

### SFPM-50GBASE-LR-PRO

MSA and TAA Compliant 50GBase-LR SFP56 Transceiver (SMF, 1310nm, 10km, DOM, 0 to 70C, LC)

#### Features

- SFF-8431 and SFF-8472 Compliance
- Up to 53Gb/s bi-directional data links
- SFP56 package with duplex LC connector
- Cooled 1310 EML Transmitter
- PIN Receiver
- Single-mode Fiber
- Single +3.3V power supply
- Build-in DSP
- 2.5W maximum power consumption
- Class 1 laser safety certified
- Operating Temperature: 0C to 70C
- RoHS Compliant



#### Applications:

- 50GBase Ethernet
- Access and Enterprise

#### Product Description

This MSA Compliant SFP56 transceiver provides 50GBase-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.

Proline's 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>	0	25	70	°C
Relative Humidity	RH	5		95	%
Data Rate		10.3125		53.125	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		
<b>Transmitter</b>							
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	
<b>Receiver</b>							
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 4.7kΩ on the host board.

### Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
<b>Transmitter</b>						
Launch Optical Power (average@50G PAM4)	P <sub>av</sub>	-4.5		+4.2	dBm	1
Launch Optical Power (OMA@50G PAM4)	P <sub>o</sub>	-1.5		+4	dBm	1
Launch Optical Power (average@10G&25G NRZ)	P <sub>av</sub>	-5		+2	dBm	1
Launch Optical Power (OMA@10G&25G NRZ)	P <sub>o</sub>	-4		+2.2	dBm	1
TDECQ (50G PAM4)	TDECQ			3.2	dB	
Extinction Ratio	ER	3.5			dB	
Center Wavelength Range	λ <sub>c</sub>	1304.5		1317.5	nm	
Spectral Width	Δλ			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>						
50G Receiver Sensitivity (average)	R <sub>av</sub>			-10.8	dBm	3
50G Receiver Sensitivity (OMA)	R <sub>oma</sub>			-7.7	dBm	3
25G Receiver Sensitivity (average)	R <sub>av</sub>			-12	dBm	4
25G Receiver Sensitivity (OMA)	R <sub>oma</sub>			-11.3	dBm	4
10G Receiver Sensitivity (average)	R <sub>av</sub>			-12	dBm	5
10G Receiver Sensitivity (OMA)	R <sub>oma</sub>			-11.3	dBm	5
Receiver Overload	P <sub>av</sub>	+4.2			dBm	
Optical Wavelength Range	λ <sub>c</sub>	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 2.4×10<sup>-4</sup> BER.
4. Measured with PRBS 2<sup>31</sup>-1 at 5×10<sup>-5</sup> BER.

5. Measured with PRBS  $2^{31}-1$  at  $1 \times 10^{-12}$  BER.

### Multi-rate Functionality

Through the I2C interface, the data rate ranges can be set through byte 110 & byte 118 (in the 0xA2)

Bit 110.3 soft RS0	Bit 118.3 soft RS1	Data Rate
0	0	10.31Gbps
0	1	NA
1	0	25.78Gbps
1	1	53.12Gbps (default setting)

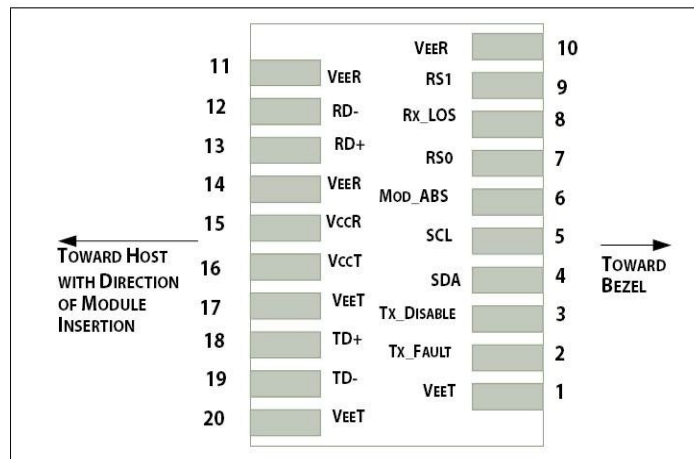
**Note:** Rate selection only supports software function but not hardware pin function

### 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

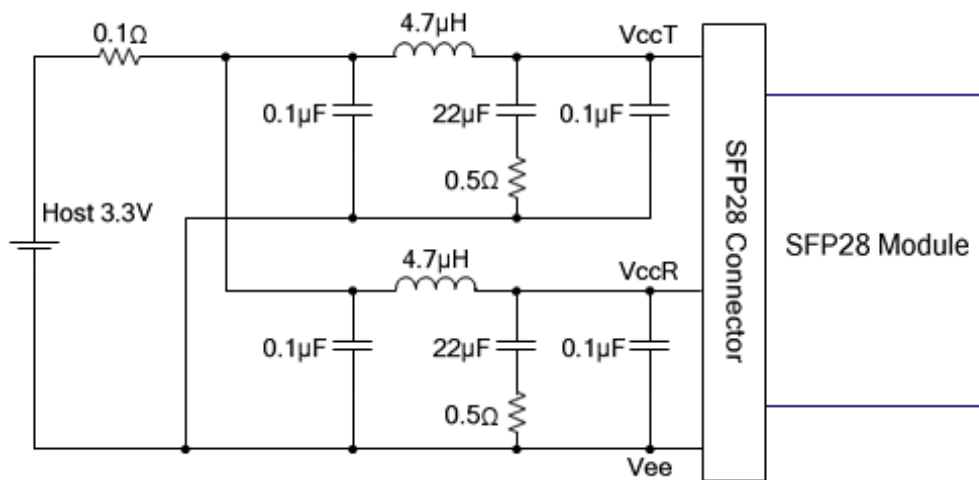
**Notes:**

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 4.7KΩ to 10KΩ pull-up resistor to Vcc-Host.
3. This input is internally biased high with a 4.7KΩ to 10KΩ 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 4.7KΩ to 10KΩ pull-up resistor to Vcc-Host.
6. Rate select not available

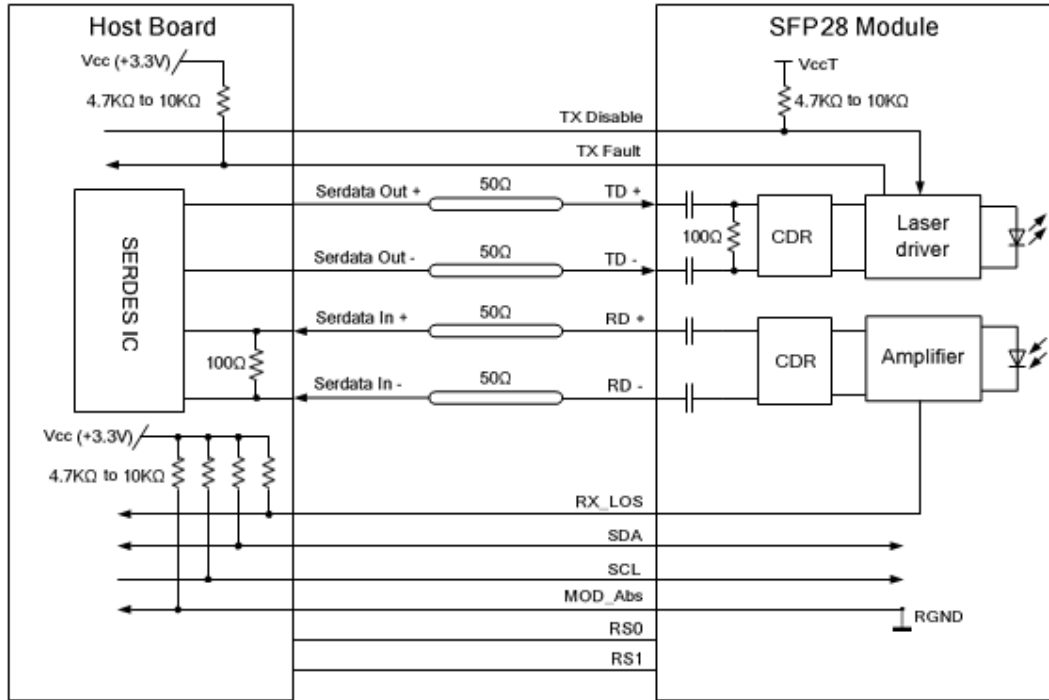


Host PCB SFP28 Pad Assignment Top View

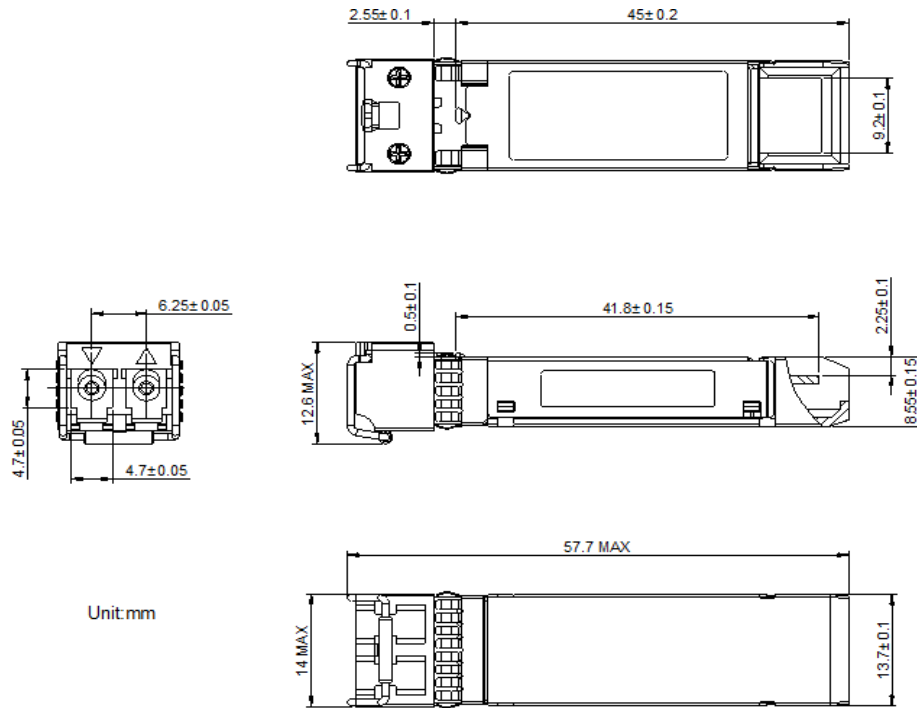
**Recommended Host Board Power Supply Filter Network**



## Recommended Application Interface Block Diagram



## Mechanical Specifications



**About Us:**

Proline Options is one of North America's leading providers of transceivers and high speed cabling. With a reputation for quality, tested products that cover the connectivity spectrum, Proline Options has a solution for you regardless of the specification.

At Proline Options, every product is tested in its intended application - never batch or spec tested only. We run bandwidth, distance and IOS network tests. We have documented an impressive 0.03% failure rate over the last 10 years. To continue this rate of success we invest millions annually in our own on-site testing lab.



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