

SFPM-50GBASE-LR-I-C

MSA and TAA 50GBase-LR SFP56 Transceiver Multi-Rate 10/25/50G (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 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.

ProLabs'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	Vcc	-0.5		4.0	V
Storage Temperature	TS	-40		85	°C
Operating Case Temperature	Tc	-40	25	85	°C
Relative Humidity	RH	5		95	%
Data Rate		10.3125		53.125	Gbps

Electrical Characteristics (TOP=25°C, Vcc=3.3Volts)

Parameter		Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage		Vcc	3.135	3.3	3.465	V	
Module Supply Current		Icc			760	mA	
Power Dissipation		P _D			2500	mW	
Transmitter							
Differential data input swing		V _{in} , p-p			900	mVp-p	
Input differential impedance		Z _{in}	90	100	110	Ω	
TX_FAULT	Transmitter Fault	V _{OH}	2.0		V _{CCHOST}	V	
	Normal Operation	V _{OL}	0		0.8	V	
TX_DISABLE	Transmitter Disable	V _{IH}	2.0		V _{CCHOST}	V	
	Transmitter Enable	V _{IL}	0		0.8	V	
Receiver							
Differential data output swing		V _{out} , p-p			900	mVp-p	1
Output differential impedance		Z _o	90	100	110	Ω	
Data Output Rise Time, Fall Time		t _r , t _f	9.5			ps	2
RX_LOS	Loss of signal (LOS)	V _{OH}	2.0		V _{CCHOST}	V	3
	Normal Operation	V _{OL}	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
Transmitter						
Launch Optical Power (average@50G PAM4)	P _{av}	-4.5		+4.2	dBm	1
Launch Optical Power (OMA@50G PAM4)	P _o	-1.5		+4	dBm	1
Launch Optical Power (average@10G&25G NRZ)	P _{av}	-5		+2	dBm	1
Launch Optical Power (OMA@10G&25G NRZ)	P _o	-4		+2.2	dBm	1
TDECQ (50G PAM4)	TDECQ			3.2	dB	
Extinction Ratio	ER	3.5			dB	
Center Wavelength Range	λ _c	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 _{off}			-30	dBm	
Receiver						
50G Receiver Sensitivity (average)	R _{av}			-10.8	dBm	3
50G Receiver Sensitivity (OMA)	R _{oma}			-7.7	dBm	3
25G Receiver Sensitivity (average)	R _{av}			-12	dBm	4
25G Receiver Sensitivity (OMA)	R _{oma}			-11.3	dBm	4
10G Receiver Sensitivity (average)	R _{av}			-12	dBm	5
10G Receiver Sensitivity (OMA)	R _{oma}			-11.3	dBm	5
Receiver Overload	P _{av}	+4.2			dBm	
Optical Wavelength Range	λ _c	1260		1340	nm	
Receiver Reflectance				-26	dB	
LOS De-Assert	LOS _D			-12	dBm	
LOS Assert	LOS _A	-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 2³¹-1 at 2.4×10⁻⁴ BER.
4. Measured with PRBS 2³¹-1 at 5×10⁻⁵ BER.

5. Measured with PRBS $2^{31}-1$ at 1×10^{-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)

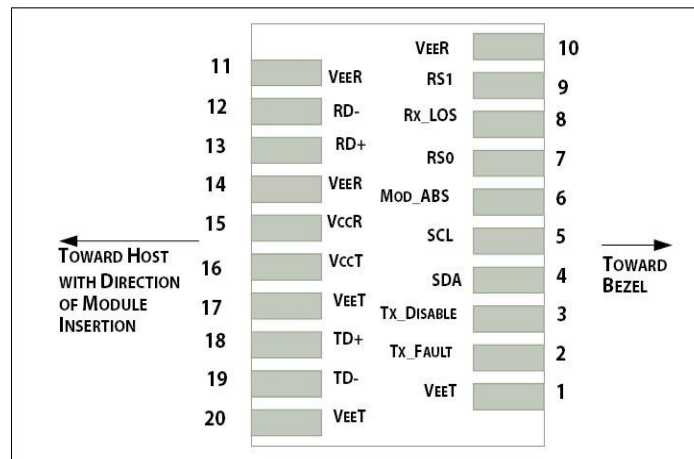
Note: Rate selection only supports software function but not hardware pin function

Pin Descriptions

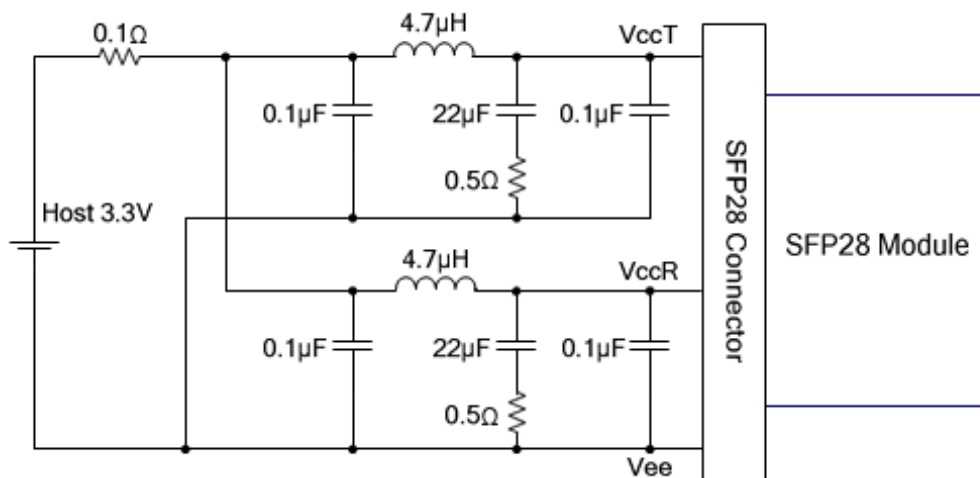
Pin	Symbol	Name/Descriptions	Notes
1	VeeT	Transmitter Ground	1
2	TX_Fault	Transmitter Fault (LVTTL-O) - High indicates a fault condition	2
3	TX_Disable	Transmitter Disable (LVTTL-I) – High or open disables the transmitter	3
4	SDA	Two wire serial interface Data Line (LVCMOS-I/O) (MOD-DEF2)	4
5	SCL	Two 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 (LVTTL-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:

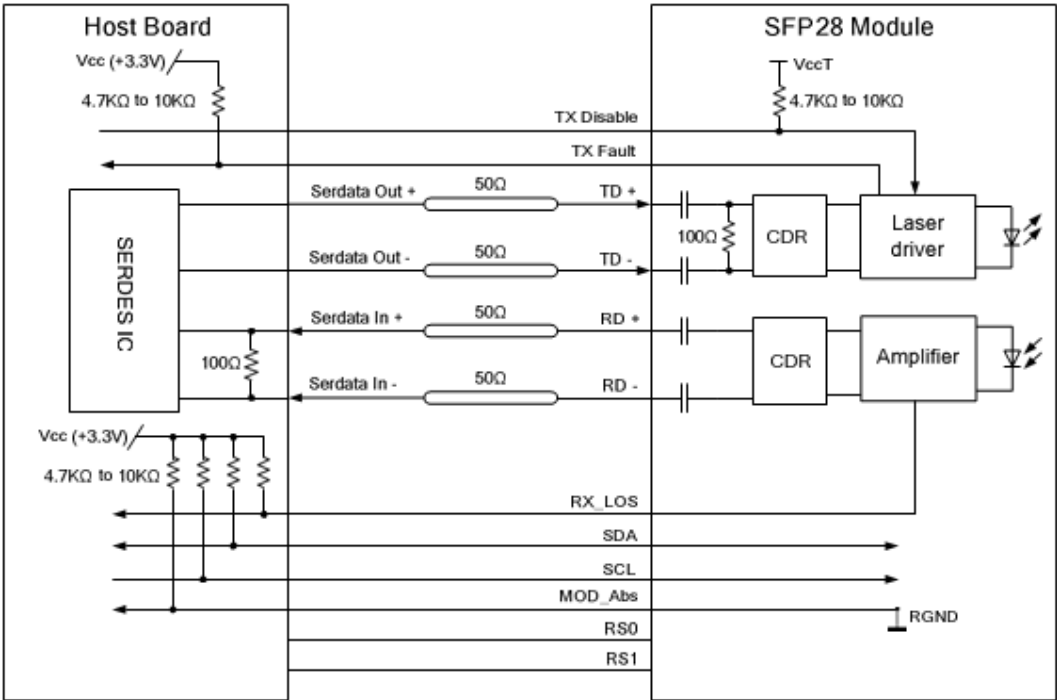
1. The module signal grounds are isolated from the module case.
2. This is an open collector/drain output that on the host board requires a 4.7K Ω to 10K Ω pull-up resistor to Vcc-Host.
3. This input is internally biased high with a 4.7K Ω to 10K Ω pull-up resistor to VccT.
4. Two-Wire Serial interface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



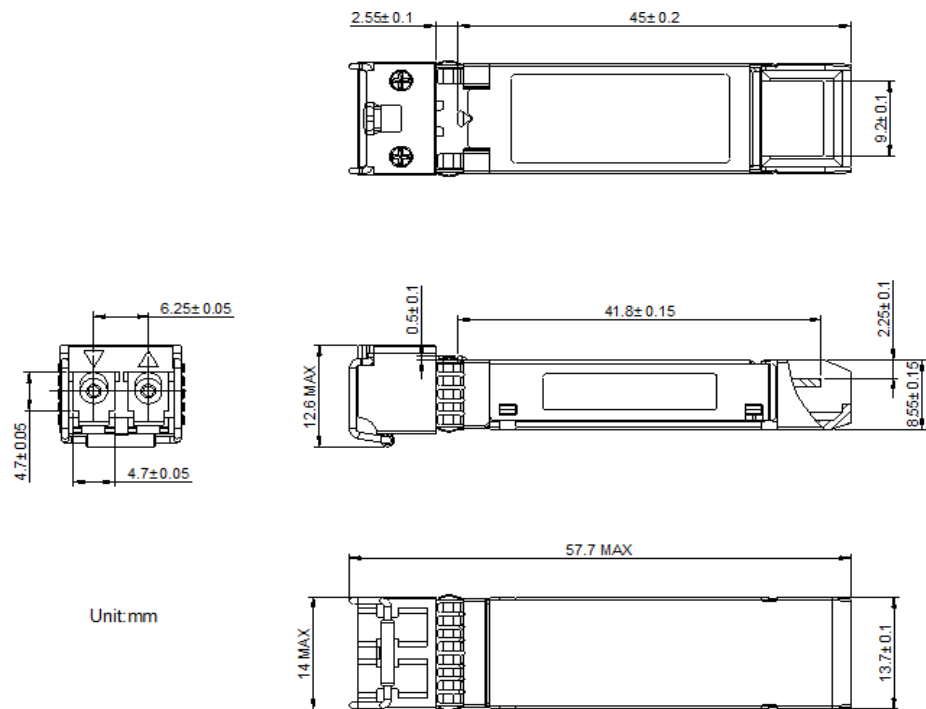
Host PCB SFP28 Pad Assignment Top View

Recommended Host Board Power Supply Filter Network

Recommended Application Interface Block Diagram



Mechanical Specifications



About ProLabs

Our experience comes as standard; for over 15 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 over 90 optical switching and transport platforms.

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 400G 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.

Trusted Partner

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure that you get immediate answers to your questions and compatible product when needed. 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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