2.5G Spring-Latch SFP Transceiver

with DDM Function

(For 300m～40km transmission)

- Compatible with IEEE 802.3z
- Compatible with ANSI specifications for Fibre Channel
- Compatible with Telcordia GR-468-CORE
- Compatible with FCC 47 CFR Part 15, Class B
- Compatible with FDA 21 CFR 1040.10 and 1040.11, Class I
- RoHS compliance (Optional)

Features

- Up to 2.5Gb/s data rate operation
- 1310nm FP/DFB,1550nm DFB laser,CWDM and PIN photo detector
- 300m transmission with MMF
- 2km~40km transmission with SMF
- Standard serial ID information compatible with SFP MSA
- SFP MSA package with duplex LC connector
- With Spring-Latch for high density application
- Very low EMI and excellent ESD protection
- +3.3V single power supply
- Operating case temperature:
  Standard:0 to +70°C
  Industrial: -40 to +85°C

Applications

- Router/Server interface
- Switch to Switch interface
- Switched backplane applications
- Other optical transmission systems

Standard

- Compatible with SFP MSA

Description

The SFP transceiver is high performance, cost effective module supporting data-rate of 2.5Gbps and from 2km to 40km transmission distance with SMF. And 300m transmission distance with MMF

The transceiver consists of two sections: The transmitter section incorporates a FP/DFB laser in SMF and VCSEL in MMF. And the receiver section consists of a PIN photodiode integrated with a TIA. All modules satisfy class I laser safety requirements.

The optical output can be disabled by a TTL logic high-level input of Tx Disable. Tx Fault is provided to indicate that degradation of the laser. Loss of signal(LOS) output is provided to indicate the loss of an input optical signal of receiver.

The standard serial ID information compatible with SFP MSA describes the transceiver's capabilities,standard interfaces, manufacturer and other information. The host equipment can access this information via the 2-wire serial CMOS EEPROM protocol. For further information, please refer to SFP MSA.

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Absolute Maximum Ratings

Table 1 - Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
Storage Temperature	Tstg	-40	+85	ºC
Relative Humidity -Storage	RHS	0	95	%
Relative Humidity -Operating	RHO	0	85	%
DC Supply Voltage	Vcc	0	3.6	V
Tx DATA	Vin	0	VCC + 0.5	V
Optical and Electrical Signal Absolute Maximum Ratings				
Signal / Data Input Voltage (Tx_DATA)	VIN PK-PK	-	2.4	V
Rx Optical Input Power	PIN-MAX		3	dBm
Logic State Absolute Maximum Ratings				
Tx_DISABLE Logic HIGH State	Tx_DIS	-	VCC+0.5	V
Tx_FAULT Logic HIGH State	Tx_FAULT	-	VCC+0.5	V
Rx_LOS Logic HIGH State	Rx_LOS	-	VCC+0.5	V

Note:Exceeding these ratings may cause irreversible damage to the device.

Recommended Operating Conditions

Table 2- Recommended Operating Conditions

Parameter		Symbol	Min.	Typical	Max.	Unit
Operating Temperature	Standard	TC	0		+70	°C
	Industrial		-40		+85	
Power Supply Voltage		VCC	3.13		3.47	V
Power Supply Current		Icc		200	300	mA
Date Rate				2.48832		Gbps

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Table 3 - Optical and Electrical Characteristics

Parameter		Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter							
Centre Wavelength		λC	830	850	860	nm	VCSEL
			1266	1310	1360		2km FP LD
			1230	1310	1360		DFB LD
			1500	1550	1580		DFB LD
			λ -6.5		λ +6.5		CWDM LD ①
Average Output Power	300m	Pout	-10		-3	dBm	850nm VCSEL ②
	2km		-11		-3		1310nm FP LD ⑨
	10km		-10		0		1310nm/1550nm DFB LD ⑨
	20km		-8		+3		
	40km		-5		+3		
	CWDM		-3		+3		CWDM ⑧
P0ut@TX Disable Asserted		Pout			-45	dBm	④
Spectral Width (RMS)		Δλ			0.85	nm	VCSEL
					4		FP LD
					1		DFB LD(-20dB)
Extinction Ratio		EX	9			dB	
Side Mode Suppression Ratio		SMSR	30			dB	DFB LD
Rise/Fall Time (20%～80%)		tr/tf			150	ps	④
Transmitter jitter	2.488G	TJ			0.1	UIp-p	⑤
Output Optical Eye Diagram		Complies with OC-48 eye masks when filtered					⑥
Data Input Swing Differential		VIN	500		2400	mV	⑦
Input Differential Impedance		ZIN	90	100	110	Ω	
TX Disable	Disable		2.0		Vcc	V	
	Enable		0		0.8	V	
TX Fault	Fault		2.0		Vcc+0.3	V	
	Normal		0		0.8	V	
Receiver							
Receiver Sensitivity	300m	S			-18	dBm	850 PIN ⑧
	2/10km				-18		PIN ⑧
	20/40km				-20		
Receiver Overload			-3			dBm	⑧
Return Loss			12			dB	
LOS De-Assert		LOSD			S	dBm	
LOS Assert		LOSA	-35			dBm	
LOS Hysteresis			0.5	3	5	dB	
DataOutput Swing Differential		VOUT	370		2000	mV	⑦
LOS	High		2.0		Vcc+0.3	V	

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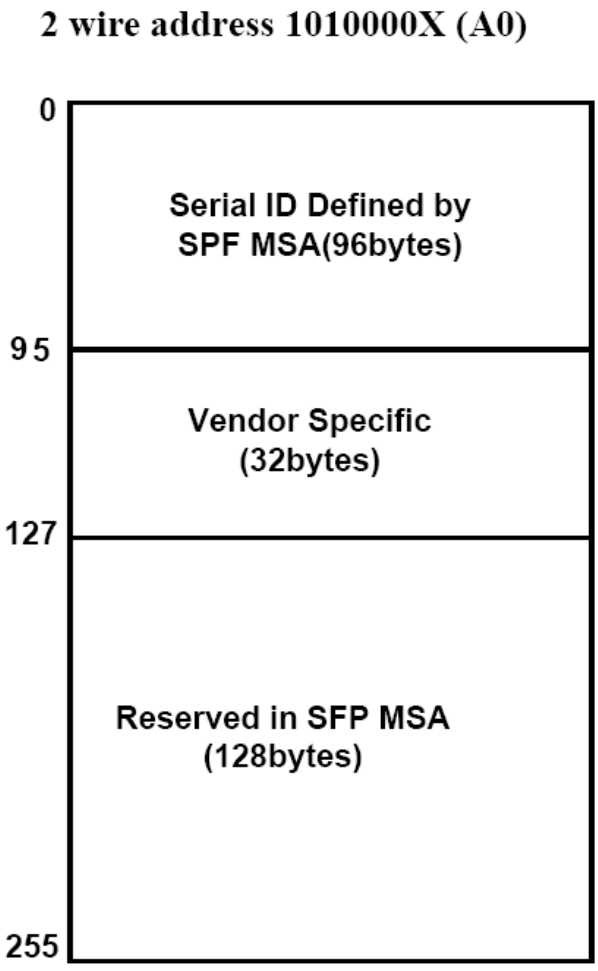
	Low		0		0.8	V	

Notes:

①. CWDM Centre Wavelength 1470,1490,1510,1530,1550,1570,1590,1610nm.
②. The optical power is launched into MMF.
③. The optical power is launched into SMF.
④. Unfiltered, measured with a PRBS 2^7-1 test pattern @2.48832Gbps
⑤. Meet the specified maximum output jitter requirements if the specified maximum input jitter is present.
⑥. Measured with a PRBS 2^7-1 test pattern @2.48832Gbps.
⑦. PECL logic, internally AC coupled.
⑧. Measured with a PRBS 2^7-1 test pattern @2.48832Gbps, worst-case extinction ratio, BER ≤1×10^(-12).

Memory Map



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EEPROM Information

The SFP SMA defines a 256-byte memory map in EEPROM describing the transceiver's capabilities, standard interfaces, manufacturer, and other information, which is accessible over a 2 wire serial interface at the 8-bit address 1010000X (A0h). The memory contents refer to Table 6

Table 6 - EEPROM Serial ID Memory Contents (A0h)

Addr.	Field Size (Bytes)	Name of Field	Hex	Description
0	1	Identifier	03	SFP
1	1	Ext. Identifier	04	MOD4
2	1	Connector	07	LC
3—10	8	Transceiver		Transmitter Code
11	1	Encoding	03	NRZ
12	1	BR, nominal	19	2.5Gbps
13	1	Reserved	00	
14	1	Length (9um)-km		Transceiver transmit distance
15	1	Length (9um)		
16	1	Length (50um)		
17	1	Length (62.5um)		
18	1	Length (copper)	00	
19	1	Reserved	00	
20—35	16	Vendor name	4E 4F 41 48 20 20 20 20 20 20 20 20 20 20 20 20	"NOAH "(ASCⅡ)
36	1	Reserved	00	
37—39	3	Vendor OUI	00 00 00	
40—55	16	Vendor PN		Transceiver part number (ASCⅡ)
56—59	4	Vendor rev	xx xx xx xx	ASCⅡ("31 30 20 20" means 1.0 revision)
60-61	2	Wavelength		Transceiver 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	Serial Number of transceiver(ASCⅡ)
84—91	8	Vendor date code	xx xx xx xx xx xx 20 20	Year(2 bytes), Month(2 bytes), Day (2 bytes)
92—94	3	Reserved	00 00 00	
95	1	CC_EXT	xx	Check sum of bytes 64 - 94
96—255	160	Vendor specific		

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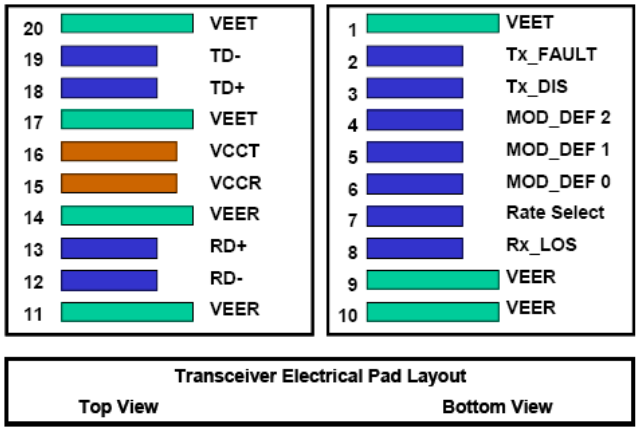
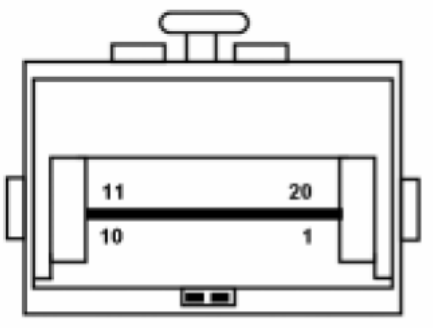
Note: The “xx” byte should be filled in according to practical case. For more information, please refer to the related document of SFP Multi-Source Agreement (MSA).

Pin Description



Transceiver Electrical Pad Layout



Transceiver Pin Locations

Pin	Name	Function/Description	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	
2	TX Fault	Transmitter Fault Indication	3	1
3	TX Disable	Transmitter Disable-Module disables on high or open	3	2
4	MOD-DEF2	Module Definition 2-Two wire serial ID interface	3	3
5	MOD-DEF1	Module Definition 1-Two wire serial ID interface	3	3
6	MOD-DEF0	Module Definition 0-Two wire serial ID interface	3	3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	4
9	VeeR	Receiver Ground	1	
10	VeeR	Receiver Ground	1	
11	Veer	Receiver Ground	1	
12	RD-	Inverse Received Data out	3	5
13	RD+	Received Data out	3	5
14	VeeR	Receiver Ground	1	
15	VccR	Receiver Power —— +3.3V±5%	2	6
16	VccT	Transmitter Power —— +3.3 V±5%	2	6
17	VeeT	Transmitter Ground	1	
18	TD+	Transmitter Data In	3	7
19	TD-	Inverse Transmitter Data In	3	7
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.

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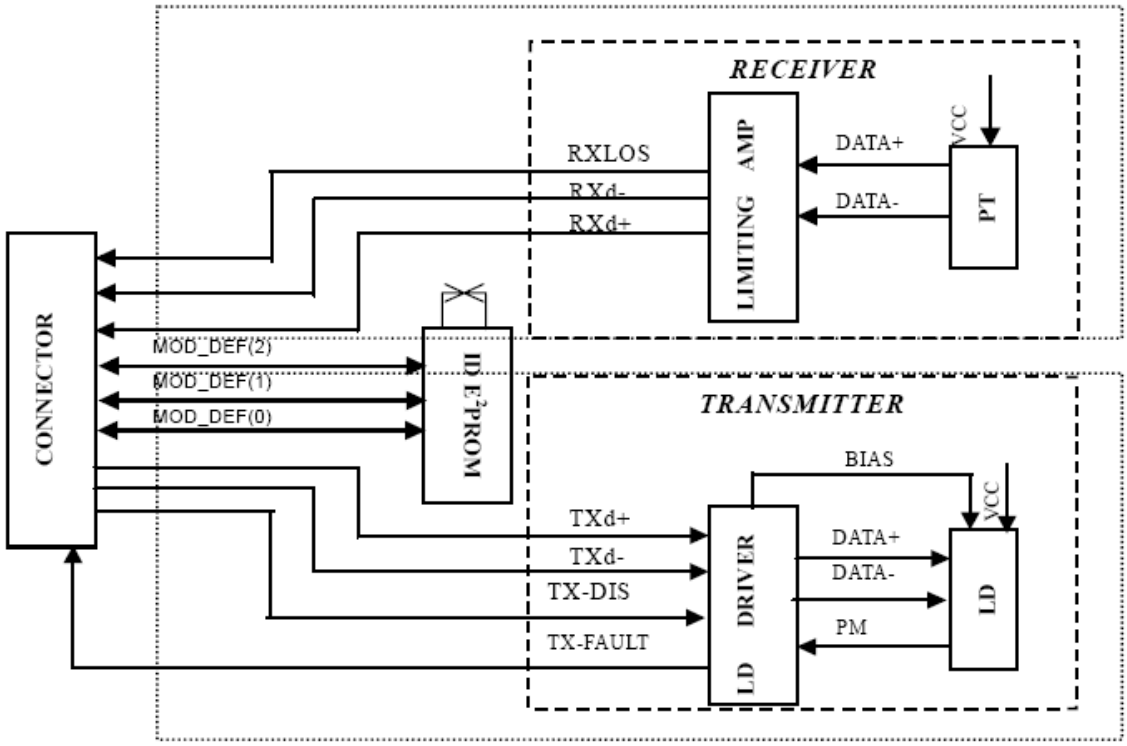
2. TX Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7k~10kΩ resistor. Its states are:
   Low (0~0.8V): Transmitter on
   (>0.8V, <2.0V): Undefined
   High (2.0~3.465V): Transmitter Disabled
   Open: Transmitter Disabled
3. MOD-DEF 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 output. They are internally 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.

Block Diagram



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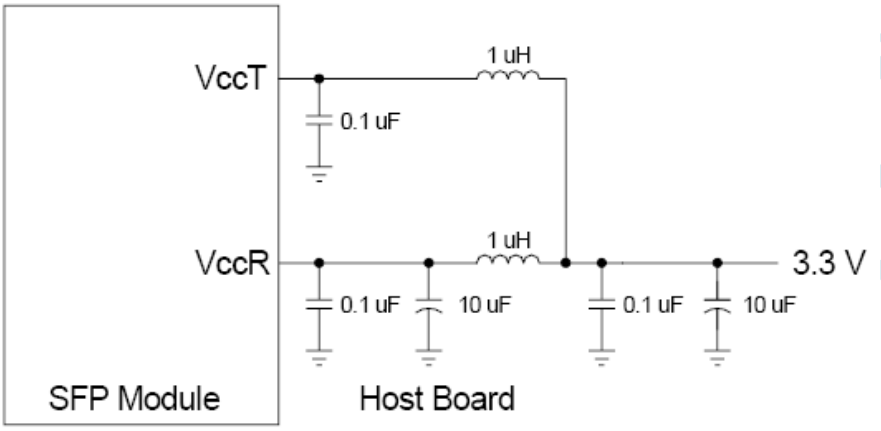
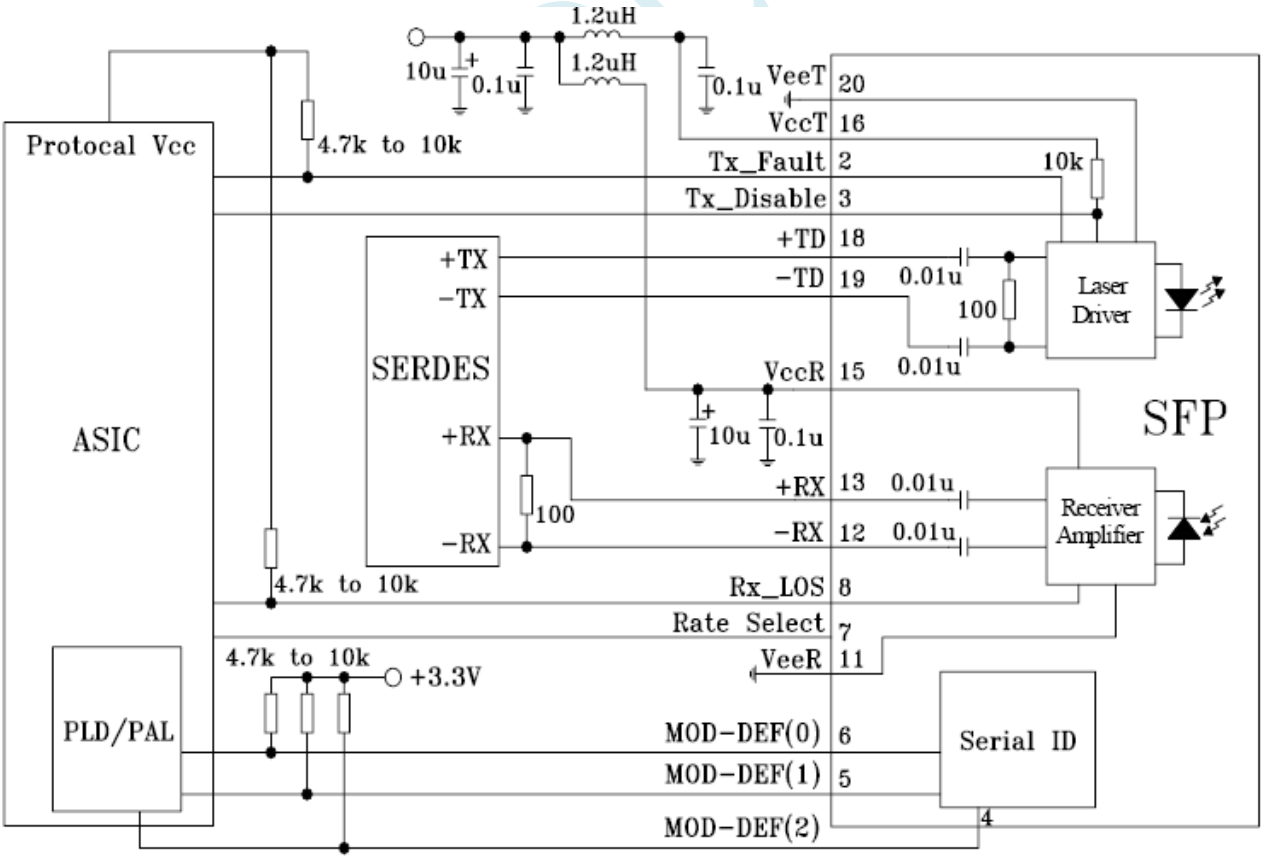
Required Host Board Components

The MSA power supply noise rejection filter is required on the host PCB to meet data sheet performance. The MSA filter incorporates an inductor which should be rated 400mADC and 1Ωserial resistance or better.It should not be replaced with a ferrite. The required filter is illustrated in Figure 3. The MSA also specifies that 4.7K to 10KΩ pull-up resistors for TX_FAULT, LOS, and MOD_DEF0,1,2 are required on the host PCB. Figure is the suggested transceiver/host interface.



Typical Application Circuit



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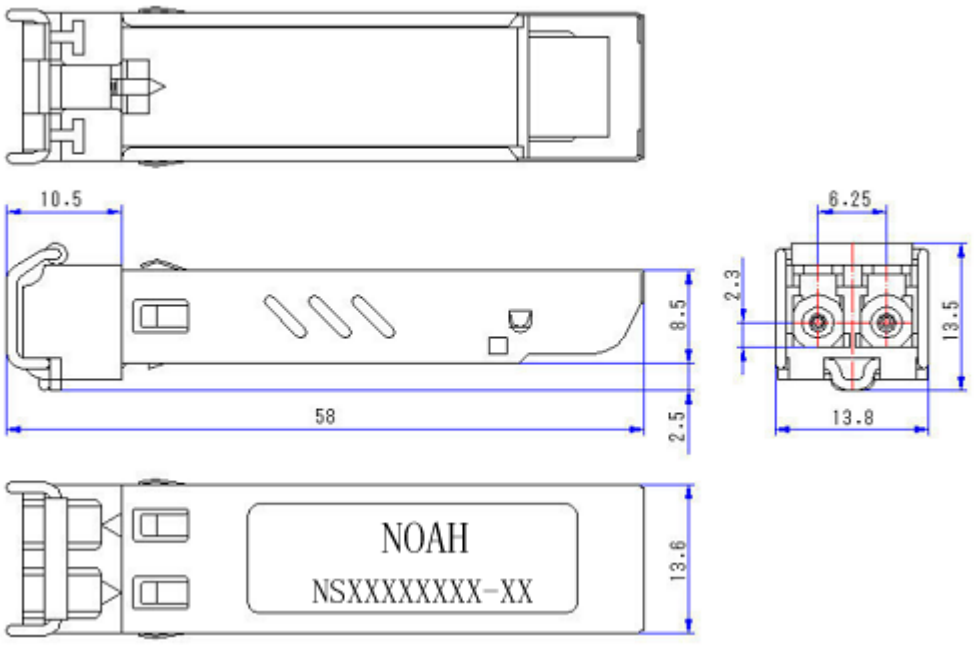
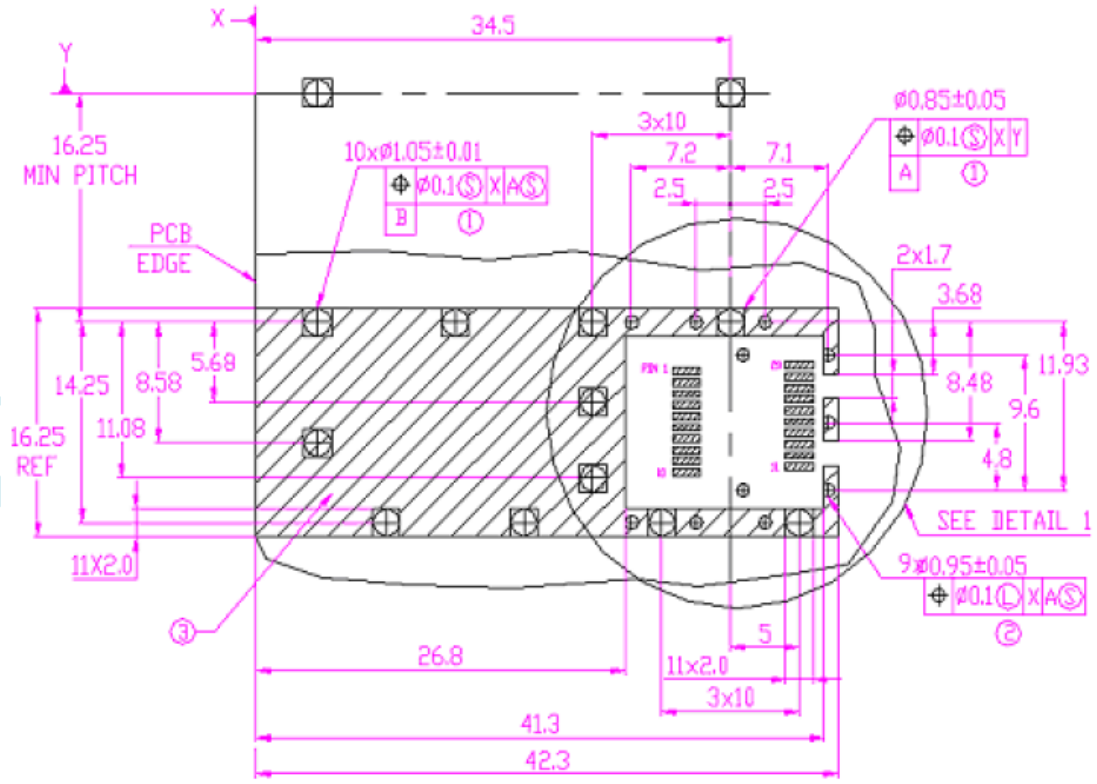
Dimensions

Dimensions are in millimeters. All dimensions are ±0.1mm unless otherwise specified. (unit:mm).



PCB layout Recommendation



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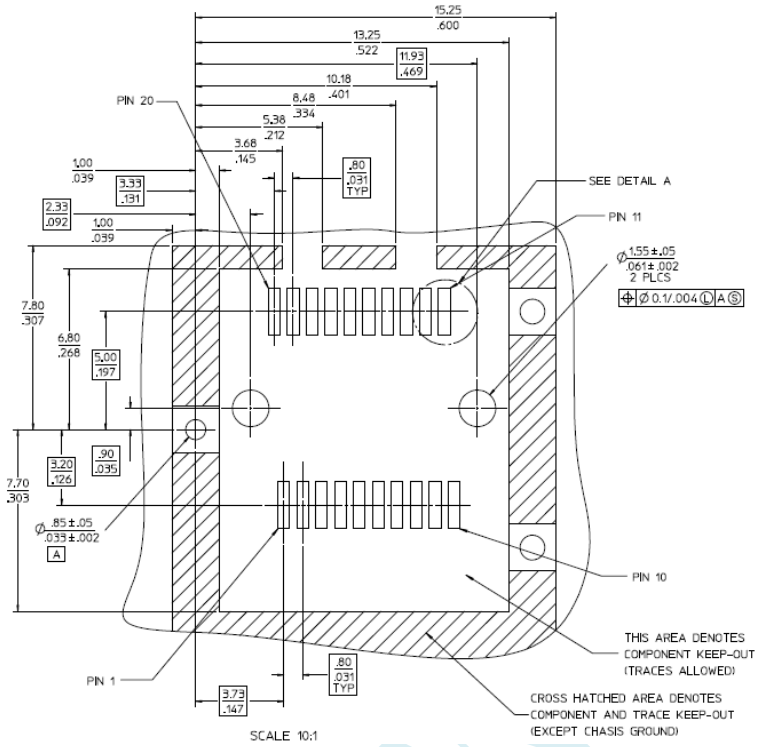

Ordering Information

Part No.	TX Power (dBm)	RX Sens(Max.) (dBm)	Supply Voltage (V)	Distance
NS(R)161603	-10 ~ -3	-18	+3.3	300m(850nm MMF)
NS(R)262613	-10 ~ -3	-18	+3.3	2km(SMF)
NS(R)362633	-10 ~ -3	-18	+3.3	10km(SMF)
NS(R)362643	-8 ~ 0	-20	+3.3	20km(SMF)
NS(R)562663	-5 ~ +3	-20	+3.3	40km(SMF)

NOTICE:This document contains preliminary information on product but not yet fully characterized. Wuhan Noah Science & Tech Co., Ltd. reserves the right to change the specification in any manner without notice.

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