25Gb/s 1310nm SFP28 Transceiver

1. Features

- Dual-rate: 25.78Gb/s and 10.3125Gb/s
- Up to 10km transmission on SMF
- 1310nm DML laser transmitter
- Hot-pluggable SFP28, SFP28 MSA compliant
- Built-in digital diagnostic functions
- Single +3.3V power supply
- Operating case temperature: -40 to +85 °C or 0 to +70 °C
- Directive 2011/96/EU RoHS, FCC Compliant

2. Application

- 25GBASE-LR
- eCPRI & CPRI Option 10 (24.33 Gbps), CPRI Option 9 (12.165 Gbps), CPRI Option 8 (10.138 Gbps), CPRI option 7 (9.830 Gbps)

3. Overview

SFP28-25GB-LR 25G SFP28 transceivers are designed for use in Ethernet links up to 25.78 Gb/s data rate and up to 10 km link length. They are compliant to IEEE802.3cc, SFF-8402, SFF-8432. Digital diagnostic monitoring interface compliant to SFF-8472 is available via an I2C interface. IEC 61754-20 interface connectors install standard.

4.Order Information

Part No.	Data Rate	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI
SFP28-25GB-LRI	25G	1310nm-DFB	SMF	10km	DuplexLC	-40~85C	Yes
SFP28-25GB-LR	25G	1310nm-DFB	SMF	10km	DuplexLC	0~70C	Yes

5. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage Temperature	T_S	-40	-	+85	℃	1
Supply Voltage	V_{CC}	-0.5	-	+4.0	V	
Operating Relative Humidity	RH	0	-	+95	%	

6.Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	T_C	-40	-	+85	℃	1
Operating Case Temperature	T_C	0	-	+70	℃	2
Power Supply Voltage	V_{CC}	3.135	3.3	3.465	V	
Power Supply Current	I_{CC}	-	-	360	mA	
Maximum Power Consumption	P_{cs}			1.3	W	
Maximum Power Dissipation	P_D	-	-	1.2	W	
Transmission Distance	TD		-	10	km	Over SMF

Note1,2: See order information

7. Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter						
Center Wavelength	λ_t	1295	1310	1325	nm	
Average Optical Power, 25GE	P_{avg}	-7	-	2	dBm	
Optical Modulation Amplitude, 25GE	OMA	-4	-	-	dBm	
OMA–TDP, 25GE	OMA_TDP	-5	-	-	dBm	
Average Output Power (Laser Turn off)	P_{OFF}	-	-	-30	dBm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Extinction Ratio, 25GE	ER	3	-	-	dB	
Transmitter and Dispersion Penalty	TDP	-	-	2.7	dB	1
Optical Return Loss Tolerance	ORLT	-	-	11	dB	
Receiver						
Center Wavelength	λr	1295		1325	nm	
Stressed OMA Sensitivity, 25GE		-	-	-8.3	dBm	
OMA Sensitivity, 25GE@1E-12	P_{SEN_OMA}	-	-	-9.6	dBm	
Average Rx Sensitivity, 25GE@1E-12	P_{SEN}	-	-	-11.4	dBm	
Receiver Overload	P_{IN-OL}	2.5	-	-	dBm	

Reflectance	Ref	-	-	-26	dB	
LOS Assert	LOS_A	-30	-	-17	dBm	
LOS De-assert	LOS_D	-	-	-17	dBm	
LOS Hysteresis	LOS_H	0.5	-	-	dB	

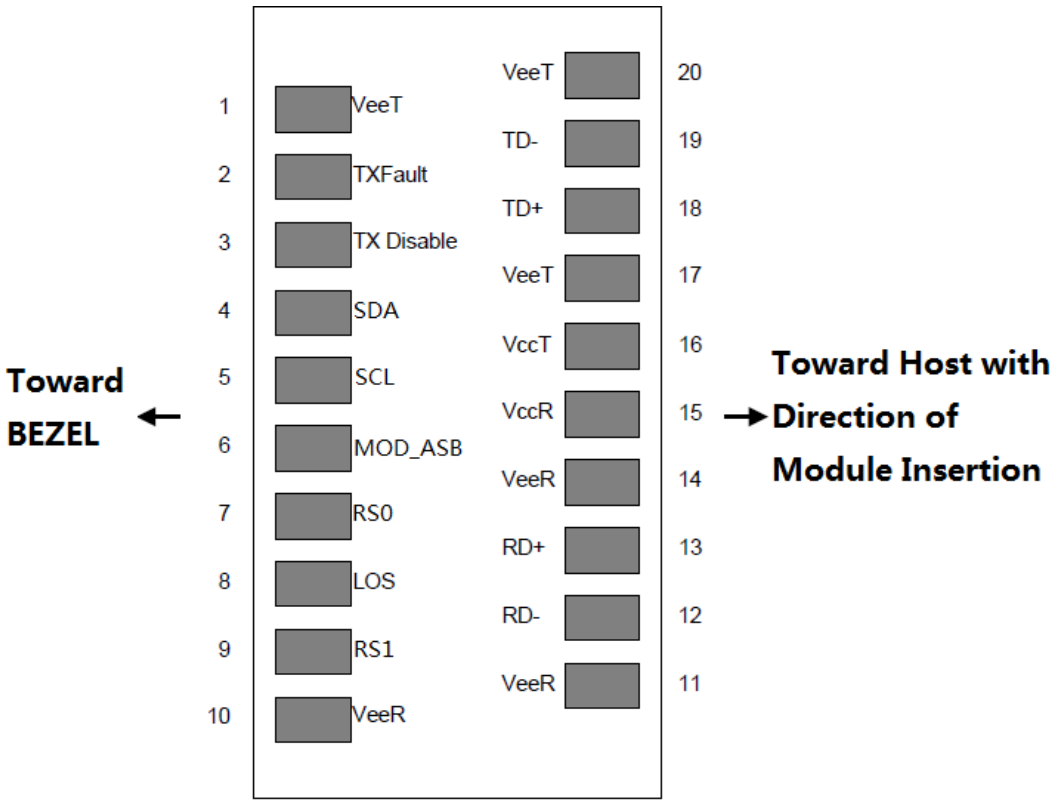
Notes:

1. Measured with a PRBS 2^{31}-1 test pattern @25.78125 Gb/s.
2. After FEC BER≤ 10^{-12}

8.Electrical Characteristics

Parameter		Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter (Module Input)							
Single-ended Differential Data Input Amplitude		$V_{IN,P-P}$	95	-	450	mV	
Differential Input Impedance		Rin	-	100	-	Ω	
Tx_Fault	Normal Operation	V_{IL}	-0.3	-	0.4	V	
	Tx Fault	V_{IH}	2.4	-	V_{CC}+0.3	V	
Tx_Disable	Normal Operation	V_{IL}	-0.3	-	0.8	V	
	Laser Disable	V_{IH}	2.0	-	V_{CC}+0.3	V	
Receiver (Module Output)							
Single-ended Differential Data Output Amplitude		$V_{OUT,P-P}$	150	-	450	mV	
Differential Output Impedance		Rout	-	100	-	Ω	
Differential Termination Mismatch			-	-	±5	%	
Output Rise/Fall Time, 20%~80%		T_R	9.5	-	-	ps	
Rx_LOS	Normal Operation	V_{OL}	-0.3	-	0.4	V	
	Lose Signal	V_{OH}	2.4	-	V_{CC}+0.3	V	

9.Pin Definition



Pin	Symbol	Name/Description	Notes
1	VeeT	Transmitter Ground	1
2	Tx_Fault	Transmitter Fault - High indicates a fault condition	2
3	Tx_Disable	Transmitter Disable – High or open disables the transmitter	
4	SDA	2-wire Serial Interface Data Line (MOD-DEF2)	3
5	SCL	2-wire Serial Interface Clock (MOD-DEF1)	3
6	MOD_ABS	Module Absent, connected to VeeT or VeeR in the module	
7	RS0	Rate Select 0 – Not used, Presents high input impedance	5
8	RX_LOS	Receiver Loss of Signal(LVTTL-O). Logic 0 indicates normal operation	4
9	RS1	Rate Select 1 – Not used, Presents high input impedance	5
10	VeeR	Receiver Ground	1
11	VeeR	Receiver Ground	1
12	RD-	Inverse Received Data out (CML-O), AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	VeeR	Receiver Ground	1
15	VccR	Receiver Power Supply	
16	VccT	Transmitter Power Supply	
17	VeeT	Transmitter Ground	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	

19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	VeeT	Transmitter Ground	1

Notes:

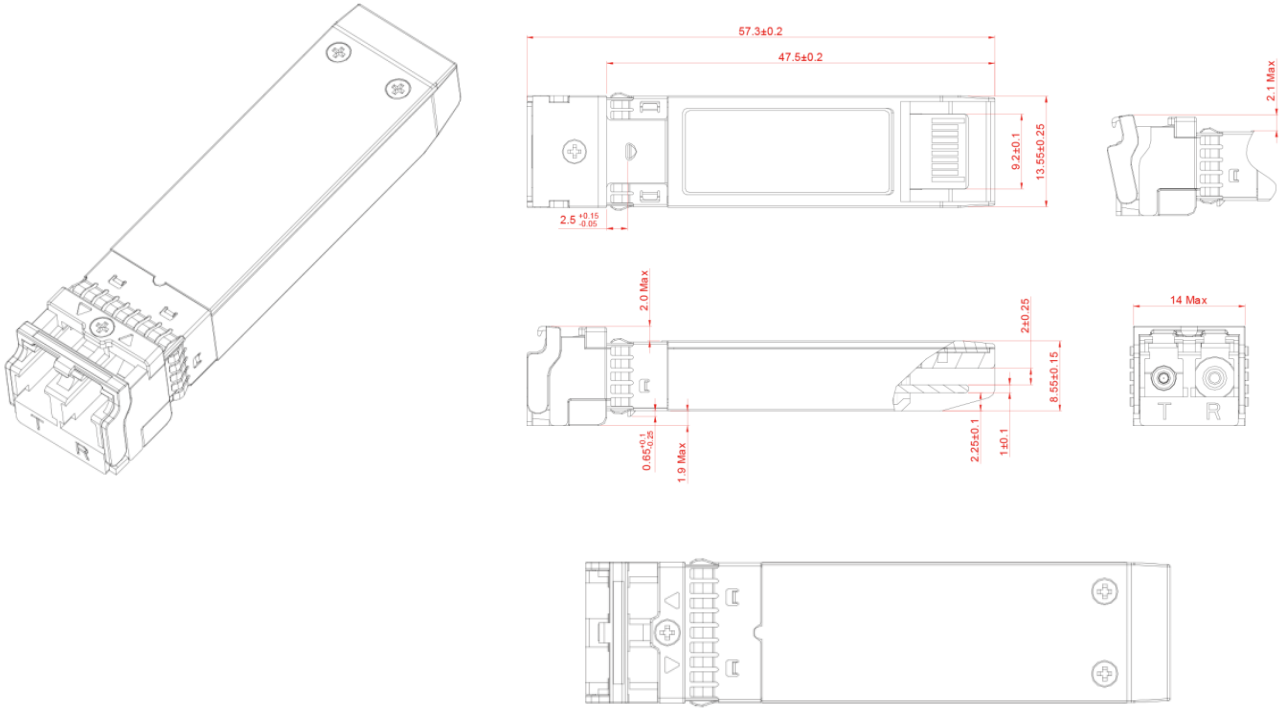
1. Module ground pins GND are isolated from the module case.
2. Tx_Fault is an open collector/drain output, which should be pulled up with a 4.7k – 10k Ohms resistor on Host board.
3. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V.
4. LOS is open collector output. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V.
5. RS0 and RS1 pins are pulled low to GND with a resistor > 30KΩ in module.

10.Digital Diagnostics

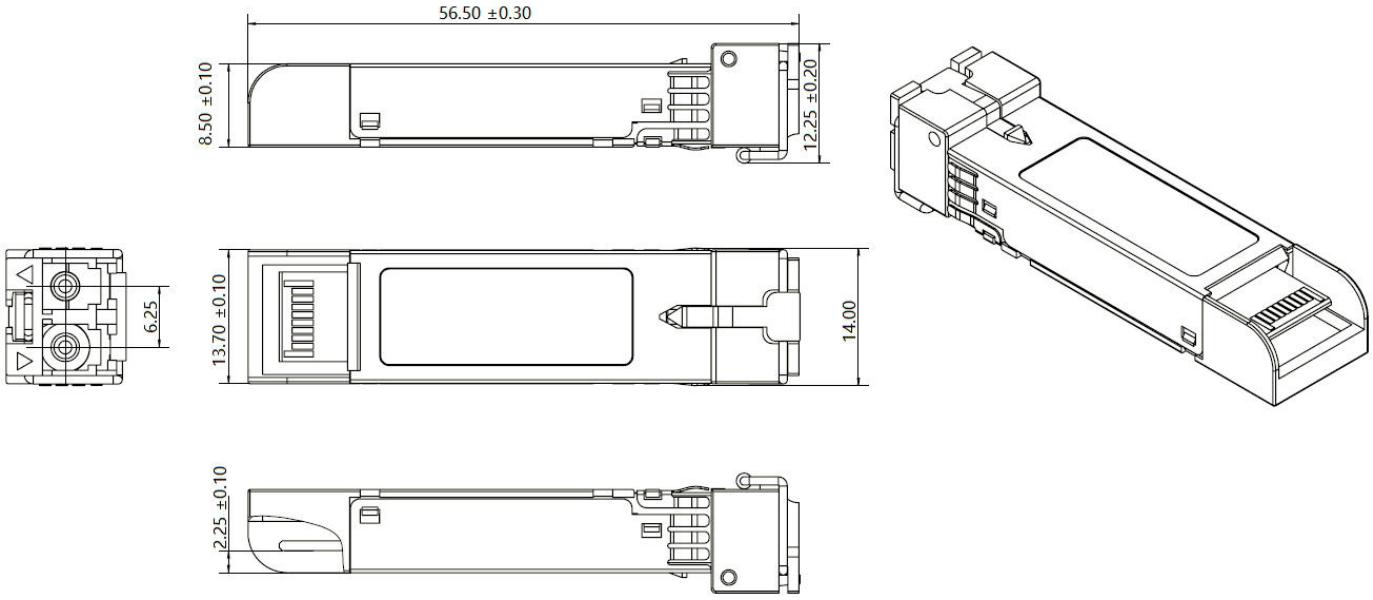
Parameter	Range	Accuracy	Unit	Calibration
Temperature	-40 to 85	±3	℃	Internal
Voltage	0 to V_{CC}	±5%	V	Internal
Tx Bias Current Per Lane	0 to 100	±10%	mA	Internal
Tx Output Power Per Lane	-5 to +3	±3	dBm	Internal
Rx Power (Each Lane)	-12 to +2.5	±3	dBm	Internal

11. Outline Dimensions (mm) (Reference only)

Design Version 1



Design Version 2



Note: We have two designs of the 25G SFP28 Transceiver, but design version 1 is the main.

12.Regulatory Compliance

Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>1000 V)
Electrostatic Discharge (ESD) to the Single LC Receptacle	IEC 61000-4-2 GR-1089-CORE	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2	Compatible with Class 1 laser product