

### **SFP-50GBASE-LR-I-C**

MSA and TAA 50GBase-LR SFP56 Transceiver (SMF, 1310nm, 10km, LC, DOM, -40 to 85C)

#### **Features:**

- SFF-8431 and SFF-8472 Compliance
- SFP56 package with duplex LC connector
- Up to 53Gb/s bi-directional data links
- Single-mode Fiber
- Cooled 1310 EML Transmitter
- PIN Receiver
- Build-in DSP
- Single +3.3V power supply
- Class 1 laser safety certified
- 2.5W maximum power consumption
- Industrial Temperature -40 to 85 Celsius
- RoHS Compliant



#### **Applications:**

- 50GBase Ethernet
- Access and Enterprise

#### **Product Description**

This MSA and TAA compliant SFP56 transceiver provides 25GBase-LR throughput up to 10km over single-mode fiber (SMF) using a wavelength of 1310nm via an LC connector. It is built to MSA standards and is uniquely serialized and data-traffic and application tested to ensure that they will integrate into your network seamlessly. Digital optical monitoring (DOM) support is also present to allow access to real-time operating parameters. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

ProLabs' transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S.-made or designated country end products.")



## Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.4
- ESD to the LC Receptacle: compatible with IEC 61000-4-3
- EMI/EMC compatible with FCC Part 15 Subpart B Rules, EN55022:2010
- Laser Eye Safety compatible with FDA 21CFR, EN60950-1& EN (IEC) 60825-1,2
- RoHS compliant with EU RoHS 2.0 directive 2015/863/EU

## Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit
Maximum Supply Voltage	V <sub>cc</sub>	-0.5		4.0	V
Storage Temperature	T <sub>S</sub>	-40		85	°C
Operating Case Temperature	T <sub>c</sub>	-40	25	85	°C
Relative Humidity	RH	5		95	%
Data Rate			53.13		Gbps

## Electrical Characteristics (TOP=25°C, V<sub>cc</sub>=3.3Volts)

Parameter		Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage		V <sub>cc</sub>	3.135	3.3	3.465	V	
Module Supply Current		I <sub>cc</sub>			760	mA	
Power Dissipation		P <sub>D</sub>			2500	mW	
Transmitter							
Differential data input swing		V <sub>in</sub> , p-p			900	mVp-p	
Input differential impedance		Z <sub>in</sub>	90	100	110	Ω	
TX_FAULT	Transmitter Fault	V <sub>OH</sub>	2.0		V <sub>CCHOST</sub>	V	
	Normal Operation	V <sub>OL</sub>	0		0.8	V	
TX_DISABLE	Transmitter Disable	V <sub>IH</sub>	2.0		V <sub>CCHOST</sub>	V	
	Transmitter Enable	V <sub>IL</sub>	0		0.8	V	
Receiver							
Differential data output swing		V <sub>out</sub> , p-p			900	mVp-p	1
Output differential impedance		Z <sub>o</sub>	90	100	110	Ω	
Data Output Rise Time, Fall Time		t <sub>r</sub> , t <sub>f</sub>	9.5			ps	2
RX_LOS	Loss of signal (LOS)	V <sub>OH</sub>	2.0		V <sub>CCHOST</sub>	V	3
	Normal Operation	V <sub>OL</sub>	0		0.8	V	3

## Notes:

1. Internally AC coupled, but requires an external 100Ω differential load termination.

2. 20 – 80 %.
3. LOS is an open collector output. Should be pulled up with 4.7k $\Omega$  on the host board.

### Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
<b>Transmitter</b>						
Launch Optical Power (average)	P <sub>AV</sub>	-4.5		+4.2	dBm	1
Launch Optical Power (OMA)	P <sub>O</sub>	-1.5		+4	dBm	1
TDECQ (50G PAM4)	TDECQ			3.2	dB	
Extinction Ratio	ER	3.5			dB	
Center Wavelength Range	$\lambda_c$	1304.5		1317.5	nm	
Spectral Width	$\Delta\lambda$			1	nm	2
Side Mode suppression Ratio	SMSR	35			dB	
Optical Return Loss Tolerance	ORLT			15.1	dB	
Pout @TX-Disable Asserted	P <sub>off</sub>			-30	dBm	
<b>Receiver</b>						
Receiver Sensitivity (average)	R <sub>AV</sub>			-10.8	dBm	3
Receiver Sensitivity (OMA)	R <sub>OMA</sub>			-7.7	dBm	3
Receiver Overload	P <sub>av</sub>	+4.2			dBm	
Optical Wavelength Range	$\lambda_c$	1260		1340	nm	
Receiver Reflectance				-26	dB	
LOS De-Assert	LOS <sub>D</sub>			-12	dBm	
LOS Assert	LOS <sub>A</sub>	-20			dBm	
LOS Hysteresis		0.5			dB	

### Notes:

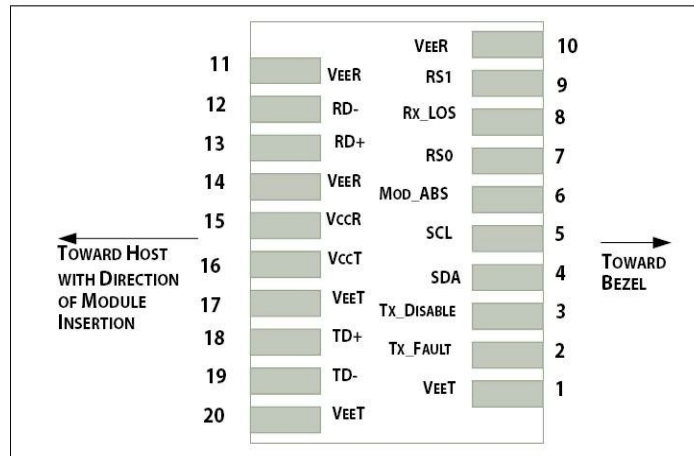
1. Class 1 Laser Safety per FDA/CDRH and EN (IEC) 60825 regulations.
2. 20dB spectral width.
3. Measured with PRBS 2<sup>31</sup>-1 at 2.4 $\times 10^{-4}$  BER.

## Pin Descriptions

Pin	Symbol	Name/Descriptions	Notes
1	VeeT	Transmitter Ground	1
2	TX_Fault	Transmitter Fault (LVTTTL-O) - High indicates a fault condition	2
3	TX_Disable	Transmitter Disable (LVTTTL-I) – High or open disables the transmitter	3
4	SDA	Two wire serial interface Data Line (LVCMOS-I/O) (MOD-DEF2)	4
5	SCL	Two wire serial interface Clock Line (LVCMOS-I/O) (MOD-DEF1)	4
6	MOD_ABS	Module Absent (Output), connected to VeeT or VeeR in the module	5
7	RS0	NA	6
8	RX_LOS	Receiver Loss of Signal (LVTTTL-O)	2
9	RS1	NA	6
10	VeeR	Receiver Ground	1
11	VeeR	Receiver Ground	1
12	RD-	Inverse Received Data out (CML-O)	
13	RD+	Received Data out (CML-O)	
14	VeeR	Receiver Ground	
15	VccR	Receiver Power - +3.3V	
16	VccT	Transmitter Power - +3.3 V	
17	VeeT	Transmitter Ground	1
18	TD+	Transmitter Data In (CML-I)	
19	TD-	Inverse Transmitter Data In (CML-I)	
20	VeeT	Transmitter Ground	1

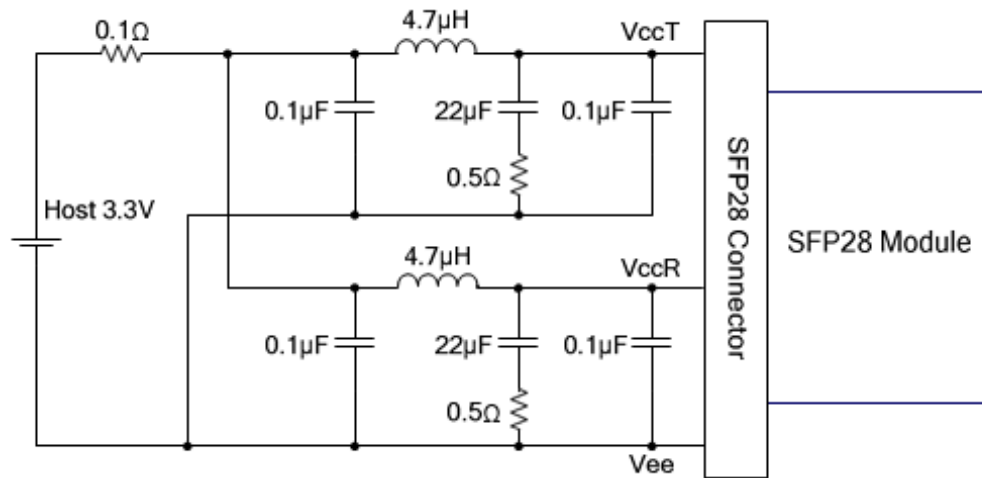
### Notes:

1. The module signal grounds are isolated from the module case.
2. This is an open collector/drain output that on the host board requires a 4.7K $\Omega$  to 10K $\Omega$  pull-up resistor to Vcc-Host.
3. This input is internally biased high with a 4.7K $\Omega$  to 10K $\Omega$  pull-up resistor to VccT.
4. Two-Wire Serial interface clock and data lines require an external pull-up resistor.
5. This is a ground return that on the host board requires a 4.7K $\Omega$  to 10K $\Omega$  pull-up resistor to Vcc-Host.
6. Rate select not available

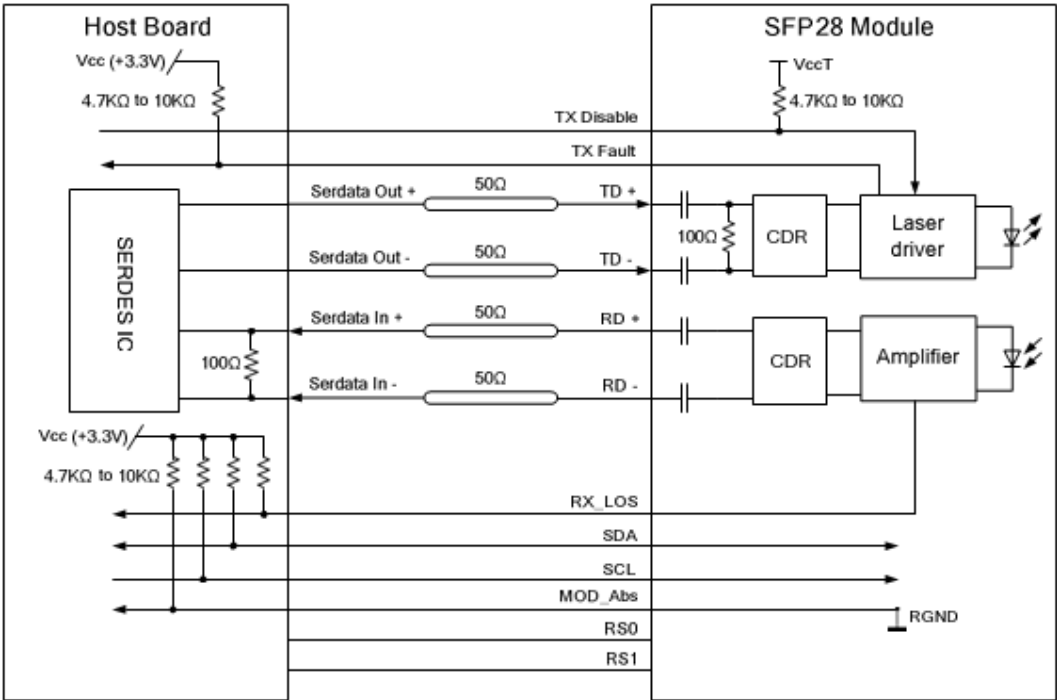


Host PCB SFP28 Pad Assignment Top View

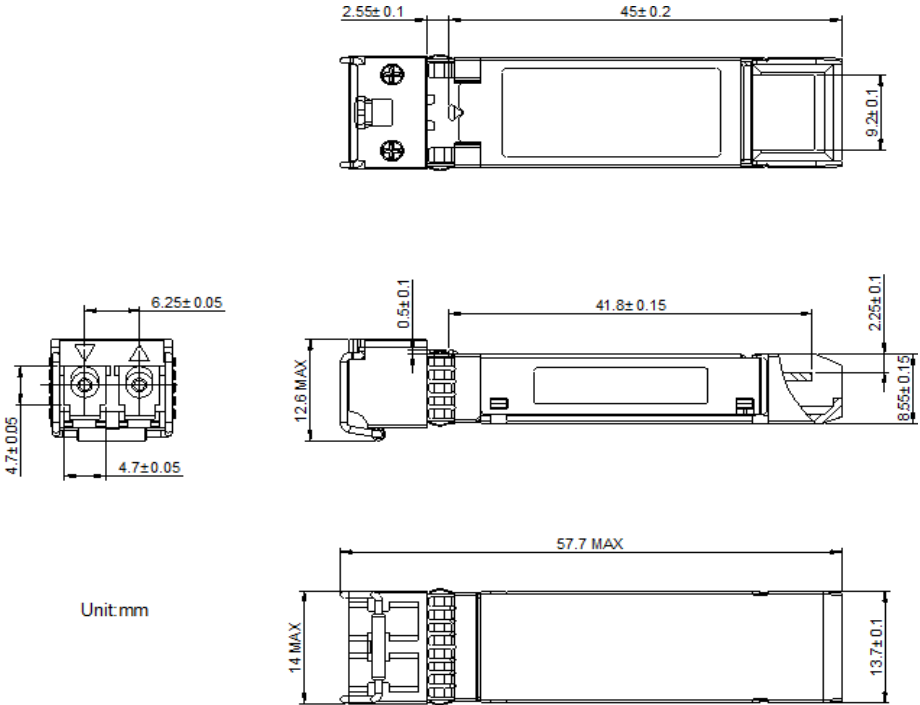
### Recommended Host Board Power Supply Filter Network



Recommended Application Interface Block Diagram



Mechanical Specifications



## About ProLabs

Our extensive experience comes as standard. For over 20 years ProLabs has delivered optical connectivity solutions that give our customers freedom and choice through our ability to provide seamless interoperability. At the heart of our company is the ability to provide state-of-the-art optical transport and connectivity solutions that are compatible with more than 100 optical switching and transport platforms.

## A Complete Portfolio of Network Solutions

ProLabs is focused on innovations in optical transport and connectivity. The combination of our knowledge of optics and networking equipment enables ProLabs to be your single source for optical transport and connectivity solutions from 100Mb to 1.6T while providing innovative solutions that increase network efficiency. We provide the optical connectivity expertise that is compatible with and enhances your switching and transport equipment.

## The Trusted Partner

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure compatible products, and immediate answers to your questions. With Engineering and Manufacturing offices in the U.K. and U.S. augmented by field offices throughout the U.S., U.K. and Asia, ProLabs is able to be our customers best advocate 24 hours a day.



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