

25Gb/S SFP28 SR Transceiver

P/N: TSFP28-BC1Q85A



Product Features

- Compliant to IEEE802.3by 25GBASE-SR
- Up to 25.78Gb/s data links
- 850nm VCSEL laser and PIN photo-detector
- Maximum power consumption 1.0W
- All-metal housing for superior EMI performance
- 0°C to 70°C case temperature operating range
- 25G electrical interface (OIF CEI-28G-VSR)
- Maximum link length of 70m on OM3 MMF and 100m on OM4 MMF
- Advanced firmware allow customer system encryption information to be stored in transceiver
- Digital diagnostics functions are available via the I2C interface
- RoHS-6 Compliant

Application

- High-speed storage area networks
- Computer cluster cross-connect
- Custom high-speed data pipes
- Inter Rack Connection
- 25GBASE-SR Ethernet

Absolute Maximum Rating

Parameter	Min	Max	Unit	Note
Storage Temperature	-40	85	°C	
3.3V Power Supply Voltage	0	3.6	V	
Relative Humidity	5	85	%	
Damage Threshold / Lane	3.4		dBm	

Recommended Operating Conditions

Parameter	Min	Typical	Max	Unit	Note
Case Operating Temperature	0		70	°C	
Power Supply Voltage	3.135	3.3	3.465	V	
Data Rate per Channel		25.78125		Gbps	
Control Input Voltage High	2		V _{cc}	V	
Control Input Voltage Low	0		0.8	V	
Data Rate Accuracy	-100		100	ppm	
Fiber Length: 50/125μm MMF (OM3)			70	m	
Fiber Length: 50/125μm MMF (OM4)			100	m	

Electrical Characteristics

Parameter	Min	Typical	Max	Unit	Note
Transceiver Electrical Characteristics					
TRx Power Consumption			1.0	W	
Supply Current			300	mA	
Transmitter					
Overload Differential Voltage pk-pk	900			mV	
Common Mode Voltage (V _{cm})	-350		2850	mV	1
Differential Termination Resistance Mismatch			10	%	At 1MHz
Differential Return Loss (SDD11)			See CEI-28G-VSR Equation 13-19	dB	

Common Mode to Differential conversion and Differential to Common Mode conversion (SDC11, SCD11)			See CEI-28G-VSR Equation 13-20	dB	
Stressed Input Test	See CEI-28G-VSR Section 13.3.11.2.1				
Receiver					
Differential Voltage, pk-pk			900	mV	
Common Mode Voltage (Vcm)	-350		2850	mV	1
Common Mode Noise, RMS			17.5	mV	
Differential Termination Resistance Mismatch			10	%	At 1MHz
Differential Return Loss (SDD22)			See CEI-28G-VSR Equation 13-19	dB	
Common Mode to Differential conversion and Differential to Common Mode conversion (SDC22, SCD22)			See CEI-28G-VSR Equation 13-21	dB	
Common Mode Return Loss (SCC22)			-2	dB	2
Transition Time, 20 to 80%	9.5			ps	
Vertical Eye Closure (VEC)			5.5	dB	
Eye Width at 10 ⁻¹⁵ probability (EW15)	0.57			UI	
Eye Height at 10 ⁻¹⁵ probability (EH15)	228			mV	

Notes

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

Optical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Note
Transmitter Optical Characteristics						
Center Wavelength	λ	840		860	nm	
Spectral Width – RMS	$\Delta\lambda$			0.6	nm	
Average Launch Optical Power,	LOP	-8.4		2.4	dBm	
Optical Modulation Amplitude,	OMA	-6.4		3	dBm	1
Launch power in OMA minus TDEC		-7.3			dBm	
Transmitter and dispersion eye closure	TDEC			4.3	dB	
Extinction Ratio	ER	2			dB	
Optical return loss tolerance				12	dB	
Average Launch Power OFF Transmitter	Poff			-30	dBm	
Encircled Flux		$\geq 86\% @ 19\mu\text{m},$ $\leq 30\% \text{ at } 4.5\mu\text{m}$				2
Transmitter Eye Mask Definition (Hit ratio 1.5×10^{-3} hits per sample)		$\{X1, X2, X3, Y1, Y2, Y3\} =$ $\{0.3, 0.38, 0.45, 0.35, 0.41, 0.5\}$				3

Notes

1. Even if the TDEC < 0.9dB, the OMA (min) must exceed the minimum value specified here.
2. If measured into type A1a.2 or type A1a.3 50 μm fiber in accordance with IEC 61280-1-4.
3. Mask margin shall be higher than 5%.

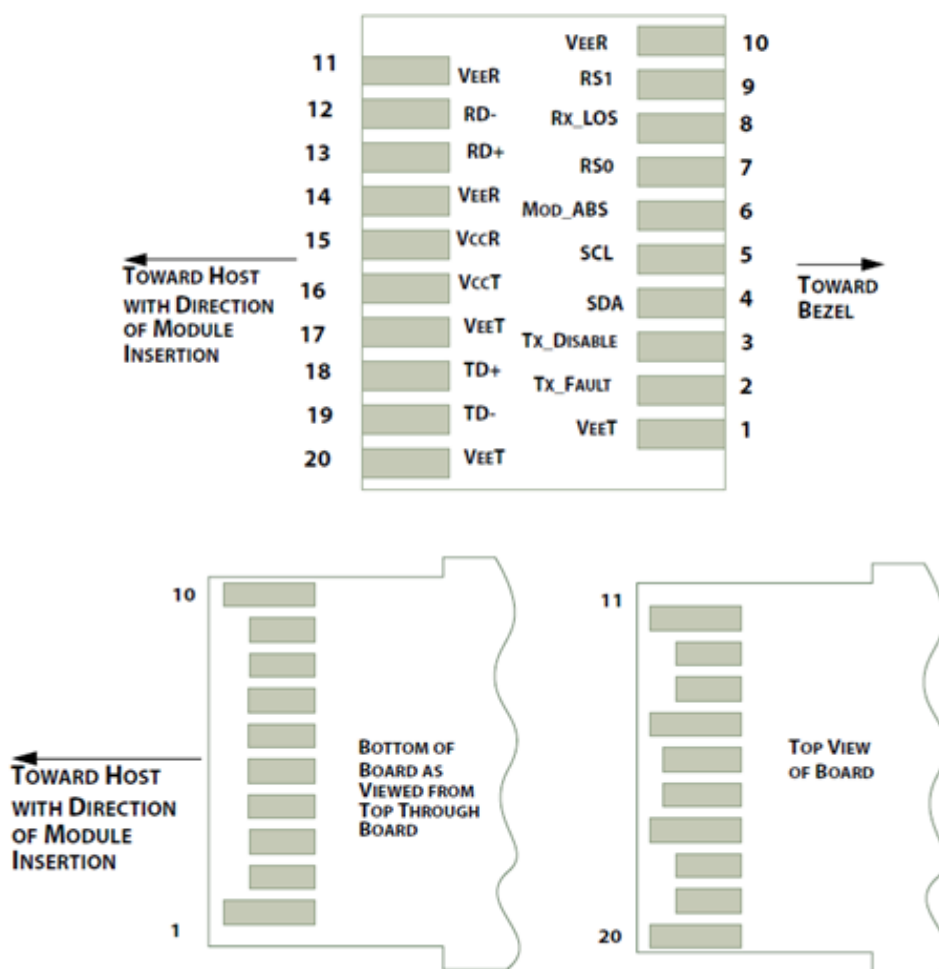
Parameter	Symbol	Min	Typical	Max	Unit	Note
Receiver Optical Characteristics						
Center wavelength	λ	840		860	nm	
Damage Threshold	THd	3.4			dBm	1
Average Receiver Power		-10.3			dBm	2
Average Receiver Power (Overload)				2.4		3
Receiver Power (OMA)				3	dBm	4
Receiver Reflectance				-12	dB	
Stress Receiver Sensitivity (OMA)				-5.2	dBm	5
LOS Assert	LosA	-30			dBm	
LOS Deassert	LosD			-12	dBm	
LOS Hysteresis	LosH	0.5			dB	
Conditions of stressed receiver sensitivity test (Note6)						
Stressed eye closure (SEC)			4.3		dB	
Stressed eye J2 Jitter			0.39		UI	
Stressed eye J4 Jitter,			0.53		UI	
OMA of each aggressor lane			3		dBm	
Stressed receiver eye mask definition (Hit ratio 1.5×10^{-5} hits per sample)		(X1, X2, X3, Y1, Y2, Y3) = (0.28, 0.5, 0.5, 0.33, 0.33, 0.4)				

Notes

1. 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.
2. Average receive power (min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance.
3. If TX ER < 5.68dB.
4. If TX ER > 5.68dB.
5. Measured with conformance test signal at TP3 for BER specified in IEEE802.3bm 95.1.1.

6. These test conditions are for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

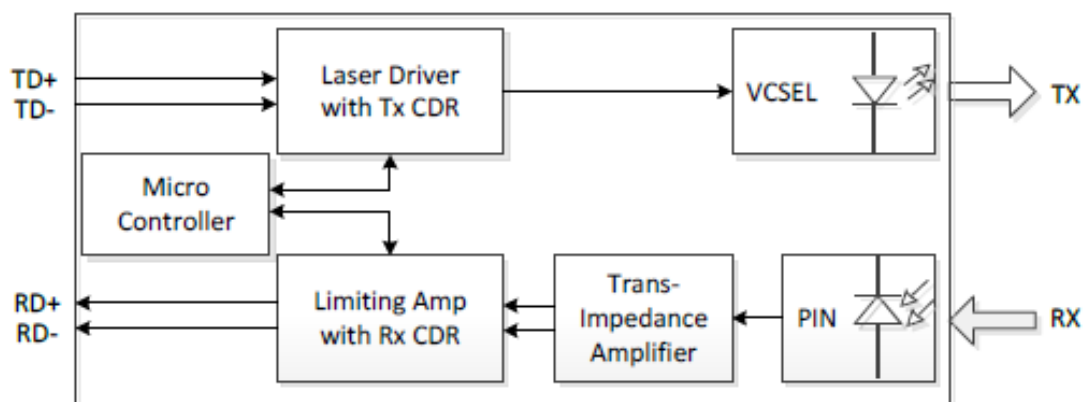
SFP28 Module Pad Assignments and Descriptions



PIN	Logic	Symbol	Name / Description	Note
1		VeeT	Module Transmitter Ground	
2	LVTTL-O	TX_Fault	Module Transmitter Fault	
3	LVTTL-I	TX_Dis	Transmitter Disable; Turns off transmitter laser output	
4	LVTTL-I/O	SDA	2-Wire Serial Interface Data Line	
5	LVTTL-I	SCL	2-Wire Serial Interface Clock	
6		MOD_DEF0	Module Definition, Grounded in the module	
7	LVTTL-I	RS0	Receiver Rate Select	

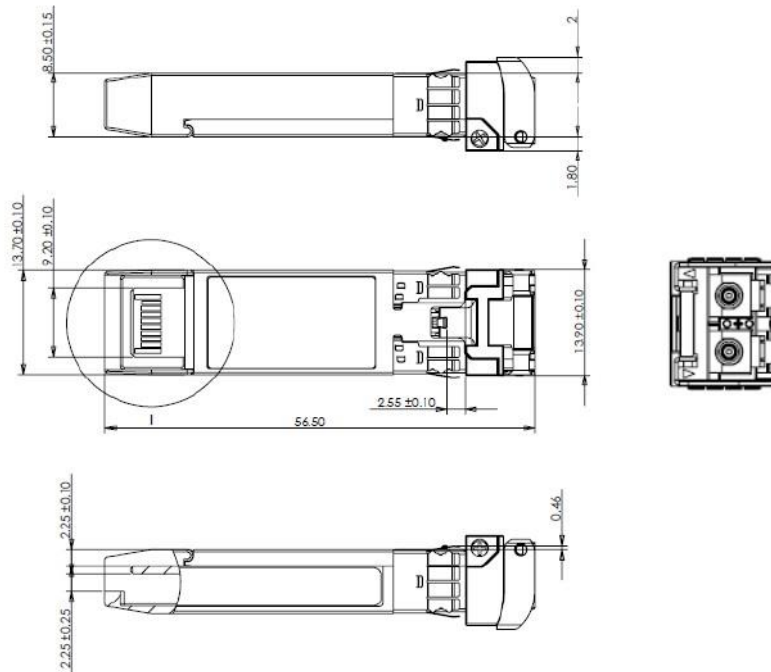
8	LVTTL-O	RX_LOS	Receiver Loss of Signal Indication Active LOW	
9	LVTTL-I	RS1	Transmitter Rate Select (not used)	
10		VeeR	Module Receiver Ground	
11		VeeR	Module Receiver Ground	
12	CML-O	RD-	Receiver Inverted Data Output	
13	CML-O	RD+	Receiver Data Output	
14		VeeR	Module Receiver Ground	
15		VccR	Module Receiver 3.3 V Supply	
16		VccT	Module Transmitter 3.3 V Supply	
17		VeeT	Module Transmitter Ground	
18	CML-I	TD+	Transmitter Non-Inverted Data Input	
19	CML-I	TD-	Transmitter Inverted Data Input	
20		VeeT	Module Transmitter Ground	

Transceiver Block Diagram



Mechanical Design Diagram

Unit: mm



ESD

This transceiver is specified as ESD threshold 1kV for high speed data pins and 2kV for all others electrical input pins, tested per MIL-STD-883, Method 3015.4 /JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

Laser Safety

This is a Class 1 Laser Product according to EN 60825-1:2014. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007).