SNS SFP-MR-35IR1

Multi-Rate 155Mbps~2.67Gbps SFP Single Fiber Bidirectional 20 km SFP Transceivers

Highlights

- SFP MSA transceiver
- Multi-Rate 155Mbps~2.67Gbps
- Protocols:
  - 1 Gbps Ethernet
  - SDH STM-16
  - SONET OC-48
- Single-mode fiber
- Single fiber, bi-directional
- 1310nm DFB laser and PIN photodetector
- 0 to 20 km
- Simplex LC or SC connector
- Digital Diagnostics
- Hot-swap
- Industrial temperature models available

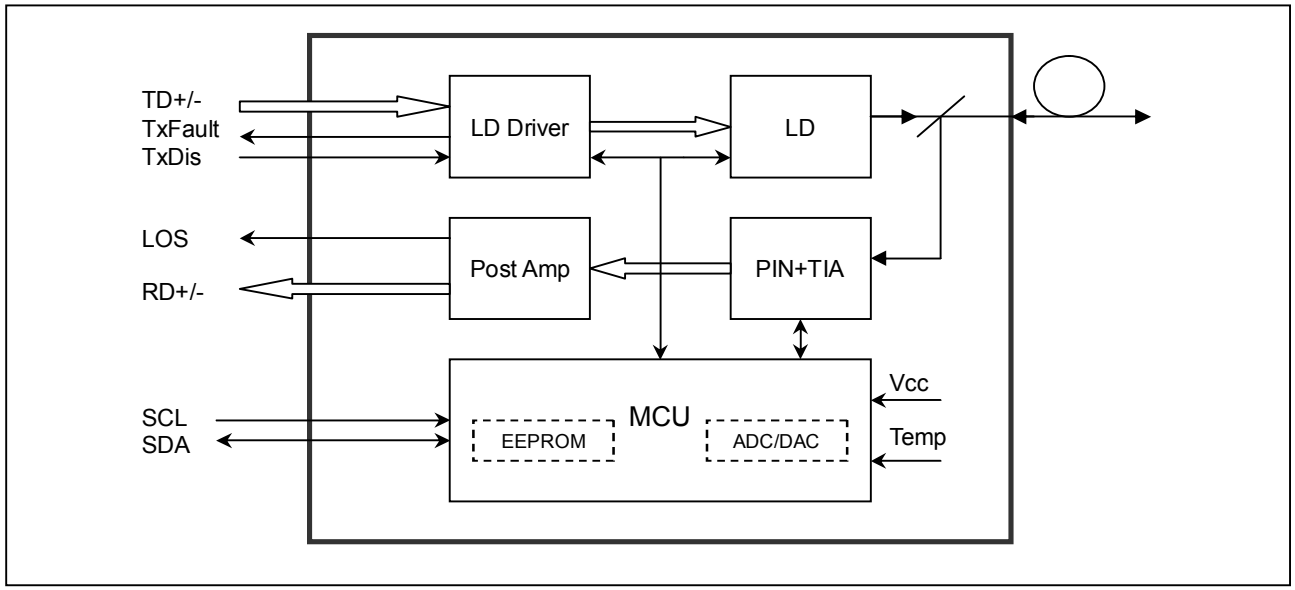
Overview

Optical SNS SFP is a high performance transceiver compliant with 1G Small Form-Factor Pluggable (SFP) Multi-Source Agreement (MSA), supporting Multi-Rate 155Mbps~2.67Gbps and transmission distance up to 20km transmission distance with SMF. The transceiver module comprises a transmitter with 1310nm DFB laser and PIN photodiode integrated with a trans-impedance preamplifier (TIA) and MCU control unit. Wide temperature range of 0°C to +70°C (Commercial) or -40°C to +85°C (Industrial) and offers optimum heat dissipation and excellent electromagnetic shielding thus enabling high port densities for 1GbE systems.

Specifications

Data Rates:	155Mbps~2.67Gbps
Wavelength Tx	1310 nm
Tx Power	-5 ~ 0 dBm
Tx Disable	Yes
Wavelength Range	1260 - 1360 nm
Rx Sensitivity	-20 ~ -18.0 dBm
Rx Overload	-3 dBm
Operating Temperature Range	0°C to +70°C (Commercial) -40°C to +85°C (Industrial)
Power Consumption	< 1.1 Watts

Module Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.5	4.5	V
Storage Temperature	Ts	-40	+85	°C
Operating Humidity	-	5	85	%

Recommended Operating Conditions

Parameter		Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Commercial	Tc	0		+70	°C
	Industrial		-40		+85	°C
Power Supply Voltage		Vcc	3.13	3.3	3.47	V
Power Supply Current		Icc			300	mA
Data Rate			155		2670	Mbps

Optical and Electrical Characteristics

Parameter		Symbol	Min	Typical	Max	Unit	Notes
Transmitter							
Centre Wavelength		λc	1260	1310	1360	nm	
Spectral Width (-20dB)		Δλ			1	nm	
Side Mode Suppression Ratio		SMSR	30			dB	
Average Output Power		Pout	-5		0	dBm	1
Extinction Ratio		ER	9			dB	
Optical Rise/Fall Time (20%~80%)		t_r/t_f			0.16	ns	
Data Input Swing Differential		V_{IN}	400		1800	mV	2
Input Differential Impedance		Z_{IN}	90	100	110	Ω	
TX Disable	Disable		2.0		Vcc	V	
	Enable		0		0.8	V	
TX Fault	Fault		2.0		Vcc	V	
	Normal		0		0.8	V	
Receiver							
Centre Wavelength		λc	1480		1580	nm	
Receiver Sensitivity				-20	-18	dBm	3
Receiver Overload			-3			dBm	3
LOS De-Assert		LOS_D			-23	dBm	
LOS Assert		LOS_A	-30			dBm	
LOS Hysteresis			1		4	dB	
Data Output Swing Differential		Vout	400		1800	mV	4
LOS		High	2.0		Vcc	V	
		Low			0.8	V	

Notes:
1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS 2^{23}-1 test pattern @2670Mbps, BER ≤1×10^{-12}.
4. Internally AC-coupled.

Timing and Electrical

Parameter	Symbol	Min	Typical	Max	Unit
Tx Disable Negate Time	t_on			1	ms
Tx Disable Assert Time	t_off			10	μs
Time To Initialize, including Reset of Tx Fault	t_init			300	ms
Tx Fault Assert Time	t_fault			100	μs
Tx Disable To Reset	t_reset	10			μs
LOS Assert Time	t_loss_on			100	μs
LOS De-assert Time	t_loss_off			100	μs
Serial ID Clock Rate	f_serial_clock			400	KHz
MOD_DEF (0:2)-High	V_H	2		Vcc	V
MOD_DEF (0:2)-Low	V_L			0.8	V

Diagnostics Specification

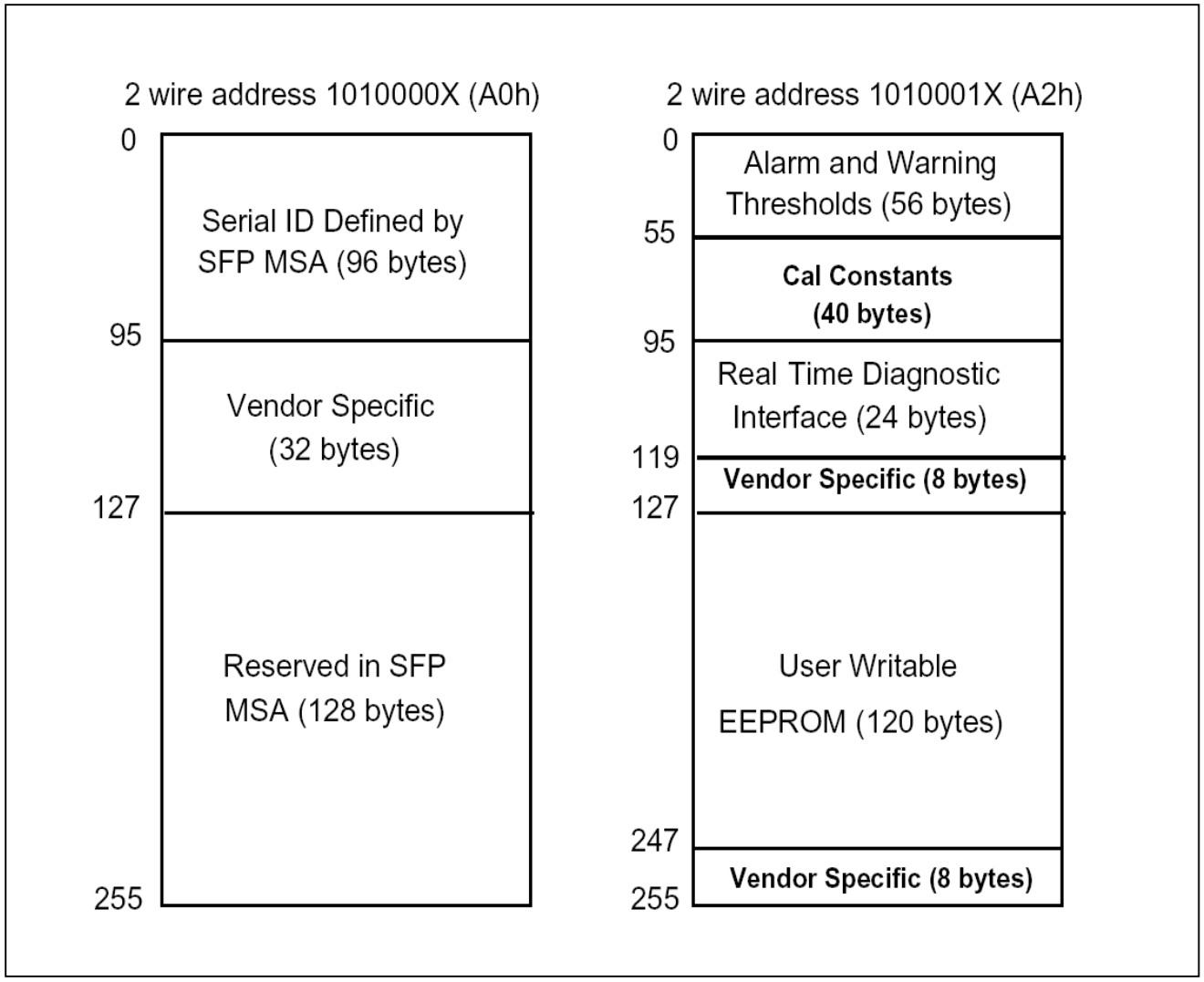
Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	°C	±3°C	Internal / External
	-40 to +85			
Voltage	3.0 to 3.6	V	±3%	Internal / External
Bias Current	0 to 100	mA	±10%	Internal / External
TX Power	-5 to 0	dBm	±3dB	Internal / External
RX Power	-18 to0	dBm	±3dB	Internal / External

Digital Diagnostic Memory Map

The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

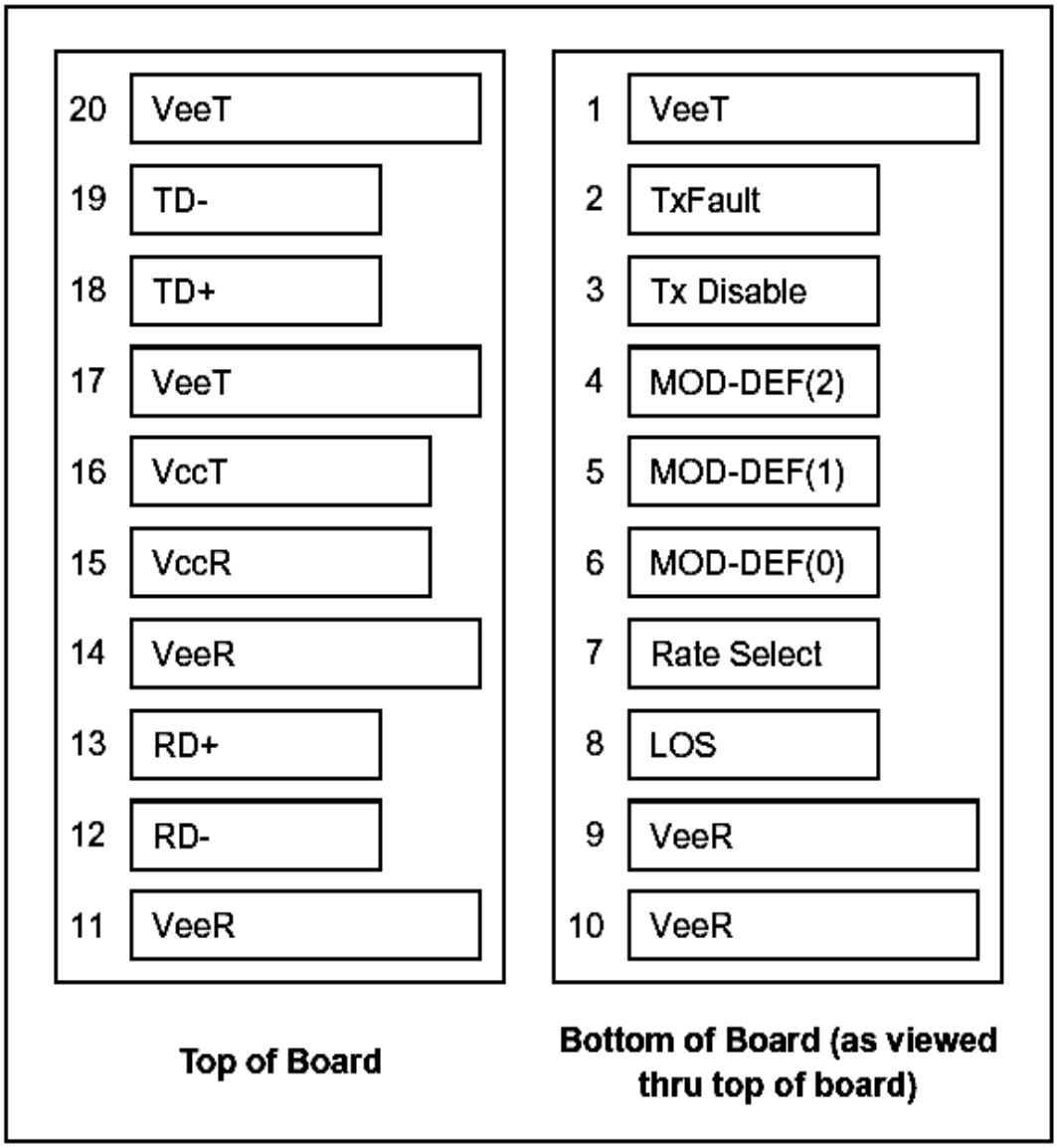
The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.

The digital diagnostic memory map specific data field defines as following.



Pin Definitions

Pin Diagram



Pin Descriptions

Pin	Signal Name	Description	Plug Seq.	Notes
1	V_{EET}	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX DISABLE	Transmitter Disable	3	Note 2
4	MOD_DEF(2)	SDA Serial Data Signal	3	Note 3
5	MOD_DEF(1)	SCL Serial Clock Signal	3	Note 3
6	MOD_DEF(0)	TTL Low	3	Note 3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note 4
9	V_{EER}	Receiver ground	1	
10	V_{EER}	Receiver ground	1	
11	V_{EER}	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	V_{EER}	Receiver ground	1	
15	V_{CCR}	Receiver Power Supply	2	
16	V_{CCT}	Transmitter Power Supply	2	
17	V_{EET}	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	V_{EET}	Transmitter Ground	1	

Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

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 to 0.8V):	Transmitter on
(>0.8V, < 2.0V):	Undefined
High (2.0 to 3.465V):	Transmitter Disabled
Open:	Transmitter Disabled

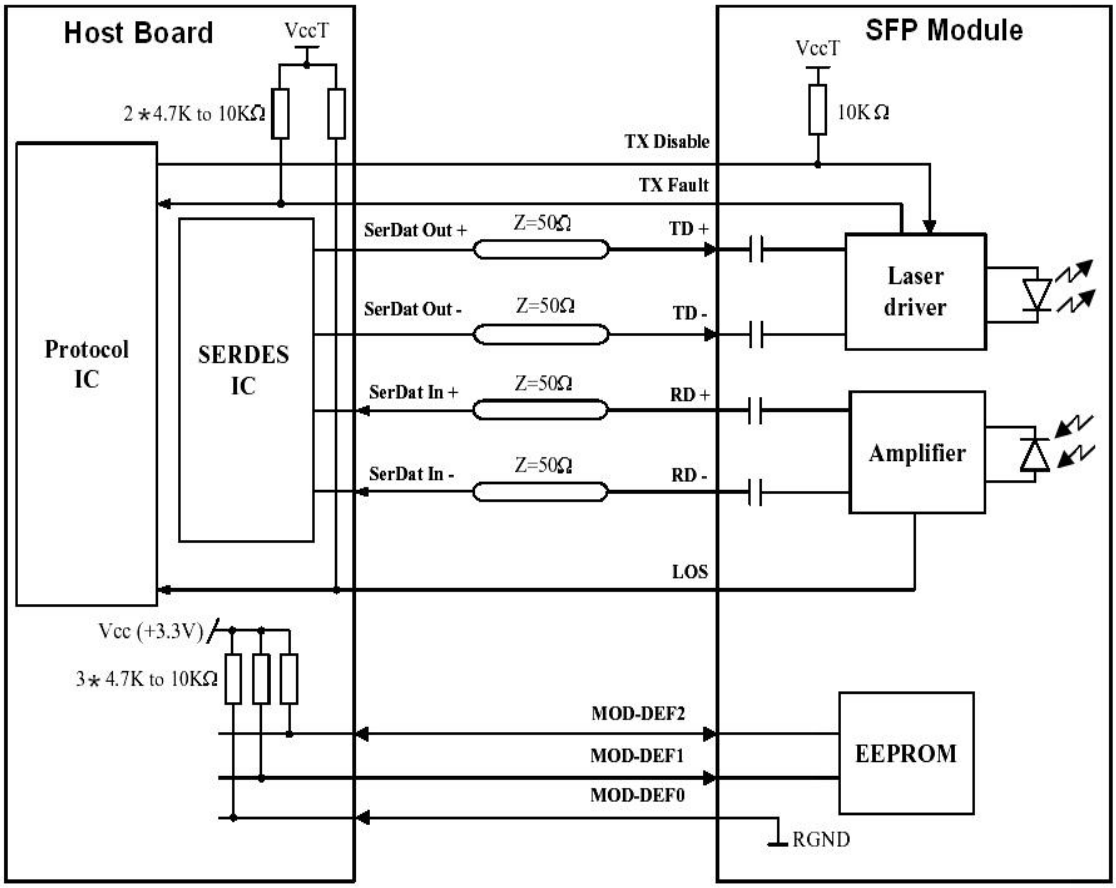
3) Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7k~10kΩ resistor on the host board. The pull-up voltage shall be VccT or VccR.
Mod-Def 0 is grounded by the module to indicate that the module is present
Mod-Def 1 is the clock line of two wire serial interface 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. Pull up voltage between 2.0V and Vcc+0.3V. Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low state, the output will be pulled to less than 0.8V.

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

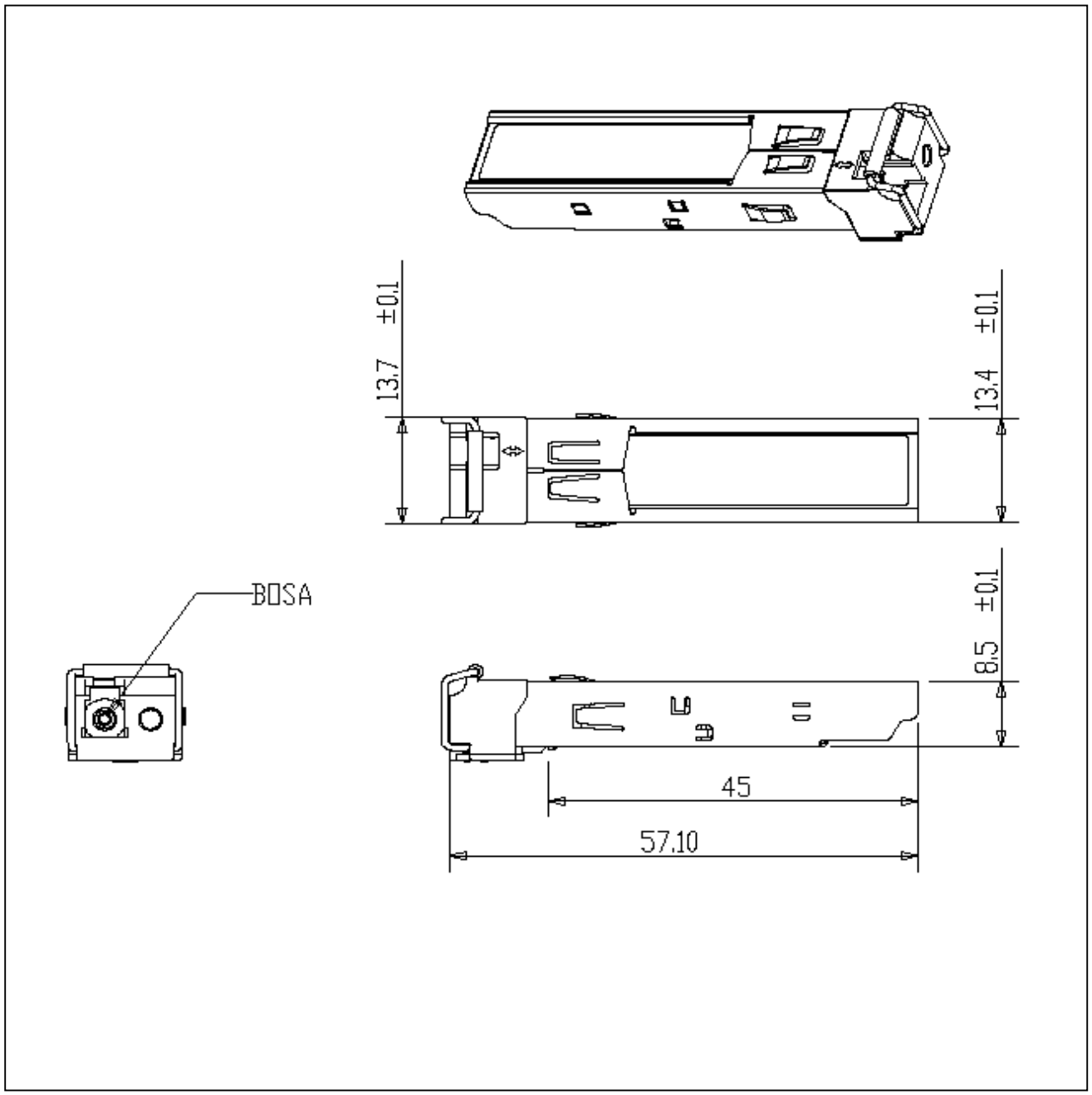
6) TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

Recommended Interface Circuit

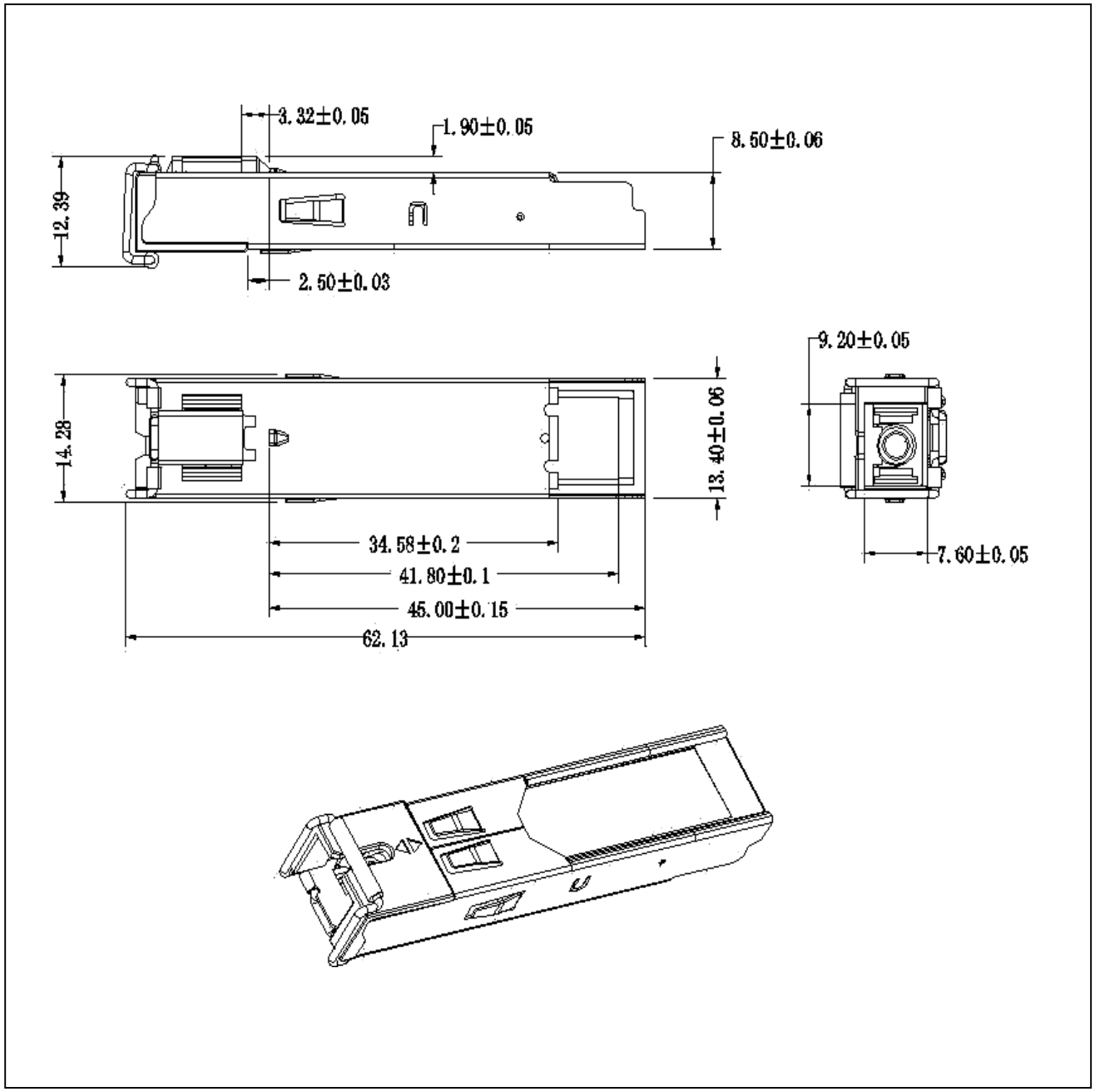


Mechanical Dimensions

A. LC



B. SC


3.32±0.05
1.90±0.05
8.50±0.06
12.39
2.50±0.03
14.28
13.40±0.06
9.20±0.05
34.58±0.2
41.80±0.1
45.00±0.15
62.13
7.60±0.05

Regulatory Compliance

SFP-BIDI transceiver is designed to be Class I Laser safety compliant and is certified per the following standards:

Feature	Agency	Standard	Certificate / Comments
Laser Safety	FDA	CDRH 21 CFR 1040 annd Laser Notice No. 50	1120289-000
Product Safety	BST	EN 60825-1：2007 EN 60825-2：2004 EN 60950-1：2006	BT0905142009
Environmental protection	SGS	RoHS Directive 2002/95/EC	GZ0902008347/CHEM
EMC	WALTEK	EN 55022:2006+A1:2007 EN 55024:1998+A1+A2:2003 -	WT10093768-D-E-E

Ordering information

Part Number	Product Description
SNS SFP-MR-35IR1SC	1310nm, 155M~2.67Gbps, SC,20km, 0°C~+70°C, WithDigital Diagnostic Monitoring
SNS SFP-MR-53IR1SC	1550nm, 155M~2.67Gbps,SC, 20km, 0°C~+70°C,WithDigital Diagnostic Monitoring
SNS SFP-MR-35IR1SCTH	1310nm, 155M~2.67Gbps, SC,20km, -40°C~+85°C,WithDigital Diagnostic Monitoring
SNS SFP-MR-53IR1SCTH	1550nm, 155M~2.67Gbps, SC,20km, -40°C~+85°C,WithDigital Diagnostic Monitoring
SNS SFP-MR-35IR1	1310nm, 155M~2.67Gbps, LC,20km, 0°C~+70°C, WithDigital Diagnostic Monitoring
SNS SFP-MR-53IR1	1550nm, 155M~2.67Gbps, LC,20km, 0°C~+70°C, With Digital Diagnostic Monitoring
SNS SFP-MR-35IR1TH	1310nm, 155M~2.67Gbps, LC,20km, -40°C~+85°C, With Digital Diagnostic Monitoring
SNS SFP-MR-53IR1TH	1550nm, 155M~2.67Gbps, LC,20km, -40°C~+85°C, With Digital Diagnostic Monitoring

References

1. Small Form Factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA),September 2000.
2. Telcordia GR-253and ITU-T G.957 Specifications.

Important Notice

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