

## 25G SFP28 Active Optical Cable

### Features:

- Electrical interface compliant to SFF-8431
- 850nm VCSEL laser and PIN photo-detector
- Maximum link length of 70m on OM3 MMF and 100m on OM4 MMF
- Digital diagnostics functions are available via the I2C interface
- Operating case temperature  
Commercial: 0°C to +70 °C
- +3.3V single power supply
- Power consumption less than 1W
- RoHS compliant
- Password protection for A0h and A2h



### Applications

- 25GBASE-SR Ethernet
- Servers, switches, storage and host card adapters

### Absolute Maximum Ratings

Table1- Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Supply Voltage	V <sub>CC3</sub>	-0.5	-	+3.6	V	
Storage Temperature	T <sub>s</sub>	-10	-	+70	°C	
Operating Humidity	RH	+5	-	+85	%	1

Note: 1 No condensation

### Recommended Operating Conditions

Table 2- Recommended operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	T <sub>c</sub>	0	-	+70	°C	
Power Supply Voltage	V <sub>CC</sub>	3.14	3.3	3.47	V	
Power Supply Current	I <sub>CC</sub>	-	-	300	mA	
Power Dissipation	P <sub>d</sub>	-	-	1.0	W	
Bit Rate	BR	8.5	25.78125	-	Gbps	
Fiber Bend Radius	R <sub>b</sub>	3	-	-	cm	

## Electrical Characteristics

Table 3- Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes	
<b>Transmitter</b>							
Differential Data Input Swing	$V_{in,P-P}$	200	-	1600	mV <sub>PP</sub>		
Input Differential Impedance	$Z_{IN}$	90	100	110	$\Omega$		
Tx_Fault	Normal Operation	$V_{OL}$	0	-	0.8	V	
	Transmitter Fault	$V_{OH}$	2.0	-	$V_{CC}$	V	
Tx_Disable	Normal Operation	$V_{IL}$	0	-	0.8	V	
	Laser Disable	$V_{IH}$	2.0	-	$V_{CC}+0.3$	V	
<b>Receiver</b>							
Differential Date Output	$V_{out}$	400	-	800	mV		
Output Differential Impedance	$Z_D$	90	100	110	$\Omega$		
Rx_LOS	Normal Operation	$V_{OL}$	0	-	0.8	V	
	Lose Signal	$V_{OH}$	2.0	-	$V_{CC}$	V	

## Optical Characteristics

Table 4-Optical Characteristics

Parameter	Symbol	Unit	Min	Typ	Max	Notes
<b>Optical transmitter Characteristics</b>						
Bit Rate	BR	Gbps	8.5	25.78125	-	
Center Wavelength Range	$\lambda_c$	nm	820	850	880	
Average Launch power Tx_off	P <sub>off</sub>	dBm	-	-	-45	
Launch Optical Power	P <sub>0</sub>	dBm	-6.0		2.4	1
Extinction Ratio	ER	dB	2	-	-	
Spectral Width(RMS)	RMS	nm	-	-	0.65	
<b>Optical Receiver Characteristics</b>						
Bit Rate	BR	Gbps	8.5	25.78125		
Bit Error Rate	BER		-	-	E-12	
Damage threshold	DT	dBm	3.4	-	-	
Overload Input Optical Power	P <sub>IN</sub>	dBm	2.4	-	-	2
Center Wavelength Range	$\lambda_c$	nm	820	-	880	
Receiver Sensitivity in Average Power	Sen	dBm	-	-	-5.2	3
Los Assert	LosA	dBm	-30	-	-	
Los De-Assert	LosD	dBm	-	-	-13	
Los Hysteresis	LosH	dB	0.5			

Note:

1. Coupled into 50/125 MMF.
2. Measured with PRBS  $2^{31}-1$  test pattern @25.78125Gbps.BER=E-12
3. BER= $1 \times 10^{-12}$ ; PRBS $2^{31}-1$ @25.78125Gbps.

## Recommended Host Board Power Supply Circuit

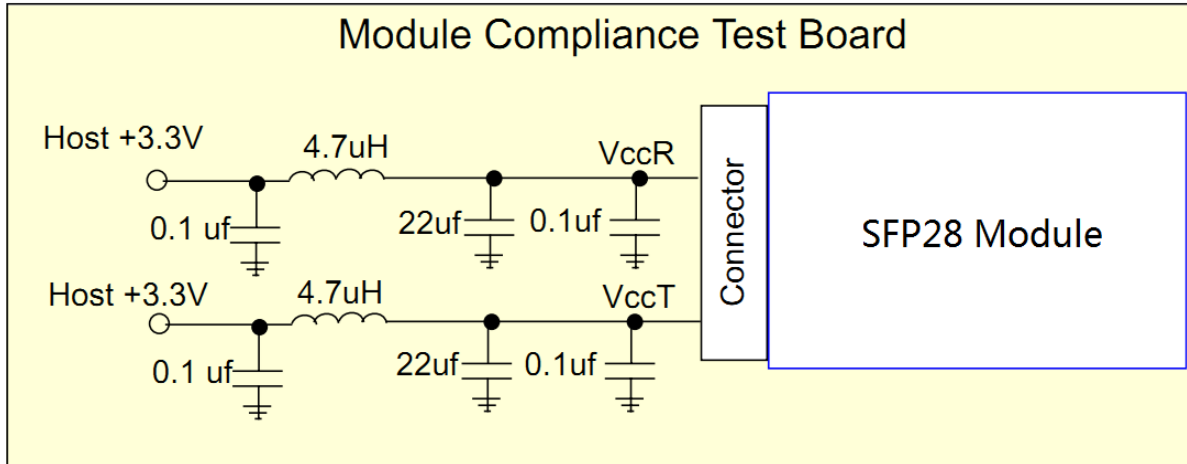


Figure 1, Recommended Host Board Power Supply Circuit

## Recommended Interface Circuit

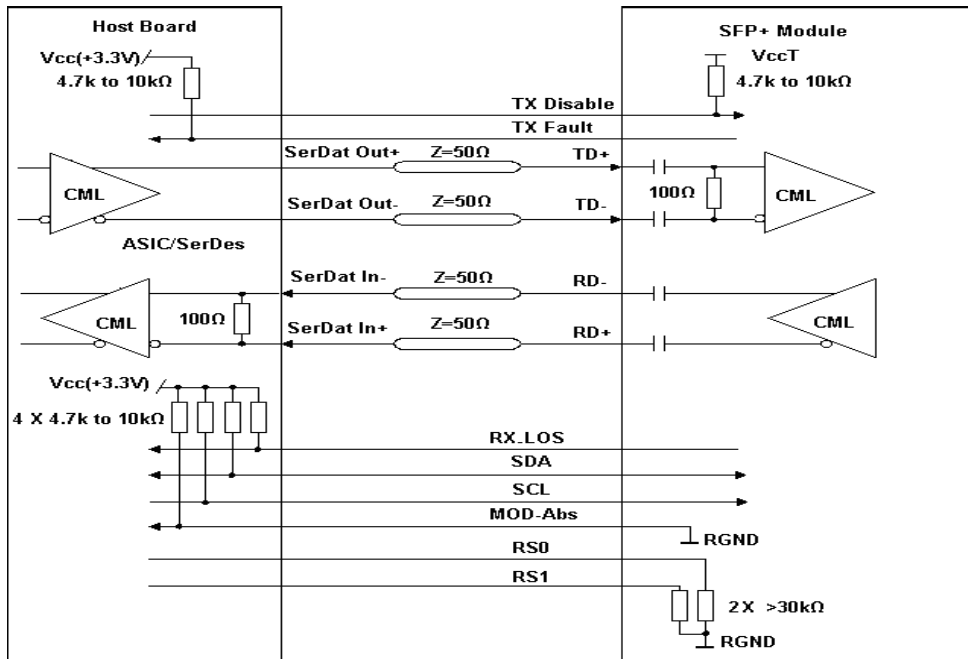


Figure 2, Recommended Interface Circuit

## Pin arrangement

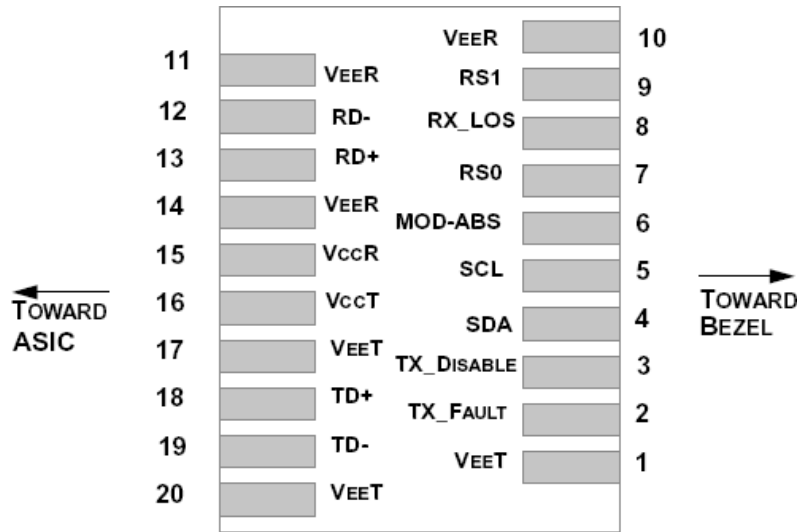


Figure 3, Pin View

Table 5-Pin Function Definitions

Pin	Symbol	Name/Description	Notes
1	VEET	Module Transmitter Ground	1
2	TX_FAULT	Module Transmitter Fault	2
3	TX_DISABLE	Transmitter Disable; Turns off transmitter laser output	3
4	SDA	2-Wire Serial Interface Data Line (MOD-DEF2)	
5	SCL	2-Wire Serial Interface Clock (MOD-DEF1)	
6	MOD_ABS	Module Absent, connected to VEET or VEER in the module	2
7	RS0	Rate Select 0, optionally controls SFP+ module receiver	4
8	RX_LOS	Receiver Loss of Signal Indication (In FC designated as Rx_LOS and in Ethernet designated as NOT Signal Detect)	2
9	RS1	Rate Select 1, optionally controls SFP+ module transmitter	4
10	VEER	Module Receiver Ground	1
11	VEER	Module Receiver Ground	1
12	RD-	Receiver Inverted Data Output	
13	RD+	Receiver Non-Inverted Data Output	
14	VEER	Module Receiver Ground	1
15	VccR	Module Receiver 3.3 V Supply	
16	VccT	Module Transmitter 3.3 V Supply	
17	VEET	Module Transmitter Ground	1
18	TD+	Transmitter Non-Inverted Data Input	
19	TD-	Transmitter Inverted Data Input	
20	VEET	Module Transmitter Ground	1

Note:

1. The module ground pins are isolated from the module case.
2. The pins shall be pulled up with 4.7K-10Kohms to a voltage between 3.14V and 3.46V on host board.
3. The pin is pulled up to VCCT with a 4.7K-10KΩ resistor in the module.
4. See SFF-8472 Rev12.2 Table 10-2.

## Monitoring Specification

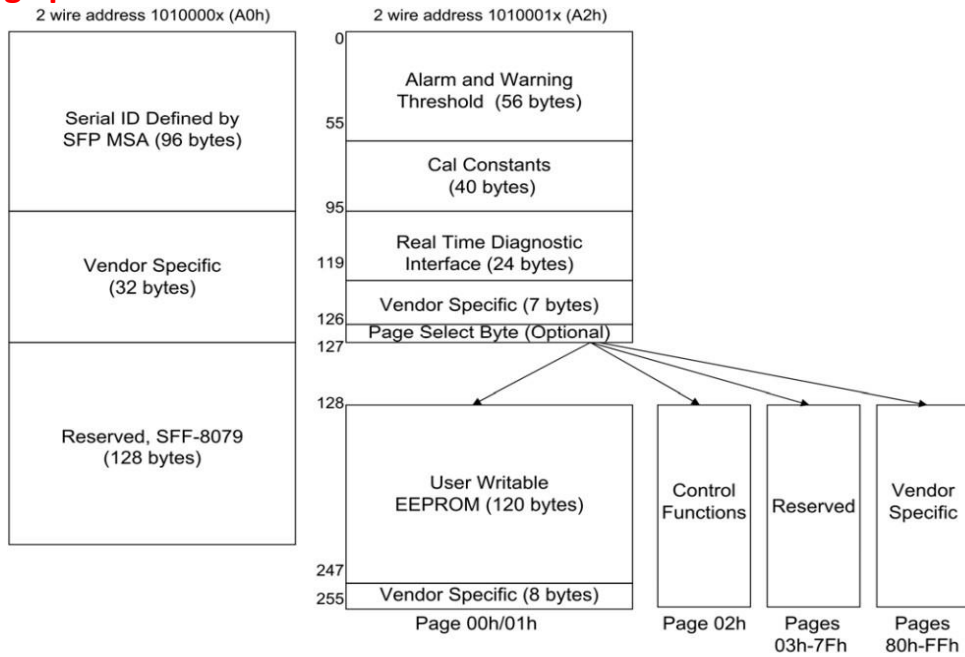


Figure 4, Memory Map

## Mechanical Design Diagram

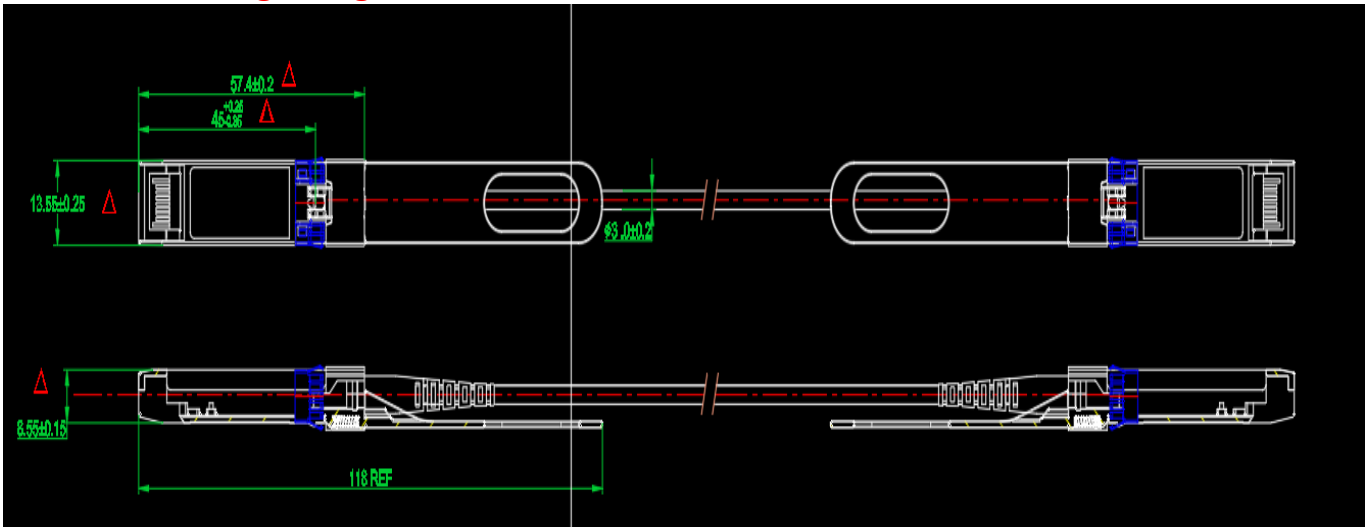


Table 5- Cable Length

Cable Length L (Unit: m)	Tolerant (Unit: cm)
$L < 1.0$	+10/-0
$1.0 \leq L \leq 4.5$	+15/-0
$4.5 < L \leq 14.5$	+30/-0
$> 14.5$	+2%L/-0

### Warnings

**Handling Precautions:** This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

**Laser Safety:** Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.