

SNR-SFP28-LR-10-I

**CWDM SFP28 Single-Mode, With DDM and Dual CDR
Duplex SFP28 Transceiver
RoHS6 Compliant**



Features

- ◆ Operating data rate support 24.33G and 25.78Gbps
- ◆ 4-Wavelength from 1271nm to 1331nm, with step 20nm
- ◆ Up to 10km over SMF
- ◆ Single 3.3V Power supply
- ◆ Power Dissipation < 1.2W(Standard)
- ◆ Power Dissipation < 1.5W(Industrial)(TBD)
- ◆ Duplex LC Connector Interface, Hot Pluggable
- ◆ Built-in dual CDR
- ◆ Compliant with Specification SFF-8402
- ◆ Build-in digital diagnostic functions
- ◆ Operating Case Temperature:
Standard: 0°C ~+70°C
Industrial: -40°C ~+85°C

Applications

- ◆ CPRI Option 10
- ◆ 25GbE

Ordering information

Part No.	Data Rate	Laser	Fiber	Distance	CDR	Interface
SNR-SFP28-LR-10 ^{*Note 1}	Up to 25.78Gbps	CWDM Uncooled DFB	SMF	10km	YES	LC
SNR-SFP28-LR-10-I ^{*Note 2}	Up to 25.78Gbps	CWDM Cooled DFB	SMF	10km	YES	LC

Note1: Standard version. X refers to CWDM Wavelength range 1271nm to 1331nm, X=A~D, denotes 1271nm to 1331nm. Note2: Industrial version. X refers to CWDM Wavelength range 1271nm to 1331nm, X=A~D, denotes 1271nm to 1331nm.

*The product image only for reference purpose.

CWDM* Wavelength

Band	Nomenclature	Wavelength(nm)		
		Min.	Typ.	Max.
O-band Original	A	1264.5	1271	1277.5
	B	1284.5	1291	1297.5
	C	1304.5	1311	1317.5
	D	1324.5	1331	1337.5

CWDM*: 4 Wavelengths from 1271nm to 1331nm, each step 20nm. Please contact LLC NAG to confirm whether the wavelength is available.

Regulatory Compliance*^{Note3}

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

Note3: 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-SFP28-LR-10 series optical transceiver is designed for fiber communications application up to 25.78Gbps, which fully compliant with the specification of SFF-8402.

This module is designed for single mode fiber and operates at a nominal wavelength of CWDM wavelength. There are four center wavelengths available from 1271nm to 1331nm, with each step 20nm. It can communicate over single mode fibers(SMF) of length from 2m to at least 10km.

The module is with the SFP+ connector to allow hot plug capability. Single 3.3V power supply is needed. The optical output can be disabled by LVTTTL logic high-level input of TX_DIS. Loss of signal (RX_LOS) output is provided to indicate the loss of an input optical signal of receiver.

This module provides digital diagnostic functions via a 2-wire serial interface as defined in the SFF-8472 specification.

Absolute Maximum Ratings*Note4

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T _S	-45	+100	°C
Supply Voltage	V _{CC}	-0.5	4.0	V
Operating Relative Humidity	RH	5	95	%

Note4: 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	Standard	0		70	°C
		Industrial	-40		85	
Power Supply Voltage	V _{CC}		3.135		3.465	V
Power Supply Current	I _{CC}	Standard				
		Industrial			455	

Performance Specifications – Electrical

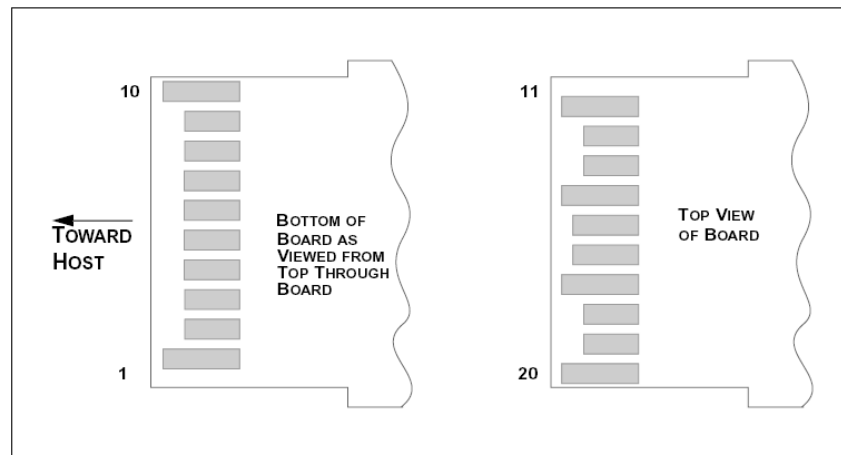
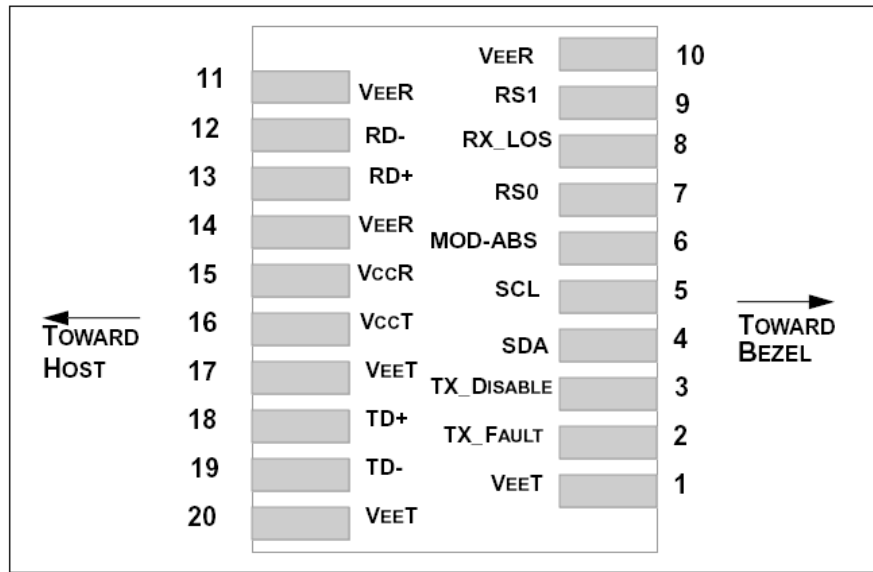
Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Transmitter						
CML Inputs (Differential)	V _{in}			900	mVpp	AC coupled inputs
Input Impedance (Differential)	Z _{in}		100		ohms	Connected directly to TX pins
Tx_DISABLE Input Voltage – High		2		V _{CC} +0.3	V	
Tx_DISABLE Input Voltage – Low		-0.3		0.8	V	
Receiver						
CML Outputs (Differential)	V _{out}		500	900	mVpp	AC coupled outputs
Rx_LOS Output Voltage – High		2.4		V _{CC} +0.3	V	
Rx_LOS Output Voltage – Low		-0.3		0.4	V	

Optical and Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit
9um Core Diameter SMF				10	Km
Data Rate				25.78	Gbps
CDR Data Rate		24.33	25.78		Gbps
Transmitter					
Optical Center Wavelength	λ	$\lambda_c - 6.5$	λ_c	$\lambda_c + 6.5$	nm
Spectral Width (-20dB)	$\Delta\lambda$			1	nm
Output Power(OMA)@25.78Gb/s	P_{OMA}	-6.5		+2.5	dBm
Extinction Ratio	ER	3.5			dB
Transmitter Dispersion Penalty	TDP			3.0	dB
Side Mode Suppression Ratio	SMSR	30			Side Mode Suppression Ratio
Average Launch Power of OFF Transmitter	P_{OFF}			-30	Average Launch Power of OFF Transmitter
Receiver					
Center Wavelength	λ_c	1260	1310	1350	nm
Receiver Sensitivity(OMA) ^{*Note5}	P_{min}			-11.5	dBm
Receiver Overload	P_{min}	2.5			dBm
Optical Return Loss	ORL			-12	dB
LOS De-Assert	LOS_D			-17	dBm
LOS Assert	LOS_A	-30			dBm
LOS Hysteresis		0.5			dB

Note5: Measured with data rate at 25.78Gb/s, BER less than 5E-5 and PRBS 2³¹-1.

SFP28 Transceiver Electrical Pad Layout



Pin Function Definitions

Pin Num.	Name	Function	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	
2	TX Fault	Transmitter Fault Indication	3	Note 1
3	TX Disable	Transmitter Disable	3	Note 2, Module disables on high or open
4	SDA	Module Definition 2	3	Data line for Serial ID.
5	SCL	Module Definition 1	3	Clock line for Serial ID.
6	MOD-ABS	Module Definition 0	3	Note 3
7	RS0	RX Rate Select (LVTTTL).	3	Rate Select 0, optionally controls SFP28 module receiver. This pin is pulled low to VeeT with a >30K resistor..
8	LOS	Loss of Signal	3	Note 4
9	RS1	TX Rate Select (LVTTTL).	1	Rate Select 1, optionally controls SFP28 module transmitter. This pin is pulled low to VeeT with a >30K resistor.
10	VeeR	Receiver Ground	1	Note 5
11	VeeR	Receiver Ground	1	Note 5
12	RD-	Inv. Received Data Out	3	Note 6
13	RD+	Received Data Out	3	Note 6
14	VeeR	Receiver Ground	1	Note 5
15	VccR	Receiver Power	2	3.3V ± 5%, Note 7
16	VccT	Transmitter Power	2	3.3V ± 5%, Note 7
17	VeeT	Transmitter Ground	1	Note 5
18	TD+	Transmit Data In	3	Note 8
19	TD-	Inv. Transmit Data In	3	Note 8
20	VeeT	Transmitter Ground	1	Note 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 2.4V 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 < 0.4V.

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~10 K Ω resistor. Its states are:

Low (-0.3 – 0.8V): Transmitter on

(>0.8, < 2.0V): Undefined

High (2.0 – VccT/R+0.3V): Transmitter Disabled

Open: Transmitter Disabled

3) Module 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 – 10K Ω resistor. Pull up voltage between 2.4V and $V_{ccT}/R+0.3V$. 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 $<0.4V$.

5) VeeR and VeeT may be internally connected within the SFP28 module.

6) RD-/+ : These are the differential receiver outputs. They are AC coupled 100 Ω differential lines which should be terminated with 100 Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be less than 450mV single-ended when properly terminated.

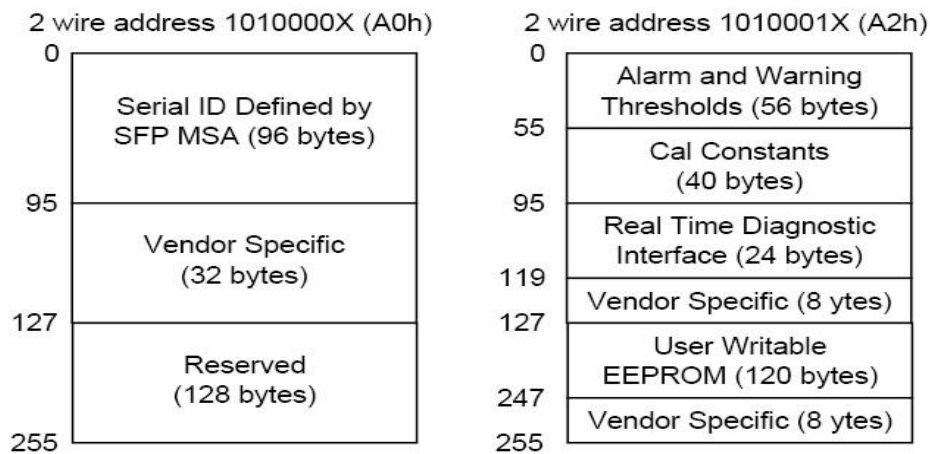
7) VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V $\pm 5\%$ at the SFP+ connector pin. Maximum supply current is 455mA. Inductors with DC resistance of less than 1 ohm should be used in order to maintain the required voltage at the SFP28 input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot plugging of the SFP28 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 SFP28 transceiver module.

8) TD-/+ : These are the differential transmitter inputs. They are AC-coupled, differential lines with 100 Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board. The inputs will accept swings less than 450mV single-ended, though it is recommended that values between 90mV-900mV in differential be used for best EMI performance.

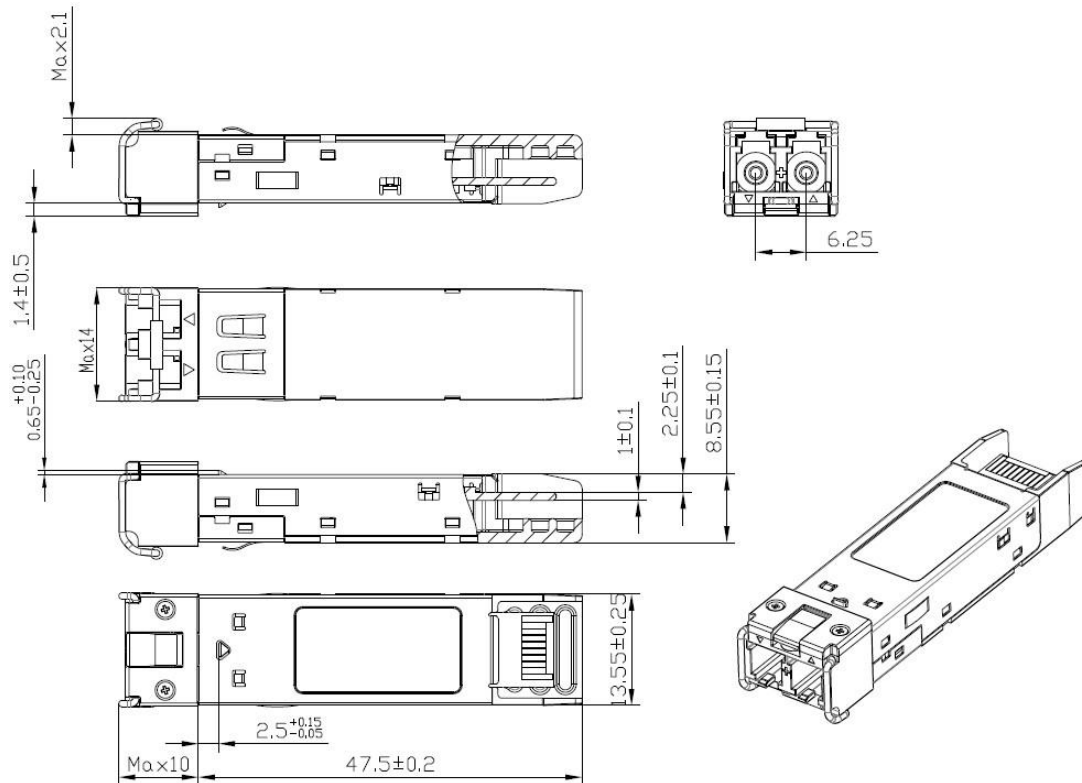
EEPROM

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 SFP28 transceiver. The negative edge clocks data from the SFP28 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 12.2.



Mechanical Specifications*



Unremarked tolerances ± 0.2 mm

*This 2D drawing only for reference, please check with LLC NAG before ordering.

GUARANTEE:



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