT	Transmitter Ground	1	
2	TX Fault	Transmitter Fault Indication	3	Note 1
3	TX Disable	Transmitter Disable	3	Note 2
4	MOD-DEF2	Module Definition 2	3	Note 3
5	MOD-DEF1	Module Definition 1	3	Note 3
6	MOD-DEF0	Module Definition 0	3	Note 3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note 4
9	VeeR	Receiver Ground	1	
10	VeeR	Receiver Ground	1	
11	VeeR	Receiver Ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	VeeR	Receiver Ground	1	
15	VccR	Receiver Power	2	
16	VccT	Transmitter Power	2	
17	VeeT	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv Transmit Data In	3	Note 6
20	VeeT	Transmitter Ground	1	

Notes:

1. TX Fault is an open collector output, which should be pulled up with a 4.7K~10KΩ resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.

2. TX Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7K~10KΩ resistor. Its states are:

Low (0~0.8V): Transmitter on

(>0.8V, <2.0V): Undefined

High (2.0~3.465V): Transmitter Disabled

Open: Transmitter Disabled.

3. MOD-DEF 0,1,2 are the module definition pins. They should be pulled up with a 4.7K~10KΩ resistor on the host board. The pull-up voltage shall be VccT or VccR.

MOD-DEF 0 is grounded by the module to indicate that the module is present.

MOD-DEF 1 is the clock line of two wire serial interface for serial ID.

MOD-DEF 2 is the data line of two wire serial interface for serial ID.

4. LOS is an open collector output, which should be pulled up with a 4.7K~10KΩ resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; logic 1 indicates loss of signal. In the low state, the output will be pulled to less than 0.8V.

5. These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES.

6. These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module.
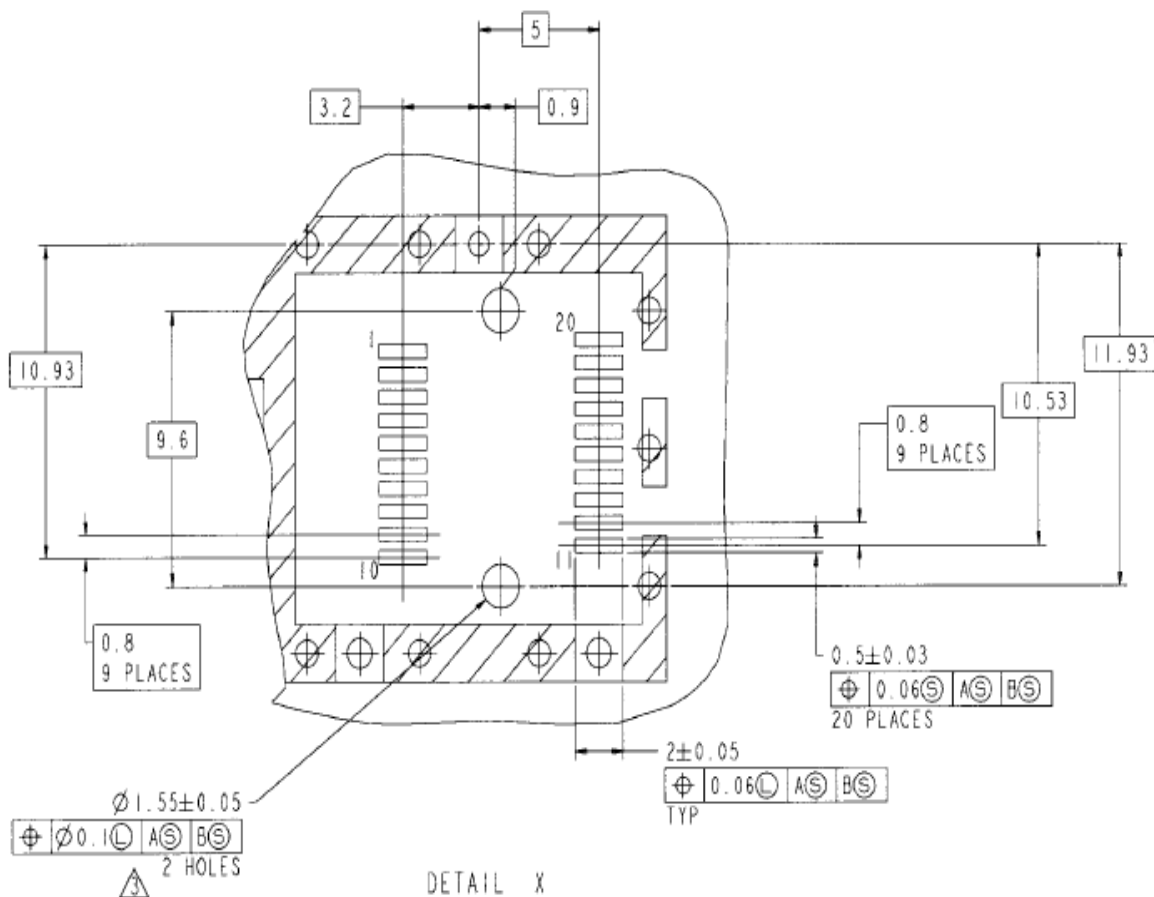
■   **SFP Host PCB Mechanical Layout**

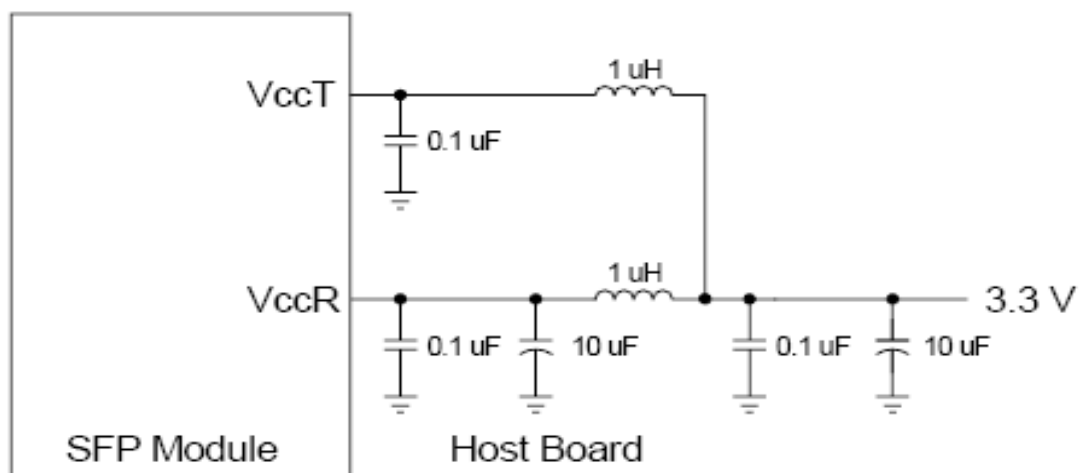# 1.25Gbps Single Mode BIDI SFP Transceiver
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1.25Gbps Single Mode BIDI SFP Transceiver
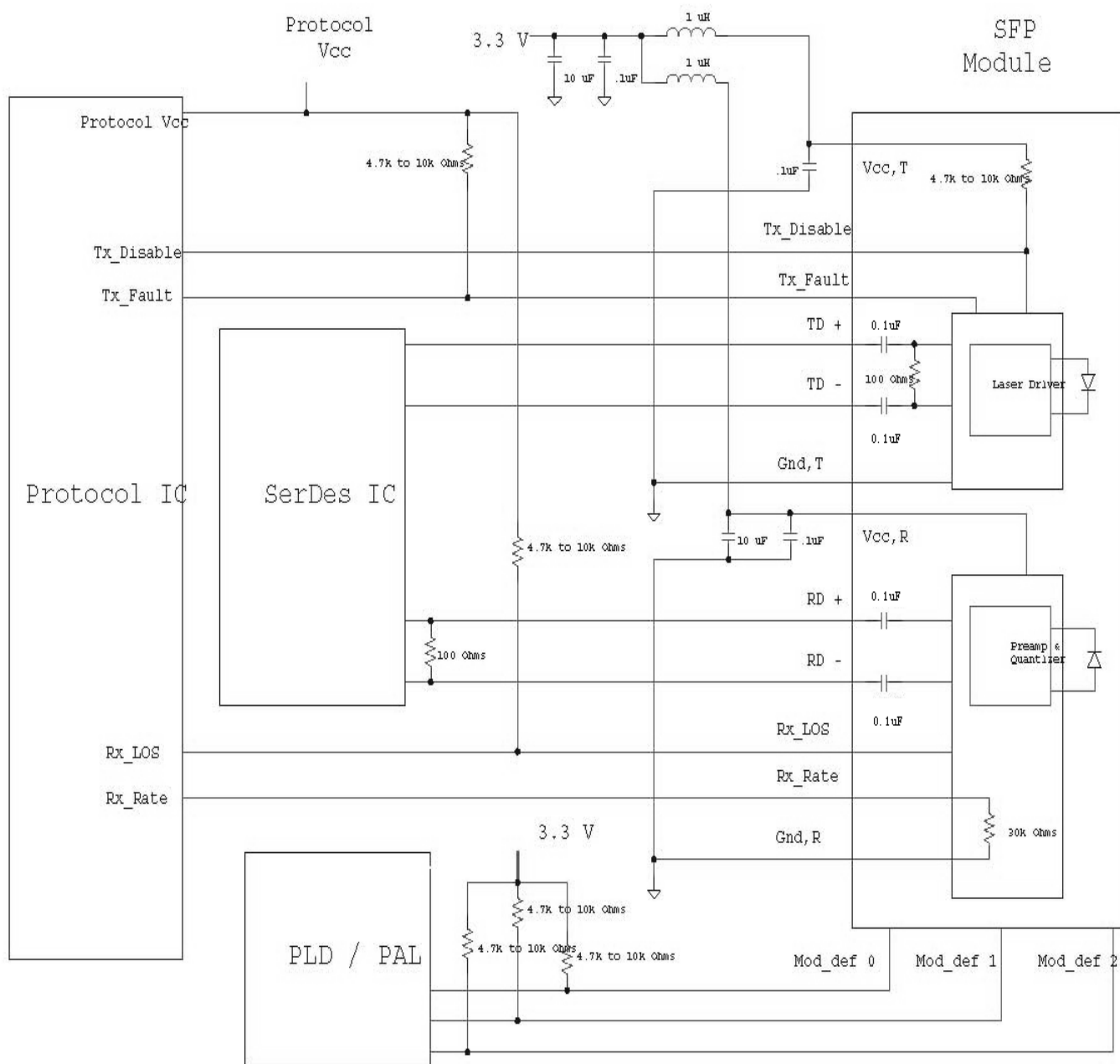## HK-1.25G-20-1310

DETAIL X
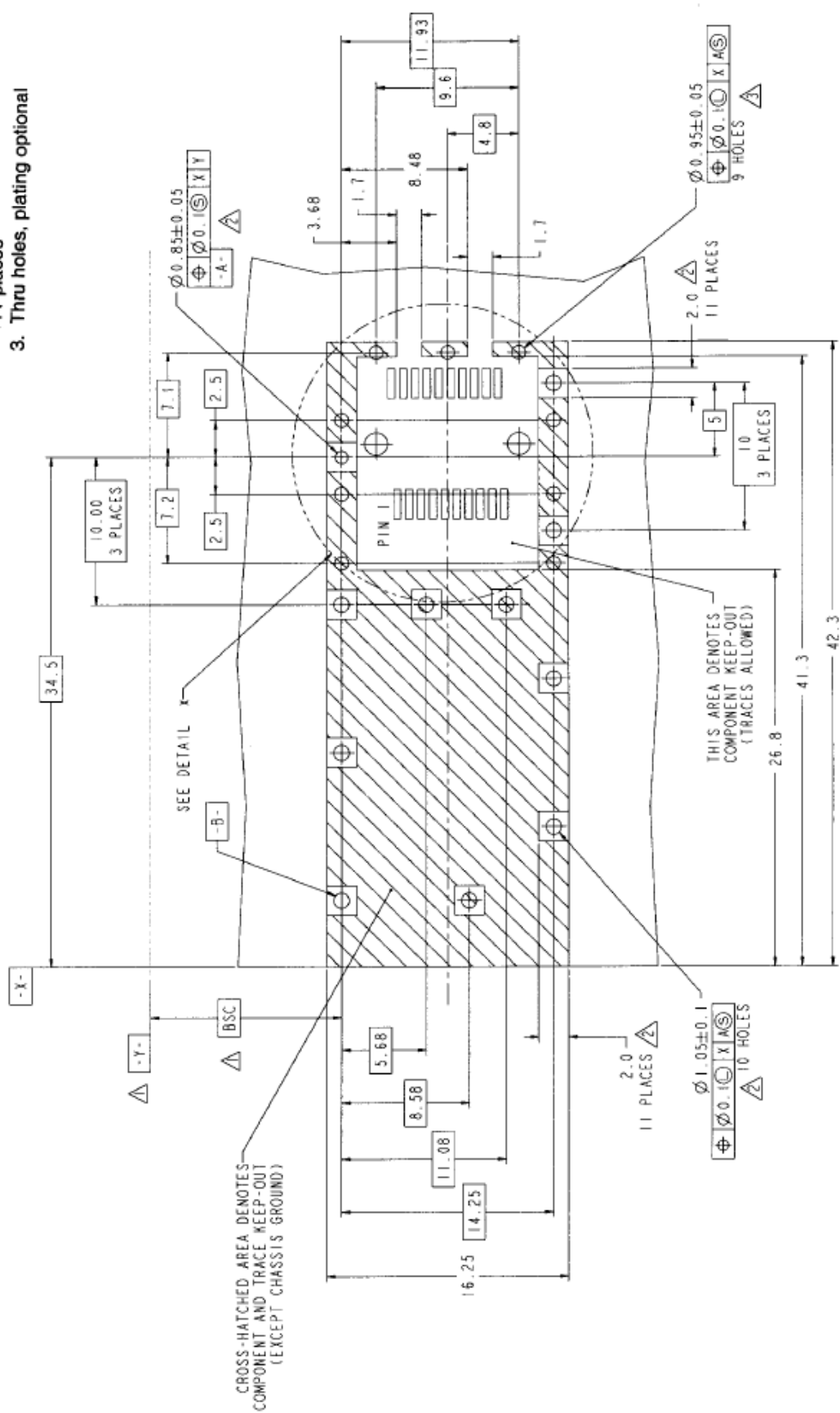
■ **Recommended Host Board Supply Filtering Network**

■ **Example SFP Host Board Schematic**

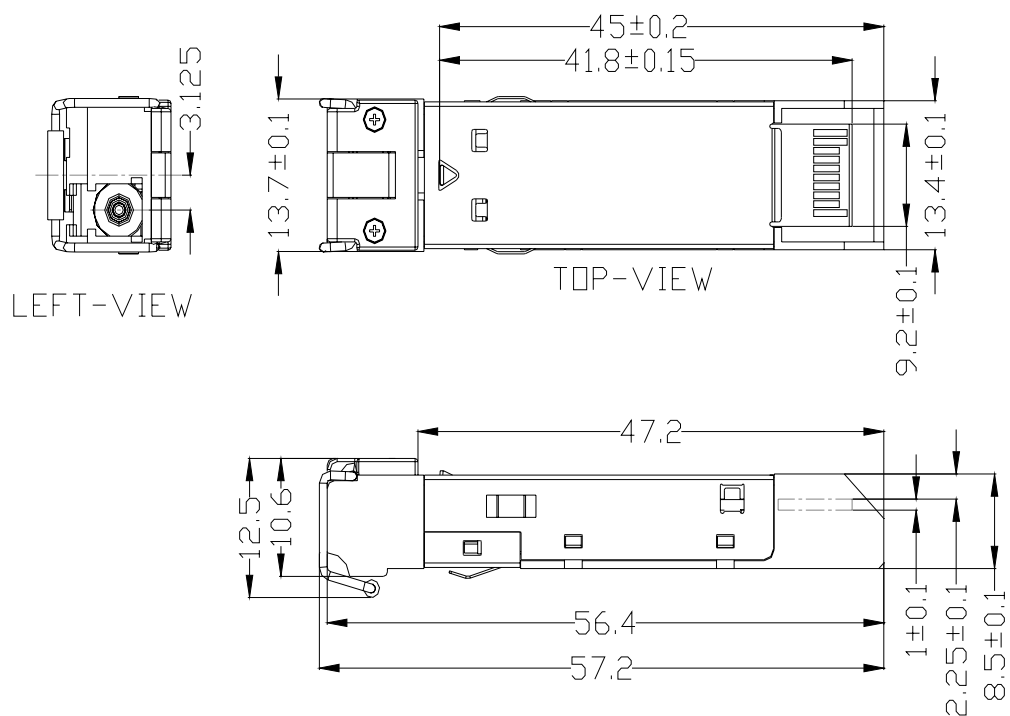## 1.25Gbps Single Mode BIDI SFP Transceiver
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- ■ **Mechanical(Units in mm)**

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■

Regulatory Compliance

Feature		Standard	Performance	Mark
CE-EMC	ESD	EN61000-6-1:2007	CLASS B	
	EMI	EN61000-6-3：2011 EN55022/A1:2007	CLASS B	
CE-LVD		EN60825-1:2007 EN60825-2:2010	CLASS 1	
C-TICK		AS/NZS CISPR 22:2009	CLASS B	
FDA		CFR TITLE 21 chapter 1 Subchapter J,CFR1040.10 and 1040.11	The laser radiation power is under the limit of class 1 laser product	
RoHS		2011-65-EU	Compatible with standards	
REACH		SVHC	Compatible with standards	

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■ **Ordering Information**

Part No.	Wavelength (nm)	Temp. (℃)	TX Power (dBm)	RX Sens(Max) (dBm)	Distance (km)
HK-1.25G-20-1310	TX1310nm FP/RX1550nm	0 to 70	-6 to -1	-21	20
HK-1.25G-20-1550	TX1550nmDFB/RX1310nm	0 to 70	-9 to -1	-21	20

Revision History:	July 2, 2015	Rev. B
Previous Version:		
Page	Subjects (major changes since last revision)	
Prepared By:	Aaron Zhang	
Approved By:	Ray Jian	