

SNR-SFP-DXX-120

32dB Power Budget SFP 1G 120km Transceiver

SNR-SFP-DXX-120 Series

SFP Single-Mode for DWDM Application
Duplex SFP Transceiver
Digital Diagnostic Function
RoHS6 Compliant

Features

- ◆ Operating Data Rate up to 1.25Gbps
- ◆ Available in all C-Band Wavelengths on the 100GHz DWDM ITU Grid
- ◆ Single 3.3V Power Supply and TTL Logic Interface
- ◆ Hot-Pluggable SFP Footprint Duplex LC Connector Interface
- ◆ Compliant with Class 1 FDA and IEC60825-1 Laser Safety
- ◆ Compliant with SFP MSA
- ◆ Compliant with SFF-8472
- ◆ Operating Case Temperature:
Standard: 0°C to 70°C
Extended: -5°C to 70°C



Applications

- ◆ Amplified DWDM networks
- ◆ Ring topologies with fixed and reconfigurable OADMs
- ◆ Fast Ethernet, Giga Ethernet
- ◆ Fiber Channel

Ordering Information

Part No.	Data Rate	Laser	Power budget ^{*(note2)}	Interface	Temperature
SNR-SFP-DXX-120 ^{*(note1)} D	1.25GMbps	DWDM DFB	32dB	LC	Standard
SNR-SFP-DXX-120 ^{*(note1)} DI	1.25GMbps	DWDM DFB	32dB	LC	Extended

Note1: XX refers to DWDM Wavelength range as ITU-T specified, please refer the following table for detailed center wavelength information.

Note2: The power budget which is guaranteed.

XX- Channel refers to the following table:

Channel (XX)	Part NO.	Frequency (THz)	Center Wavelength (nm)
15	SNR-SFP-DXX15-120 SNR-SFP-DXX15-120	191.5	1565.50
16	SNR-SFP-DXX16-120 SNR-SFP-DXX16-120	191.6	1564.68
17	SNR-SFP-DXX17-120 SNR-SFP-DXX17-120	191.7	1563.86
18	SNR-SFP-DXX18-120 SNR-SFP-DXX18-120	191.8	1563.05
19	SNR-SFP-DXX19-120	191.9	1562.23

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	SNR-SFP-DXX19-120		
20	SNR-SFP-DXX20-120 SNR-SFP-DXX20-120	192.0	1561.42
21	SNR-SFP-DXX21-120 SNR-SFP-DXX21-120	192.1	1560.61
22	SNR-SFP-DXX22-120 SNR-SFP-DXX22-120	192.2	1559.79
23	SNR-SFP-DXX23-120 SNR-SFP-DXX23-120	192.3	1558.98
24	SNR-SFP-DXX24-120 SNR-SFP-DXX24-120	192.4	1558.17
25	SNR-SFP-DXX25-120 SNR-SFP-DXX25-120	192.5	1557.36
26	SNR-SFP-DXX26-120 SNR-SFP-DXX26-120	192.6	1556.55
27	SNR-SFP-DXX27-120 SNR-SFP-DXX27-120	192.7	1555.75
28	SNR-SFP-DXX28-120 SNR-SFP-DXX28-120	192.8	1554.94
29	SNR-SFP-DXX29-120 SNR-SFP-DXX29-120	192.9	1554.13
30	SNR-SFP-DXX30-120 SNR-SFP-DXX30-120	193.0	1553.33
31	SNR-SFP-DXX31-120 SNR-SFP-DXX31-120	193.1	1552.52
32	SNR-SFP-DXX32-120 SNR-SFP-DXX32-120	193.2	1551.72
33	SNR-SFP-DXX33-120 SNR-SFP-DXX33-120	193.3	1550.92
34	SNR-SFP-DXX34-120 SNR-SFP-DXX34-120	193.4	1550.12
35	SNR-SFP-DXX35-120 SNR-SFP-DXX35-120	193.5	1549.32
36	SNR-SFP-DXX36-120 SNR-SFP-DXX36-120	193.6	1548.51
37	SNR-SFP-DXX37-120 SNR-SFP-DXX37-120	193.7	1547.72
38	SNR-SFP-DXX38-120 SNR-SFP-DXX38-120	193.8	1546.92
39	SNR-SFP-DXX39-120 SNR-SFP-DXX39-120	193.9	1546.12
40	SNR-SFP-DXX40-120 SNR-SFP-DXX40-120	194.0	1545.32
41	SNR-SFP-DXX41-120 SNR-SFP-DXX41-120	194.1	1544.53
42	SNR-SFP-DXX42-120 SNR-SFP-DXX42-120	194.2	1543.73
43	SNR-SFP-DXX43-120 SNR-SFP-DXX43-120	194.3	1542.94
44	SNR-SFP-DXX44-120 SNR-SFP-DXX44-120	194.4	1542.14
45	SNR-SFP-DXX45-120 SNR-SFP-DXX45-120	194.5	1541.35
46	SNR-SFP-DXX46-120 SNR-SFP-DXX46-120	194.6	1540.56
47	SNR-SFP-DXX47-120 SNR-SFP-DXX47-120	194.7	1539.77

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48	SNR-SFP-DXX48-120 SNR-SFP-DXX48-120	194.8	1538.98
49	SNR-SFP-DXX49-120 SNR-SFP-DXX49-120	194.9	1538.19
50	SNR-SFP-DXX50-120 SNR-SFP-DXX50-120	195.0	1537.40
51	SNR-SFP-DXX51-120 SNR-SFP-DXX51-120	195.1	1536.61
52	SNR-SFP-DXX52-120 SNR-SFP-DXX52-120	195.2	1535.82
53	SNR-SFP-DXX53-120 SNR-SFP-DXX53-120	195.3	1535.04
54	SNR-SFP-DXX54-120 SNR-SFP-DXX54-120	195.4	1534.25
55	SNR-SFP-DXX55-120 SNR-SFP-DXX55-120	195.5	1533.47
56	SNR-SFP-DXX56-120 SNR-SFP-DXX56-120	195.6	1532.68
57	SNR-SFP-DXX57-120 SNR-SFP-DXX57-120	195.7	1531.90
58	SNR-SFP-DXX58-120 SNR-SFP-DXX58-120	195.8	1531.12
59	SNR-SFP-DXX59-120 SNR-SFP-DXX59-120	195.9	1530.33
60	SNR-SFP-DXX60-120 SNR-SFP-DXX60-120	196.0	1529.55
61	SNR-SFP-DXX61-120 SNR-SFP-DXX61-120	196.1	1528.77

*: X refers to the DWDM Power budget (32) , please contact SNR to confirm whether the wavelength is available.

Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883G Method 3015.7	Class 1C (>1000V)
Electrostatic Discharge to the Enclosure	EN 55024:1998+A1+A2 IEC-61000-4-2 GR-1089-CORE	Compliant with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022:2006 CISPR 22B :2006 VCCI Class B	Compliant with standards Noise frequency range: 30MHz to 6GHz. Good system EMI design practice required to achieve Class B margins. System margins are dependent on customer host board and chassis design.
Immunity	EN 55024:1998+A1+A2 IEC 61000-4-3	Compliant with standards. 1KHz sine-wave, 80% AM, from 80MHz to 1GHz. No effect on transmitter/receiver performance is detectable between these limits.

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Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1:2007 EN (IEC) 60825-2:2004+A1	CDRH compliant and Class I laser product. TüV Certificate No. 50135086
Component Recognition	UL and CUL EN60950-1:2006	UL file E317337 TüV Certificate No. 50135086 (CB scheme)
RoHS6	2002/95/EC 4.1&4.2 2005/747/EC 5&7&13	Compliant with standards ^{*note3}

Note3: For update of the equipments and strict control of raw materials, SNR has the ability to supply the customized products since Jan 1, 2007, which meet the requirements of RoHS6 (Restrictions on use of certain Hazardous Substances) of European Union.

In light of item 5 in RoHS exemption list of RoHS Directive 2002/95/EC, Item 5: Lead in glass of cathode ray tubes, electronic components and fluorescent tubes.

In light of item 13 in RoHS exemption list of RoHS Directive 2005/747/EC, Item13: Lead and cadmium in optical and filter glass. The three exemptions are being concerned for SNR's transceivers, because SNR's transceivers use glass, which may contain Pb, for components such as lenses, windows, isolators, and other electronic components.

Product Description

The SNR-SFP-DXX-120 series single mode transceiver is small form factor pluggable module for duplex optical data communications. This module is designed for single mode fiber and operates at a nominal DWDM wavelength from 1528.77nm to 1565.50nm as specified by the ITU-T. It is designed to deploy in the DWDM networking equipment in metropolitan access and core networks.

It is with the SFP 20-pin connector to allow hot plug capability. The transmitter section uses a DWDM multiple quantum well DFB laser and is a class 1 laser compliant according to International Safety Standard IEC-60825.

The SNR-SFP-DXX-120 series are designed to be compliant with SFF-8472 Multi-Source Agreement (MSA).

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T _S	-40	+85	°C
Operating Case Temperature	T _C	0	75	°C
Supply Voltage	V _{CC}	-0.5	3.6	V
Operating Relative Humidity		-	95	%

*Exceeding any one of these values may destroy the device permanently.

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	
Operating Case Temperature	T _A	SNR-SFP-DXX-120	0	-	+70	°C
		SNR-SFP-DXX-120	-5	-	+70	
Power Supply Voltage	V _{CC}	3.15	3.3	3.45	V	
Power Supply Current	I _{CC}	-	-	300	mA	
Date Rate				1.25G	bps	

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Performance Specifications - Electrical

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Transmitter						
LVPECL Inputs(Differential)	Vin	400		2000	mVpp	AC coupled inputs*(note4)
Input Impedance (Differential)	Zin	85	100	115	ohm	Rin > 100 kohm @ DC
TX_Dis	Disable	2		Vcc	V	
	Enable	0		0.8		
TX_FAULT	Fault	2		Vcc	V	
	Normal	0		0.8		
Receiver						
LVPECL Outputs (Differential)	Vout	370		2000	mVpp	AC coupled outputs*(note4)
Output Impedance (Differential)	Zout	85	100	115	ohm	
RX_LOS	LOS	2		Vcc	V	
	Normal	0		0.8	V	
MOD_DEF (0:2)	VoH	2.5			V	
	VoL	0		0.8	V	

Performance Specifications – Optical

(DWDM DFB and APD/TIA, 32dB Power Budget at Least) (T_{OP} = -5 to 70°C, V_{CC} = 3.15 to 3.45V)

Parameter	Symbol	Min.	Typical	Max.	Unit
Data Rate			1.25G		bps
Transmitter					
Center Wavelength	λ	1528		1566	nm
Spectral Width (-20dB)	$\Delta\lambda$			0.3	nm
Channel Spacing	Δf		100		GHz
Deviation From Central Frequency@EOL		-12		12	GHz
Side Mode Suppression Ratio	SMSR	30			dB
Average Output Power*(note5)	P _{out}	0		5	dBm
Average Launch Power (Tx: OFF)	P _{off}			-45	dBm
Extinction Ratio*(note6)	ER	8.2			dB
Rise/Fall Time(20%~80%)	tr/tf			160	ps
Output Optical Eye*(note6)	Compatible with IEEE 802.3*(note8)				
TX_Disable Assert Time	t _{off}			10	us
P _{out} @TX Disable Asserted	P _{out}			-45	dBm
Relative Intensity Noise	RIN			-135	dB/Hz
Receiver					
Center Wavelength	λ	1528		1566	nm
Receiver Sensitivity*(note7)	P _{min}			-32	dBm
Receiver Overload	P _{max}	-10			dBm
LOS De-Assert	LOSD			-33	dBm
LOS Assert	LOSA	-45			dBm
LOS Hysteresis*(note9)		0.5			dB

Note3: Output is coupled into a 9/125 μ m single-mode fiber.

Note4: Filtered, measured with a PRBS 2⁷-1 test pattern @1.25Gbps

Note5: LVPECL logic, internally AC coupled.

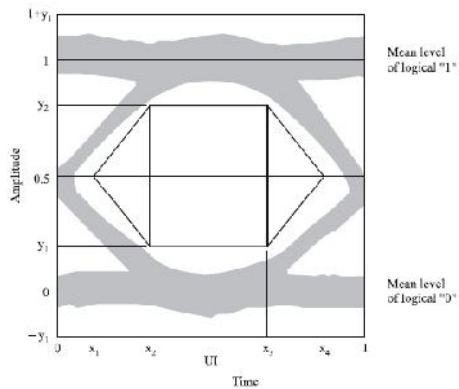
Note6: Minimum average optical power measured at BER less than 1E-12, with a 2⁷-1 PRBS and ER=9dB.

Note7: Measured with a PRBS 2⁷-1 test pattern @1.25Gbps, BER $\leq 1 \times 10^{-12}$.

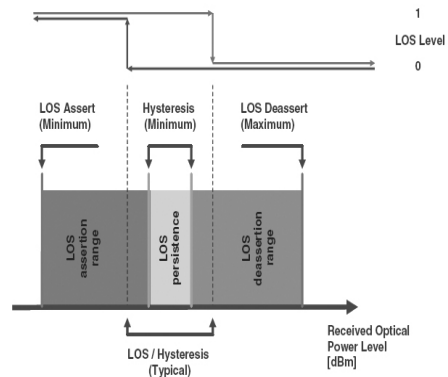
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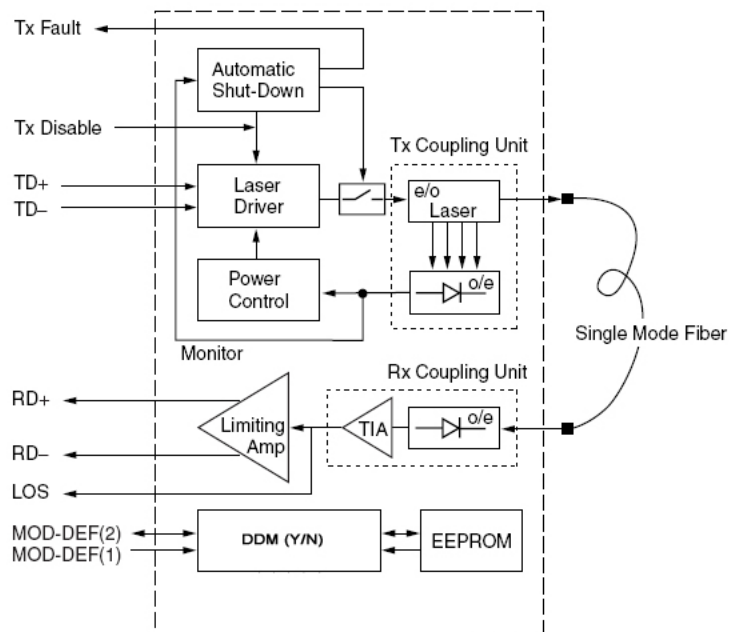
Note8: Eye Pattern Mask



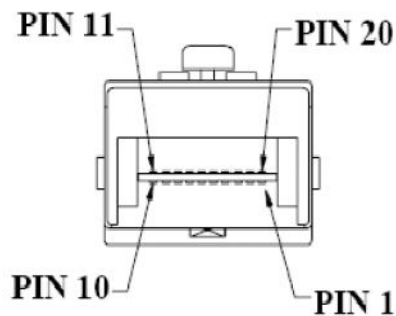
Note9: LOS Hysteresis



Functional Description of Transceiver

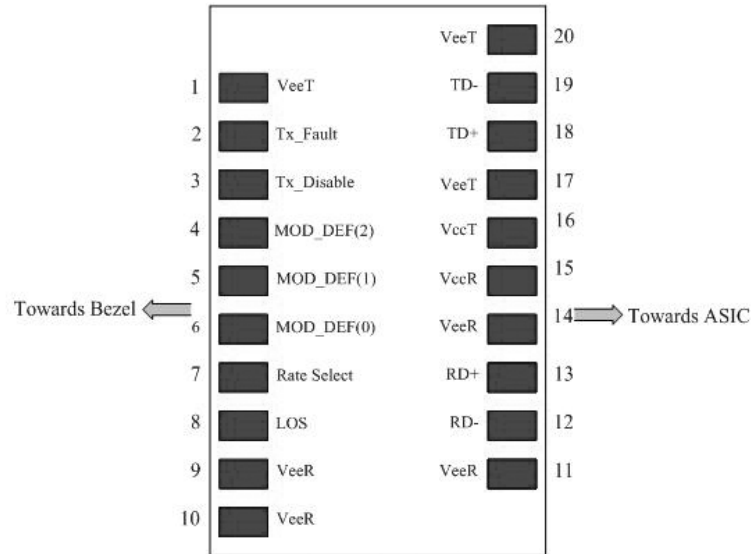


SFP Transceiver Electrical Pad Layout



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Pin Function Definitions

Pin Num.	Name	Function Description
1	VeeT	Transmitter Ground
2	TX Fault	Transmitter Fault Indication, open collector/drain output
3	TX Disable	Transmitter Disable
4	MOD-DEF2	Module Definition 2, Data line for Serial ID.
5	MOD-DEF1	Module Definition 1, Clock line for Serial ID.
6	MOD-DEF0	Module Definition 0, Grounded within the module.
7	Rate Select	Not Connect, Function not available
8	LOS	Loss of Signal, open collector/drain output
9	VeeR	Receiver Ground
10	VeeR	Receiver Ground
11	VeeR	Receiver Ground
12	RD-	Inv. Received Data Out
13	RD+	Received Data Out
14	VeeR	Receiver Ground
15	VccR	Receiver Power, 3.3 ± 5%
16	VccT	Transmitter Power, 3.3 ± 5%
17	VeeT	Transmitter Ground
18	TD+	Transmit Data In
19	TD-	Inv. Transmit Data In
20	VeeT	Transmitter Ground

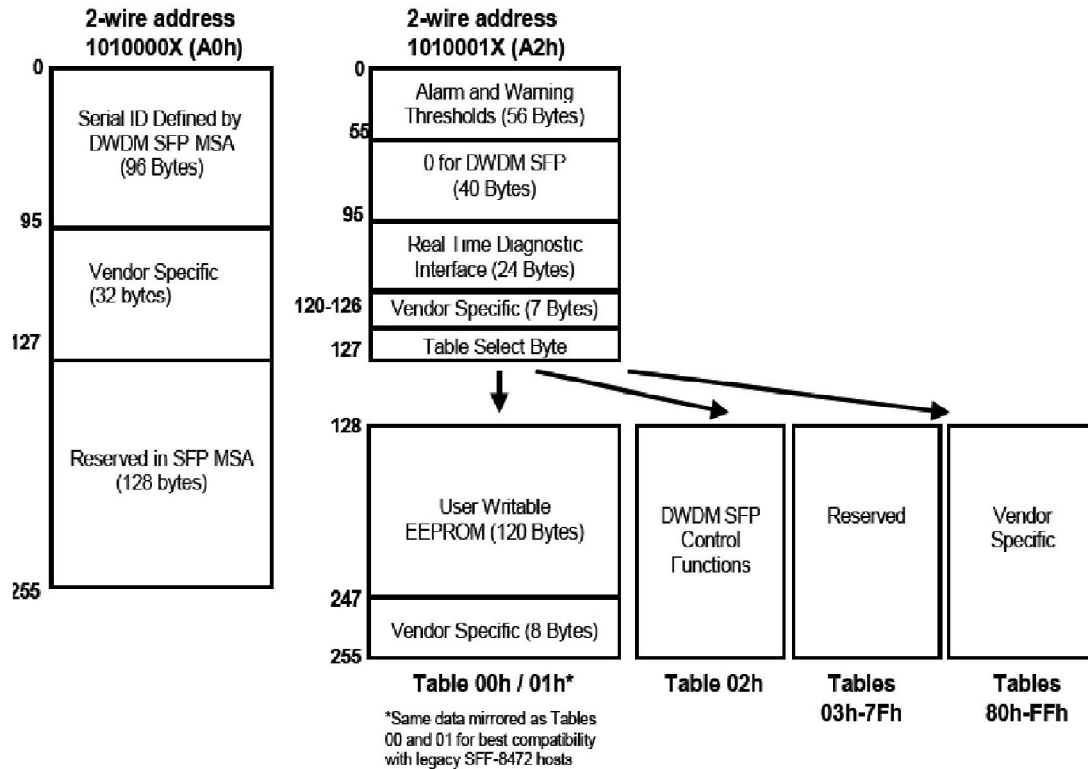
EEPROM

The serial interface uses the 2-wire serial CMOS EEPROM protocol defined for the ATMEL AT24C02/04 family of components. When the serial protocol is activated, the host generates the serial clock signal (SCL). The positive edge clocks data into those segments of the EEPROM that are not write protected within the SFP transceiver. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA) 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.

The Module provides diagnostic information about the present operating conditions. The transceiver generates this diagnostic data by digitization of internal analog signals. Calibration and alarm/warning threshold data is written during device manufacture. Received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring all are implemented. If the module is defined as external calibrated, the diagnostic data are raw A/D values and must be converted to real world units using calibration constants stored in EEPROM locations 56 – 95 at wire serial bus address A2H. The digital diagnostic memory map specific data field define as following .For detail EEPROM information, please refer to the related document of SFF 8472 Rev 9.3.

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EEPROM Serial ID Memory Contents

Accessing Serial ID Memory uses the 2 wire address 1010000X(A0H). Memory Contents of Serial ID are shown in Table 1.

Table 1 Serial ID Memory Contents

Addr.	Size(bytes)	Name of field	Vaule(Hex)	Description
0	1	Identifier	0B	DWDM SFP
1	1	Ext. Identifier	XX	
2	1	Connector	07	LC connector
3-10	8	Transceiver Codes	00	Reserved
			00	-
			00	-
			XX	
			XX	
			XX	
			01	Single mode
			XX	
11	1	Encoding	XX	
12	1	BR, Nominal	0D	1.25Gbps
13	1	Reserved	00	-
14	1	Length (9μm)km	XX	
15	1	Length(9μm)100m	FF	
16	1	Length (50μm) 10m	00	
17	1	Length(62.5μm)10m	00	
18	1	Length (Copper)	00	Not compliant
19	1	Reserved	00	
20~35	16	Vendor Name	XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX ^(note11)	Vendor name

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36	1	Implemented Optional DWDM Features	00	-
37-39	3	Vendor OUI	00 00 00	-
40-55	16	Vendor PN	XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX ^(note11)	PN
56-59	4	Vendor Rev	XX XX XX XX ^(note11)	
60-62	3	Wavelength	XX	Laser Wavelength
63	1	CC-BASE	XX	CC for Base ID fields implemented (addresses 0 to62)
64~65	2	Options	00	Reserved
			1A	1.TX_DISABLE is implemented and disables the serial output; 2.TX_FAULT signal implemented; 3.Loss of Signal implemented
66	1	BR, max	00	-
67	1	BR, max	00	-
68~83	16	Vendor SN	XX	Serial number of Transceiver (ASCII)
84~89	6	Date code	XX	The vendor's date code (ASCII)
90~91	2	Vendor specific lot code	XX XX	-
92	1	Diagnostic Monitoring Type	XX	1. Digital diagnostic monitoring implemented 2.Internally/Externally Calibrated; 3.Received power measurement type is Average Power
93	1	Enhanced Options	F0	1.Optional Alarm/warning flags implemented for all monitored quantities 2. Optional Soft TX_DISABLE control and monitoring implemented 3. Optional Soft TX_FAULT monitoring Implemented 4. Optional Soft RX_LOS monitoring Implemented
94	1	SFF-8472 Compliance	01	Includes functionality described in Rev 9.3 of SFF- 8472.
95	1	CC_EXT	XX	CC for the extended ID Fields (addresses 64 to 94) implemented.
96~127	32	Vendor Specific	XX	Read only memory
128-	128	Reserved	Read only	

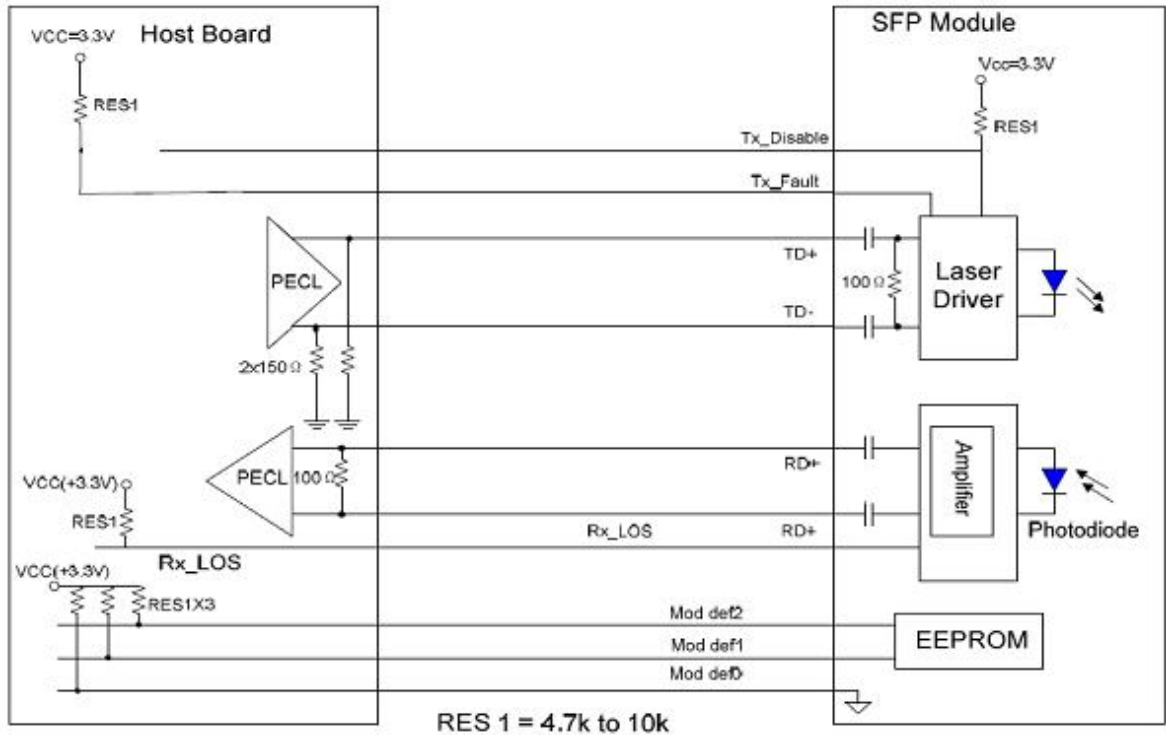
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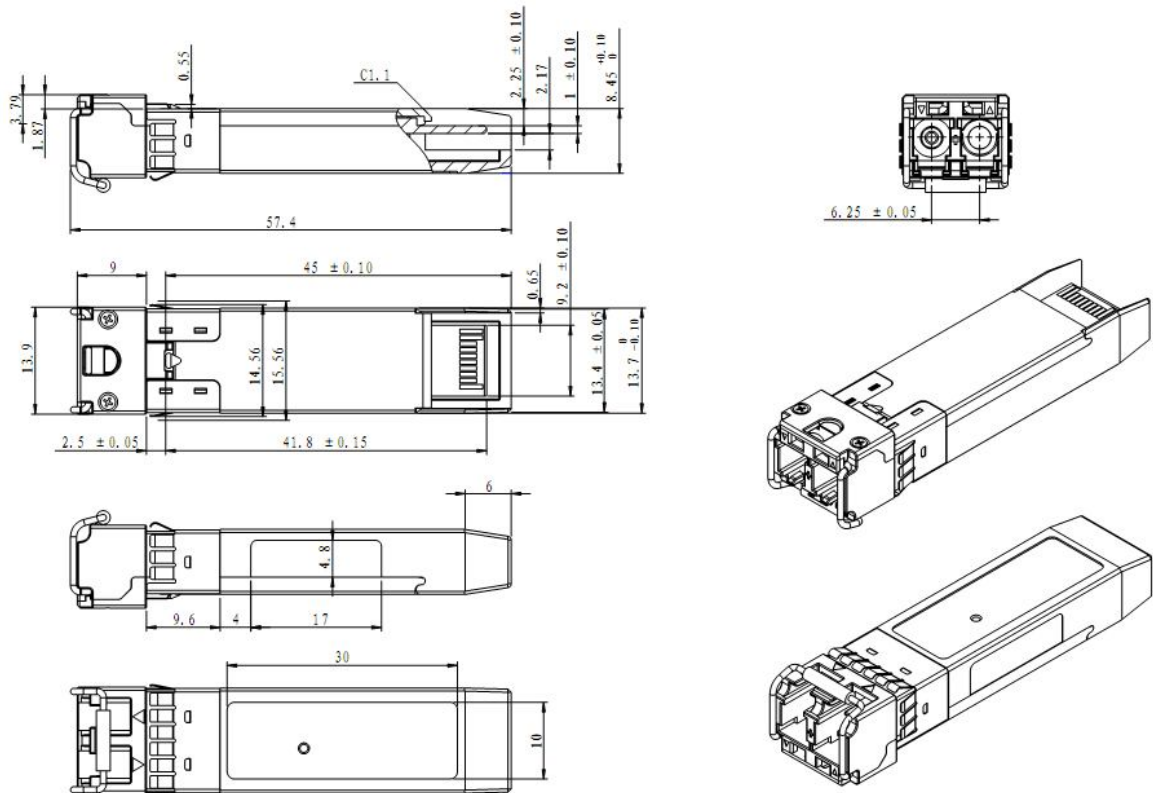
255			
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Note10: The "XX" byte should be filled in according to practical case. For more information, please refer to the related document of SFP Multi-Source Agreement (MSA).

Recommend Circuit Schematic



Mechanical Specifications



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GUARANTEE:



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