Features

- Compliant to IEEE802.3by 25GBASE-LR
- Up to 25.78Gb/s data links
- 25G 1310nm DFB transmitter
- 25G PIN photo-detector
- 2-wire interface for management specifications compliant with SFF-8472 digital diagnostic monitoring interface for optical transceivers
- All-metal housing for superior EMI performance
- 25G electrical interface (OIF CEI-28G-VSR)
- Maximum power consumption 1.5W
- Advanced firmware allow customer system encryption information to be stored in transceiver
- RoHS compliant
- Operating case temperature: -40°C ~85°C

Applications

- High-speed storage area networks
- Computer cluster cross-connect
- Custom high-speed data pipes
- Inter Rack Connection

Description

The 1310nm DFB 25Gb/s SFP28 LR transceiver is designed to transmit and receive optical data over single mode optical fiber for link length up to 10km.

The module optical connections is duplex LC and shall be compatible with SFP+ 28Gbps and backward compatible with legacy 10G SFP+ pluggable. The SFP28 LR module is a dual directional device with a transmitter and receiver plus a control management interface (2-wire interface) in the same physical package. 2-wire interface is used for serial ID, digital diagnostic and module control function.

The module operates by a single +3.3V power supply. LVCMOS/LVTTL global signals, such as Module Present, Reset, Interrupt and Low Power Mode, are available with the modules. The SFP28 LR module electrical

interface is compliant to OFI-CEI-VSR-28G-VSR. It has been designed to meet the harshest external operating conditions including temperature, humidity and EMI interference. The module offers very high functionality and feature integration, accessible via a two-wire serial interface.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Storage Temperature	T_c	–40		85	°C	
Power Supply Voltage	V_{CC}	0		3.6	V	
Relative Humidity	*RH*	5		85	%	
Damage Threshold	*THd*	3			dBm	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Operating Case Temperature	T_c	-40		85	°C	
Power Supply Voltage	*Vcc*	3.135	3.3	3.465	V	
Data Rate Accuracy		-100		100	ppm	
Control Input Voltage High		2		Vcc	V	
Control Input Voltage Low		0		0.8	V	
Link Distance with G.652	*D*	0.002		10	km	

Digital Diagnostic Functions

Parameter	Symbol	Accuracy	Unit	Notes
Temperature Monitor Absolute Error	*DMI_Temp*	± 3	°C	
Supply Voltage Monitor Absolute Error	*DMI_VCC*	±0.1	V	
TX Power	*DMI_TX*	± 2 dB	dB	
RX Power	*DMI_RX*	± 2 dB	dB	
Bias Current Monitor	*DMI_Ibias*	± 10%	mA	

Note.

1. Due to measurement accuracy of different single mode fibers, there could be an additional +/-1 dB fluctuation, or a +/- 3dB total accuracy.

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Transmitter						
Center Wavelength	*λt*	1295		1325	nm	
Side Mode Suppression Ratio	*SMSR*	30			dB	
Average Optical Power	*Pavg*	-7	-	2	dBm	
OMA	P_{OMA}	-4		2.2	dBm	1
Launch Power in OMA minus Transmitter and Dispersion Penalty (TDP)		-5			dBm	
Transmitter Dispersion Penalty	*TDP*			2.7	dB	
Extinction Ratio	*ER*	3			dB	
Relative Intensity Noise	$RIN_{20}OMA$			-130	dB/Hz	
Optical Return Loss Tolerance	*TOL*			20	dB	
Transmitter Reflectance	R_T			-26	dB	
Average Launch Power OFF Transmitter	*Poff*			-30	dBm	
Transmitter Eye Mask Definition {X1, X2,X3,Y1,Y2,Y3}-Hit Ratio $1.5x10^{-3}$ hits per sample		{0.31,0.4,0.45,0.34,0.38,0.4}				2
Receiver						
Center Wavelength	*λr*	1295		1325	nm	
Damage Threshold	*THd*	3			dBm	3
Average Receiver Power		-14		2	dBm	
Receiver Power (OMA)				2.2	dBm	
Receiver Sensitivity (OMA)	*SEN*			-12	dBm	for BER=$5x10^{-5}$
Stressed Receiver Sensitivity (OMA)				-9.5	dBm	4
Receiver Reflectance	R_R			-26	dB	
LOS Assert	*LOSA*	-30			dBm	
LOS De-Assert	*LOSD*		-	-15	dBm	

LOS Hysteresis	*LOSH*	0.5	dB
	Stressed Receiver Sensitivity Test (Note 5)		
Stressed Eye Closure (SEC)	*SEC*	2.5	dB
Stressed Eye J2 Jitter	*J2*	0.27	UI
Stressed Eye J4 Jitter	*J4*	0.39	UI
Stressed Receiver Eye Mask Definition {X1,X2,X3,Y1,Y2,Y3}-Hit Ration $1.5x10^{-5}$ per sample		{0.31,0.4,0.45,0.34,0.38,0.4}	

Notes:

1. Even if the TDP < 1dB, the OMA min must exceed the minimum value specified here.
2. Hit ratio $5x10^{-5}$ per sample
3. The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level on one lane. The receiver does not have to operate correctly at this input power.
4. Measured with conformance test signal at receiver input for BER=$5x10^{-5}$
5. Vertical eye closure penalty, stressed eye J2 jitter, stressed eye J4 jitter, and SRS eye mask definition are test conditions for measuring stressed receiver sensitivity. They are not the required characteristics of the receiver.

Electro Characteristics

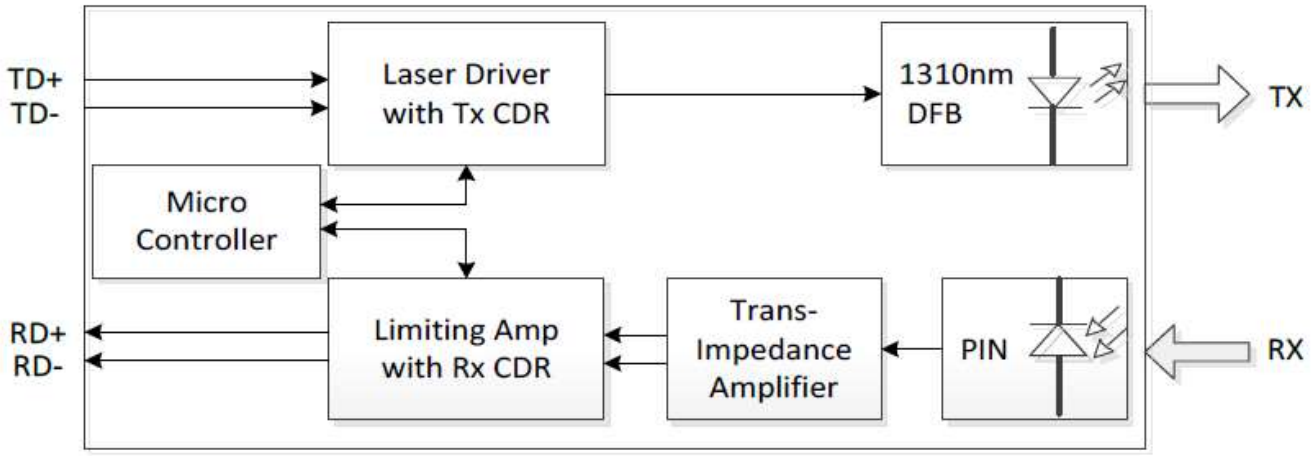
Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Power Consumption				1.5	W	
Supply Current	*Icc*			450	mA	
Transmitter						
Overload Differential Voltage pk-pk	*TP1a*	900			mV	
Common Mode Voltage (Vcm)	*TP1*	-350		2850	mV	1
Differential Termination Resistance Mismatch	*TP1*			10	%	At 1MHz
Differential Return Loss (SDD11)	*TP1*			See CEI-28G-VSR Equation 13-19	dB	
Common Mode to Differential conversion and Differential to Common Mode conversion (SDC11, SCD11)	*TP1*			See CEI-28G-VSR Equation 13-20	dB	
Stressed Input Test	*TP1a*	See CEI-28G-VSR Section 13.3.11.2.1				
Receiver						
Differential Voltage, pk-pk	*TP4*			900	mV	
Common Mode Voltage (Vcm)	*TP4*	-350		2850	mV	1
Common Mode Noise, RMS	*TP4*			17.5	mV	
Differential Termination Resistance Mismatch	*TP4*			10	%	At 1MHz
Differential Return Loss (SDD22)	*TP4*			See CEI-28G-VSR Equation 13-19	dB	

Common Mode to Differential conversion and Differential to Common Mode conversion (SDC22, SCD22)	*TP4*		See CEI-28G-VSR Equation 13-21	dB	
Common Mode Return Loss (SCC22)	*TP4*		-2	dB	2
Transition Time, 20 to 80%	*TP4*	9.5		dB	
Vertical Eye Closure (VEC)	*TP4*		5.5	dB	
Eye Width at 10^{-15} probability (EW15)	*TP4*	0.57		UI	
Eye Height at 10^{-15} probability (EH15)	*TP4*	228		mV	

Notes:

1. Vcm is generated by the host. Specification includes effects of ground offset voltage.
2. From 250MHz to 30GHz.

Block Diagram of Transceiver



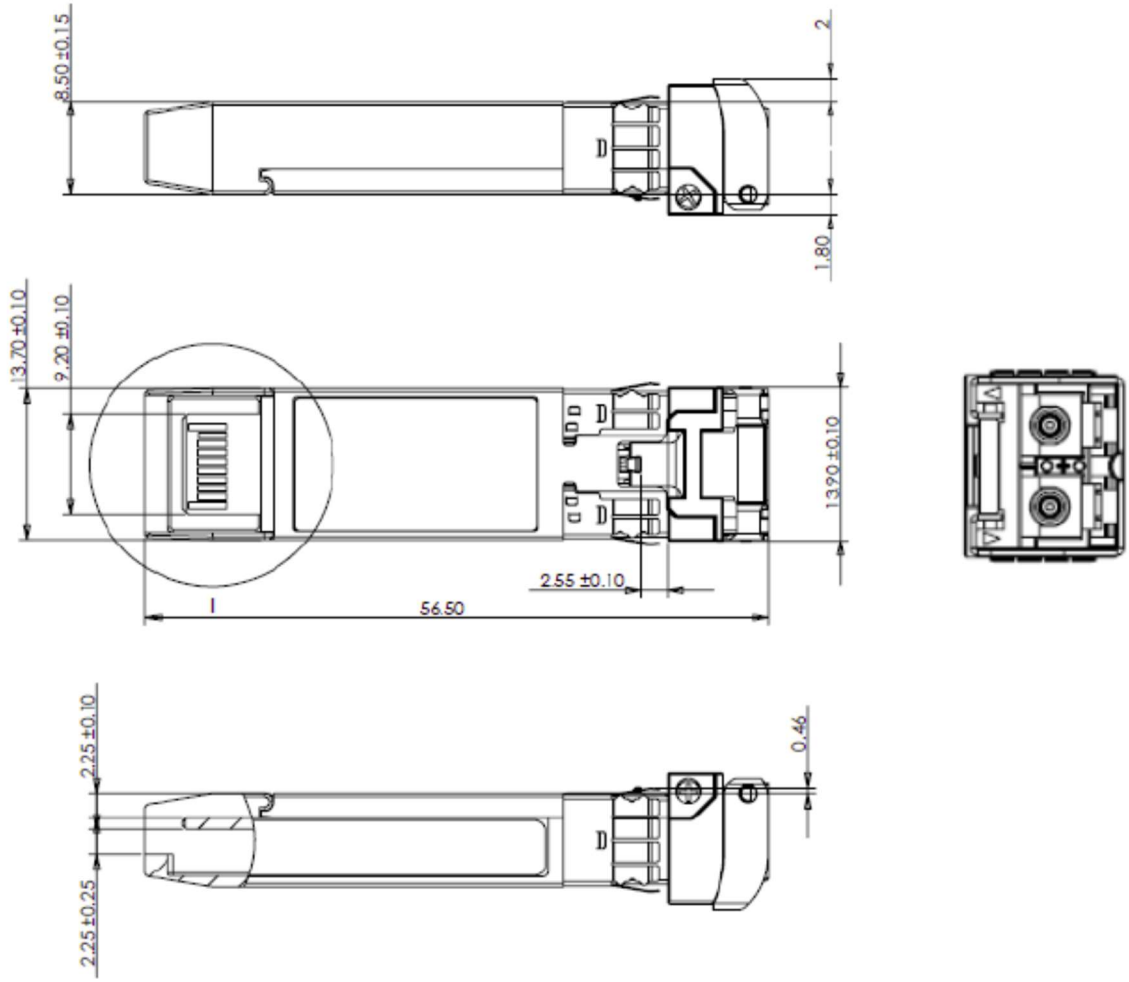
Pin Assignment

Pin	Symbol	Function/Description	Note
1	VEET	Transmitter Ground	1
2	Tx_FAULT	Transmitter Fault	2
3	Tx_DIS	Transmitter Disable. Laser output	
4	SDA	2-wire Serial Interface Data Line	2
5	SCL	2-wire Serial Interface Clock Line	2
6	MOD_ABS	Module Definition. Grounded within the module	
7	RS0	Receiver Rate Select	
8	RX_LOS	Receiver Loss of Signal Indication Active LOW	
9	RS1	Transmitter Rate Select (not used)	
10	VEER	Receiver Ground	1
11	VEER	Receiver Ground	1
12	RD-	Receiver Inverted Data Output	
13	RD+	Receiver Date Output	
14	VEER	Receiver Ground	1
15	VCCR	Receiver 3.3V Supply	
16	VCCT	Receiver 3.3V Supply	
17	VEET	Transmitter Ground	1
18	TD+	Transmitter Non-Inverted Data Input	
19	TD-	Transmitter Inverted Data Input	
20	VEET	Transmitter Ground	1

Notes:

1. Module ground pins GND are isolated from the module case.2. Shall be pulled up with 4.7k-10kohms to a voltage between 3.15V and 3.45V on the host board.
2. Shall be pulled up the voltage between 3.15V and 3.45V with 4.7k -10kohms on the host board.

Dimensions

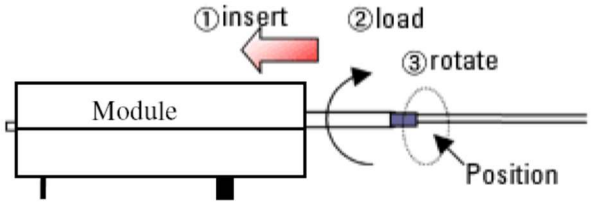

8.50 ±0.15
2
1.80
13.70 ±0.10
9.20 ±0.10
13.20 ±0.10
2.55 ±0.10
56.50
2.25 ±0.10
2.25 ±0.25
0.46

Optical Receptacle Cleaning Recommendations :

All fiber stubs inside the receptacle portions were cleaned before shipment. In the event of contamination of the optical ports, the recommended cleaning process is the use of forced nitrogen. If contamination is thought to have remained, the optical ports can be cleaned using a NTT international Cletop® stick type and HFE7100 cleaning fluid. Before the mating of patch-cord, the fiber end should be cleaned up by using Cletop® cleaning cassette.

Cleaning of patch-cord

Cleaning of fiber stub



1. Insert
   Ensure that stick is held straight when inserting into sleeve.
2. Load
   Apply sufficient pressure (approx 600-700g) to ensure ferrule a little depressed in sleeve.
3. Rotate
   Rotate stick clockwise 4-5 times, while ensuring direct contact with ferrule end-face is maintained.

Notice: Number of possible wipes:
Maintenance (repair) ~1 use / piece
Equipment construction: 4 uses / piece (max.)

Note: The pictures were extracted from NTT-ME website. And the Cletop® is a trademark registered by NTT-ME

Ordering Information

Model Number	Part Number	Wavelength	Temperature
SFP-25G-LR-I	OPAX-S10-13-IB	1310nm	-40 to 85 °C

Modification History

Revision	Date	Description
A1	Jul. 2024	Initial Release

Note: All information contained in this document is subject to change without notice.