

SNR-SFP-LX-100

**Single-Mode 1550nm up to 2.67Gbps
Duplex SFP Transceiver
RoHS6 Compliant**

Features

- ◆ Operating Data Rate up to 2.67Gbps
- ◆ 1550nm DFB Laser Transmitter
- ◆ 100km with 9/125 μm SMF
- ◆ Single 3.3V Power Supply and TTL Logic Interface
- ◆ Hot-Pluggable SFP Footprint Duplex LC Connector Interface
- ◆ Class 1 FDA and IEC60825-1 Laser Safety Compliant
- ◆ Operating Case Temperature
Standard: 0°C~70°C
Industrial: -40°C~+85°C
- ◆ Compliant with SFP MSA Specification
- ◆ Compliant with SFF-8472



Applications

- ◆ STM1/4/16 Optical Interface
- ◆ OUT-1 Optical Interface
- ◆ ATM Switches and Routers
- ◆ Fiber Channel / 2×Fiber Channel
- ◆ Other Optical Links

Ordering Information

Part No.	Data Rate	Fiber	Distance	Interface	Temperature	DDMI
SNR-SFP-LX-100	2.67Gbps	SMF	100km	LC	Standard	YES
SNR-SFP-LX-100-I	2.67Gbps	SMF	100km	LC	Industrial	YES

Note1: Standard version

Regulatory Compliance*Note2

Product Certificate	Certificate Number	Applicable Standard
TUV	R50135086	EN 60950-1:2006+A11+A1+A12+A2
		EN 60825-1:2014
		EN 60825-2:2004+A1+A2
UL	E317337	UL 60950-1
		CSA C22.2 No. 60950-1-07
EMC CE	AE 50285865 0001	EN 55022:2010
		EN 55024:2010
FCC	WTF14F0514417E	47 CFR PART 15 OCT., 2013
FDA	/	CDRH 1040.10
ROHS	/	2011/65/EU

Note2: The above certificate number updated to June 2014, because some certificate will be updated every year, such as FDA and ROHS. For the latest certification information, please check with LLC NAG.

Product Description

The SNR-SFP-LX-100 series single mode transceiver is small form factor pluggable module for duplex serial optical data communication application such as SONET OC-48 / SDH STM-16, Gigabit Ethernet 1000BASE-LX and Fiber Channel 1x/2x SM-LC-L FC-PI. It is with the SFP 20-pin connector to allow hot plug capability. This module is designed for single mode fiber and operates at a nominal wavelength of 1550nm.

The transmitter section uses a multiple quantum well 1550nm DFB laser and is a class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses an integrated InGaAs Avalanche photo detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

The SNR-SFP-LX-100 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
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 _c	SNR-SFP-LX-100	0	-	+70	°C
		SNR-SFP-LX-100-I	-40	-	+85	°C
Power Supply Voltage		V _{CC}	3.15	3.3	3.45	V
Power Supply Current		I _{CC}	-	-	300	mA
Date Rate	OC-48/STM-16 FEC			2.67		Gbps
	OC-48/STM-16		-	2.488	-	
	2FC		-	2.125	-	
	GBE		-	1.25	-	
	FC		-	1.063	-	

Performance Specifications - Electrical

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Transmitter						
CML Inputs(Differential)	V _{in}	400	-	1600	mVpp	AC coupled inputs
Input Impedance (Differential)	Z _{in}	85	100	115	ohm	R _{in} > 100 kohm @ DC
TX_Dis	Disable	2	-	V _{CC}	V	
	Enable	0	-	0.8		
TX_FAULT	Fault	2	-	V _{CC} +0.3	V	
	Normal	0	-	0.5		
Receiver						
CML Outputs (Differential)	V _{out}	400	800	1200	mVpp	AC coupled outputs*(note4)
Output Impedance (Differential)	Z _{out}	85	100	115	ohm	
RX_LOS	LOS	2	-	V _{CC} +0.3	V	
	Normal	0	-	0.8	V	
MOD_DEF (0:2)	VoH	2.5	-	-	V	With Serial ID
	VoL	0	-	0.5	V	

Performance Specifications - Optical (1550nm DFB and APD, 100km)

Parameter	Symbol	Min.	Typical	Max.	Unit	
9µm Core Diameter SMF	L	-	100	-	km	
Data Rate		1	2.488	2.67	Gbps	
Transmitter						
Center Wavelength	λ_c	1500	1550	1600	nm	
Spectral Width (-20dB)	$\Delta\lambda$	-	-	1	nm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Average Output Power*(note5)	P _{out}	0	-	5	dBm	
Extinction Ratio*(note6)	ER	8.2	-	-	dB	
Rise/Fall Time(20%~80%)	tr/tf	-	-	150	ps	
Output Optical Eye*(note6)	Compliant with ITU-T G.957*(note9)					
TX_Disable Assert Time	t _{off}	-	-	10	us	
P _{out} @TX Disable Asserted	P _{out}	-	-	-45	dBm	
Receiver						
Center Wavelength	λ	1260	-	1600	nm	
Receiver Sensitivity*(note7)	Multirate*(note8)	P _{min}	-	-	-29	dBm
Receiver Overload	P _{max}	-9	-	-	dBm	
Optical Path Penalty		-	-	1	dB	
Reflection		-	-	-27	dB	
LOS De-Assert	LOSD	-	-	-30	dBm	
LOS Assert	LOSA	-42	-	-	dBm	
LOS Hysteresis*(note10)		0.5	-	-	dB	

Note4: CML logic, internally AC coupled.

Note5: Output is coupled into a 9/125µm single-mode fiber.

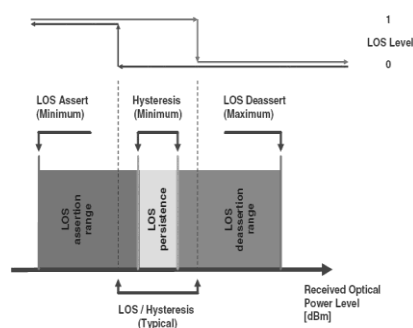
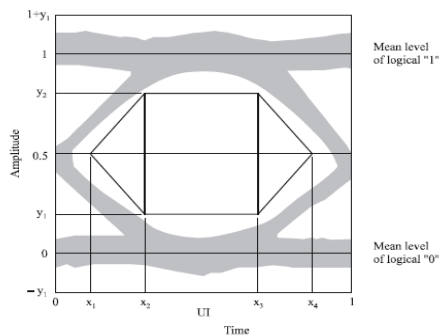
Note6: Filtered, measured with a PRBS 2²³-1 test pattern @2.488Gbps

Note7: EOL means end of life. Minimum average optical power measured at BER less than 1E-12, with a 2²³-1 PRBS and ER=9dB.

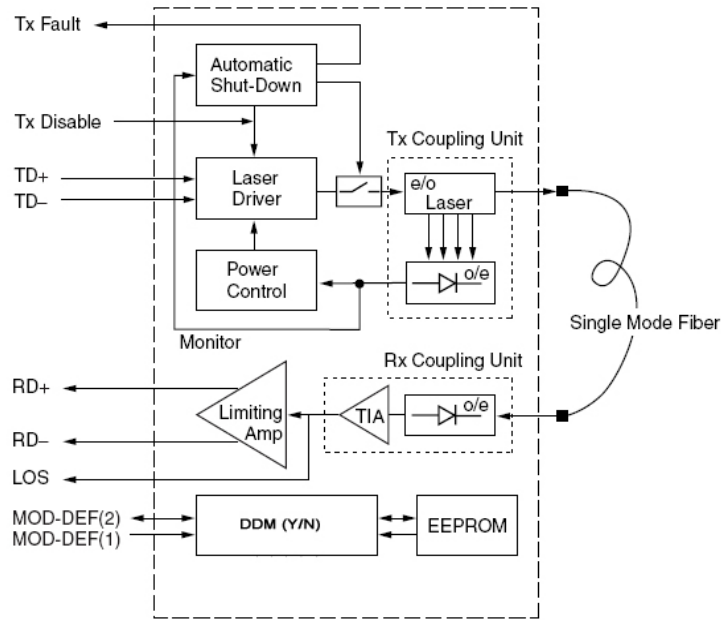
Note8: Multirate:2.67Gb/s/OC-48/2X FC/1X FC/OC-12/OC-03.

Note9: Eye Pattern Mask

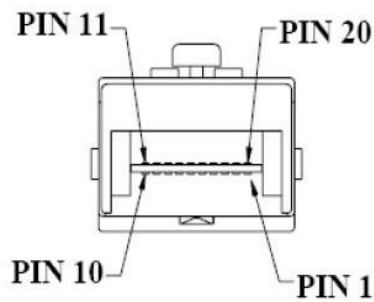
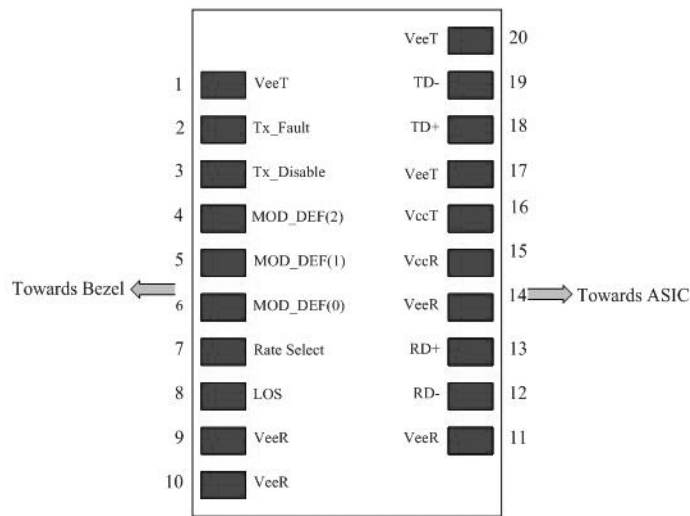
Note10: LOS Hysteresis



Functional Description of Transceiver



SFP Transceiver Electrical Pad Layout



Pin Function Definitions

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

Notes:

1) TX Fault is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor on the host board. Pull up voltage between 2.0V and VccT, R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 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 4.7 – 10 KΩ resistor. Its states are:

Low (0 – 0.8V): Transmitter on

(>0.8, < 2.0V): Undefined

High (2.0 – 3.465V): Transmitter Disabled

Open: Transmitter Disabled

3) Modulation Absent, connected to VEET or VEER in the module.

4) LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor. Pull up voltage between 2.0V and VccT, R+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.

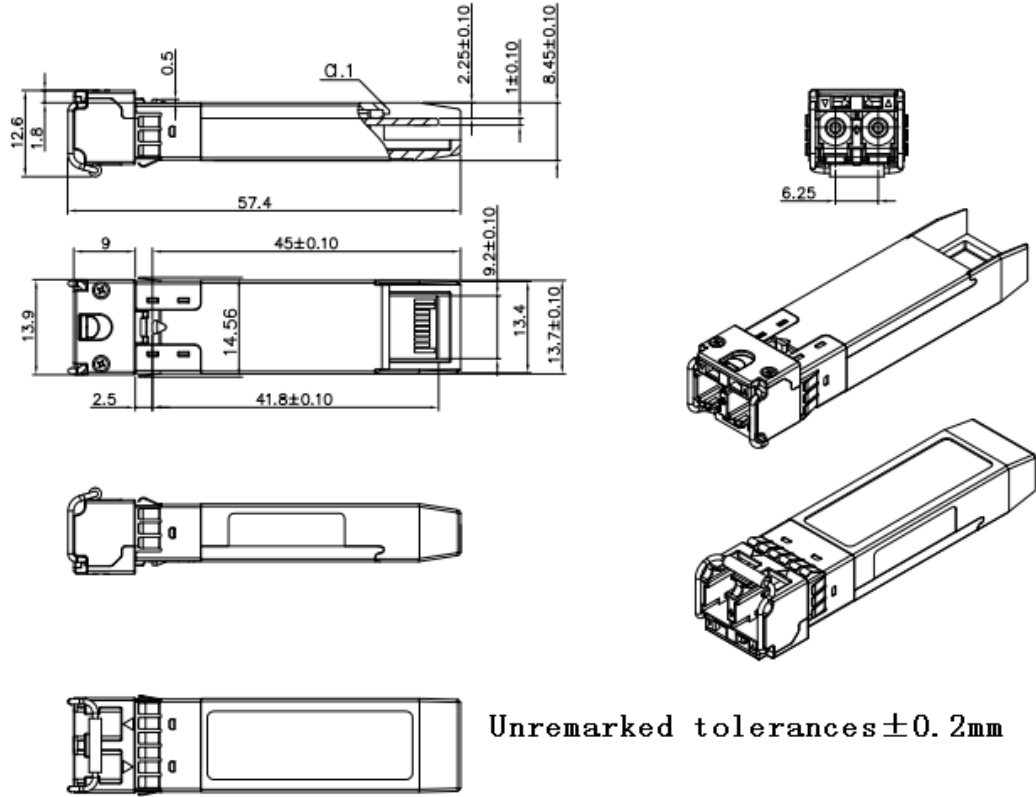
- 5) VeeR and VeeT may be internally connected within the SFP module.
- 6) RD-/+ : These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the hostboard.
- 7) VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±5% at the SFP connector pin. Maximum supply current is 300mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1 ohm should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot plugging of the SFP transceiver module will result in an inrush current of no more than 30mA greater than the steady state value. VccR and VccT may be internally connected within the SFP transceiver module.
- 8) TD-/+ : These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.

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 writing 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.

Mechanical Specifications



Laser Emission Data

Wavelength	1550nm
Total output power (as defined by FDA: 7mm aperture at 20cm distance)	<0.79mW
Total output power (as defined by IEC: 7mm aperture at 10cm distance)	<10mW
Beam divergence	12.5°

Laser Emission



Guarantee:



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