SFP-OC-48-IR1-20-I-C

MSA and TAA OC-48-IR1 SFP Transceiver (SMF, 1310nm, 20km, LC, DOM, -40 to 85C)

Features:

- Operating data rate up to 10.31Gbps
- 1310nm DFB-LD Transmitter
- Distance up to 20km
- Duplex LC Connector Interface, Hot Pluggable
- Single 3.3V Power Supply and TTL Logic Interface
- Compliant with MSA SFP+ Specification SFF-8431
- Compliant with IEEE802.3ae 10GBASE-LR/LW
- Power Dissipation: 1.0W
- Operating Temperature: -40 to 85 Celsius
- RoHS Compliant and Lead Free

Applications:

- 2.5GBase Ethernet
- Access and Enterprise

Product Description

This MSA compliant SFP transceiver provides OC-48-IR1 throughput up to 20km 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. It is built to meet or exceed the specifications of MSA Compliant, as well as to comply with MSA (Multi-Source Agreement) standards to ensure seamless network integration. 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.")

Rev. 012126

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Storage Temperature	Tstg	-40		85	°C	
Operating Case Temperature	Tc	-40		85	°C	
Relative Humidity	RH			95	%	
Supply Voltage	Vcc	-0.5		3.6	V	
Baud Rate			10.31 9.95			
9µm Core Diameter SMF	L		10		km	
Data Rate		0.6	10.31		Gbps	

Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage	Vcc	3.15	3.3	3.45	V	
Module Supply Current	Icc			300	mA	
Surge Current	Isurge			30	mA	
Transmitter						
LVPECL Differential Inputs	VIN	150		1200	mVp-p	1
Input AC Common-Mode Voltage		0		25	mV	RMS
Input Differential Impedance	ZIN	85	100	115	Ω	RIN > 100kΩ @ DC
Differential Input S-Parameter	SDD11			-10	dB	
Differential to Common-Mode Conversion	SCD11			-10	dB	
Tx_Disable Assert Time			10		us	
Tx_Disable Negate Time			1		ms	
Tx_Disable		2		Vcc	V	
		0		0.8	V	
Tx_Fault		2		Vcc+0.3	V	2
		0		0.8	V	
Receiver						
Differential CML Outputs	VOUT	350		700	mVp-p	3
Output AC Common-Mode Voltage		0		15	mV	RMS
Differential Output Impedance	Zot	90	100	110	Ω	
Differential Output S-Parameter	SD22			-10	dB	
Rx_LOS	VOH	2		Vcc+0.3		
	VOL	0		0.8		
MOD_DEF(0.2)	VOH	2			V	With Serial ID
	VOL	0		0.5	V	

Notes:

1. AC coupled inputs. LVPECL logic. Internally AC coupled.
2. Io = 400μA; Host_Vcc. Io = 4.0mA.
3. AC coupled outputs. LVPECL logic. Internally AC coupled.

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						
Center Wavelength	λC	1270	1310	1355	nm	
Spectral Width (RMS)	Δλ			1	nm	
Average Output Power	POUT	-3		2	dBm	1
Extinction Ratio	ER	3.5			dB	
Average Power of Off Transmitter	Poff			-30	dBm	
Side-Mode Suppression Ratio	SMSR	30			dB	
Transmitter Dispersion Penalty	TDP			3.2	dB	
Tx_Disable Time to Start Reset	t_reset	10			us	
Time to Initialize (Includes Reset of Tx_Fault)	t_init			300	ms	
Tx_Fault from Fault to Assertion	t_fault			100	us	
Total Jitter	TJ			0.28	UI(p-p)	
Data-Dependent Jitter	DDJ			0.1	UI(p-p)	
Uncorrelated Jitter	UJ			0.023	RMS	
Receiver						
Center Wavelength	λC	1260		1600	nm	
Receiver Sensitivity	Pmin			-14.4	dBm	2
Receiver Overload	Pmax	0.5			dBm	
Return Loss	ORL			-12		
LOS De-Assert	LOSD			-16	dBm	
LOS Assert	LOSA	-28			dBm	
LOS Hysteresis	LOSH	0.5			dB	

Notes:

1. The output is coupled into a 9/125µm SMF. The -4.7dBm is in reference to IEEE 802.3ae, the typical value is -1dBm.
2. The minimum average optical power measured at the BER is less than $1E^{-12}$, back-to-back. The measured pattern is PRBS 2^{31}-1.

Pin Description

Pin	Symbol	Name/Description	Plug Seq.	Notes
1	VeeT	Transmitter Ground.	1	5
2	Tx_Fault	Transmitter Fault Indication.	3	1
3	Tx_Disable	Transmitter Disable. Module disables on “high” or “open.”	3	2
4	SDA	Transmitter Disable. 2-Wire Serial ID Interface.	3	3
5	SCL	Module Definition 2. 2-Wire Serial ID Interface.	3	3
6	MOD_ABS	Module Definition 1.	3	3
7	RS0	Rx Rate Select. LVTTL. Rate Select 0 optionally controls the SFP+ module receiver. This pin is pulled low to the VeeT with a >30K resistor.	3	
8	LOS	Loss of Signal.	3	4
9	RS1	Tx Rate Select. LVTTL. Rate Select 1 optionally controls the SFP+ module transmitter. This pin is pulled low to the VeeT with a >30K resistor.	1	
10	VeeR	Receiver Ground.	1	5
11	VeeR	Receiver Ground.	1	5
12	RD-	Inverse Received Data Out.	3	6
13	RD+	Received Data Out.	3	6
14	VeeR	Receiver Ground.	1	5
15	VccR	3.3V ± 5% Receiver Power.	2	7
16	VccT	3.3V ± 5% Transmitter Power.	2	7
17	VeeT	Transmitter Ground.	1	5
18	TD+	Transmitter Data In.	3	8
19	TD-	Inverse Transmitter Data In.	3	8
20	VeeT	Transmitter Ground.	1	5

Notes:

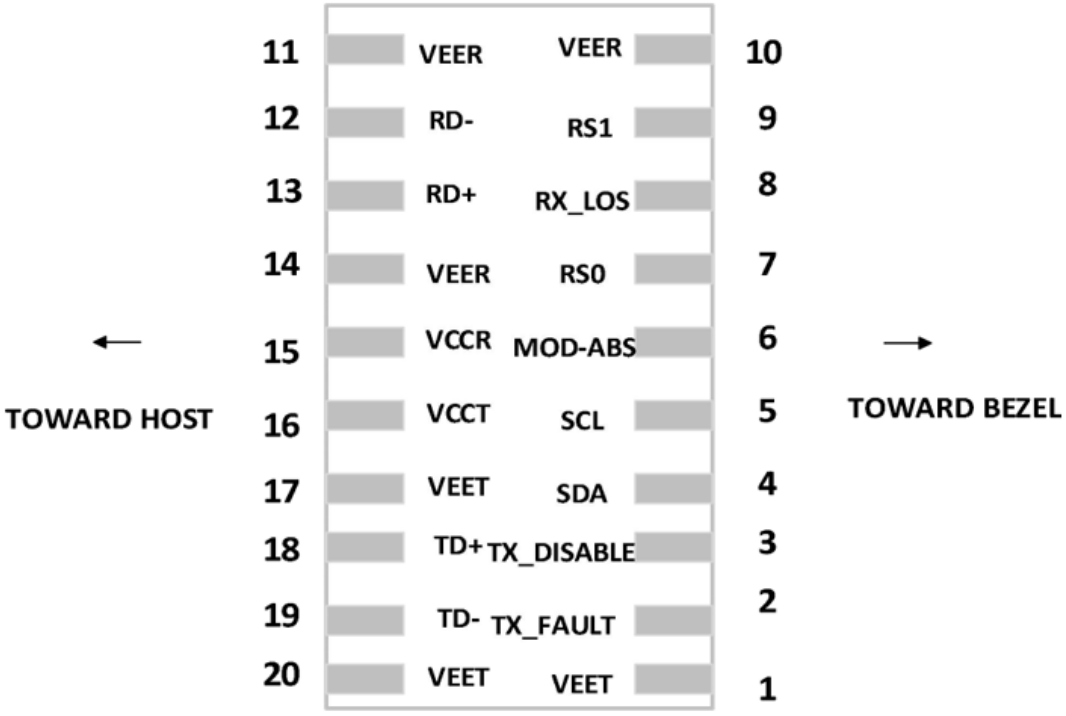
1. Tx_Fault is an open collector/drain output that should be pulled up with a 4.7kΩ to 10kΩ resistor on the host board. Pull-up voltage is between 2.0V and VccT/R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to <0.8V.
2. Tx_Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7kΩ to 10kΩ resistor. Its states are:

   Low (0V to 0.8V): Transmitter On
   (>0.8V and <2V): Undefined
   High (2.0V to 3.465V): Transmitter Disabled
   Open: Transmitter Disabled.
3. Modulation absent. Connected to the VeeT or VeeR in the module.
4. LOS (Loss of Signal) is an open collector/drain output that should be pulled up with a 4.7kΩ to 10kΩ resistor. Pull-up voltage is between 2.0V and VccT/R+0.3V. When high, this output indicates that the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use).

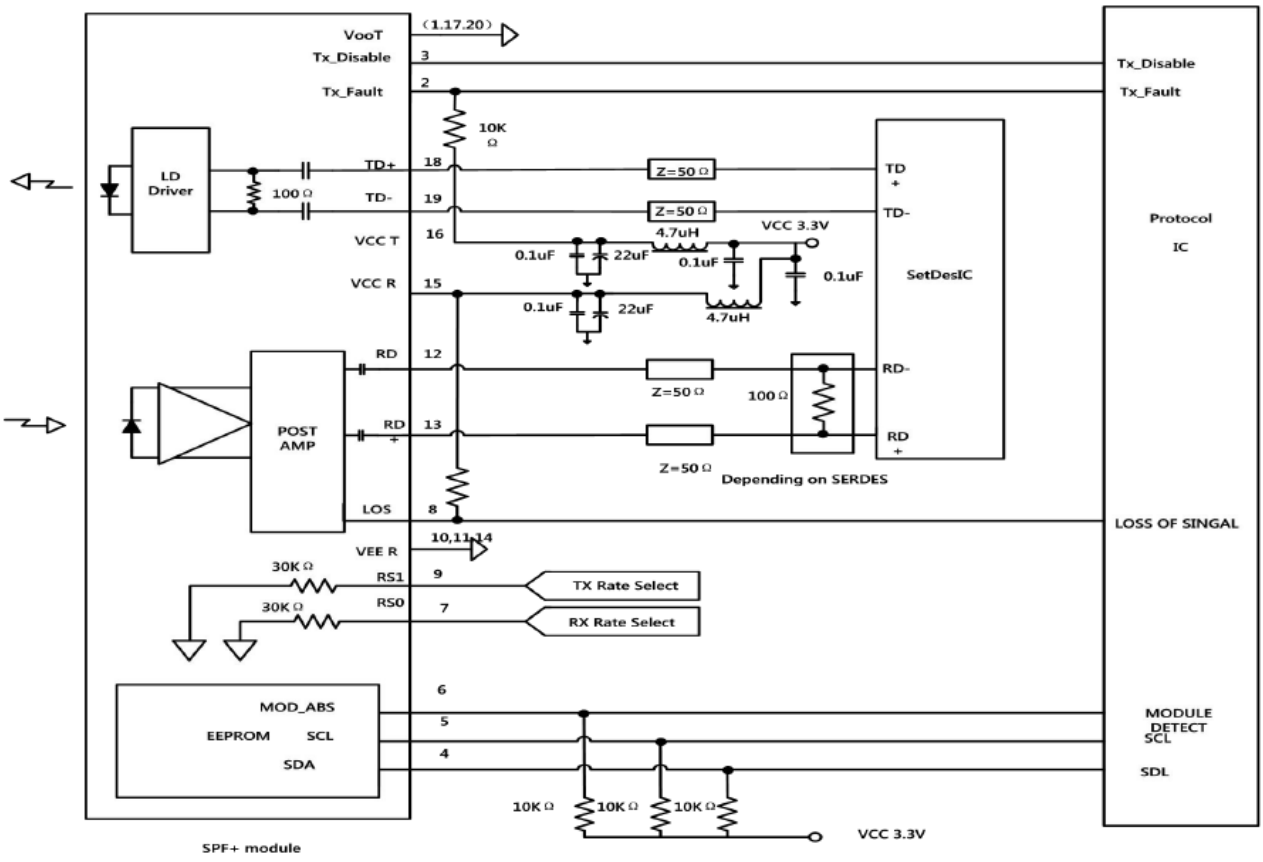
Low indicates normal operation. In the low state, the output will be pulled to <0.8V.

5. VeeR and VeeT may be internally connected within the SFP module.
6. RD-/+. These are the differential receiver outputs. They are AC-coupled, 100 differential lines which should be terminated with 100 (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 400mV and 2000mV differential (200mV and 1000mV single-ended) when properly terminated.
7. VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ± 5% at the SFP connector pin. Maximum supply current is 300mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1Ω should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot-plugging of the SFP transceiver module will result in an in-rush current of no more than 30mA greater than the steady state value. VccR and VccT may be internally connected within the SFP transceiver module.
8. TD-/+. These are the differential transmitter inputs. They are AC-coupled, differential lines with 100 differential termination inside the module.

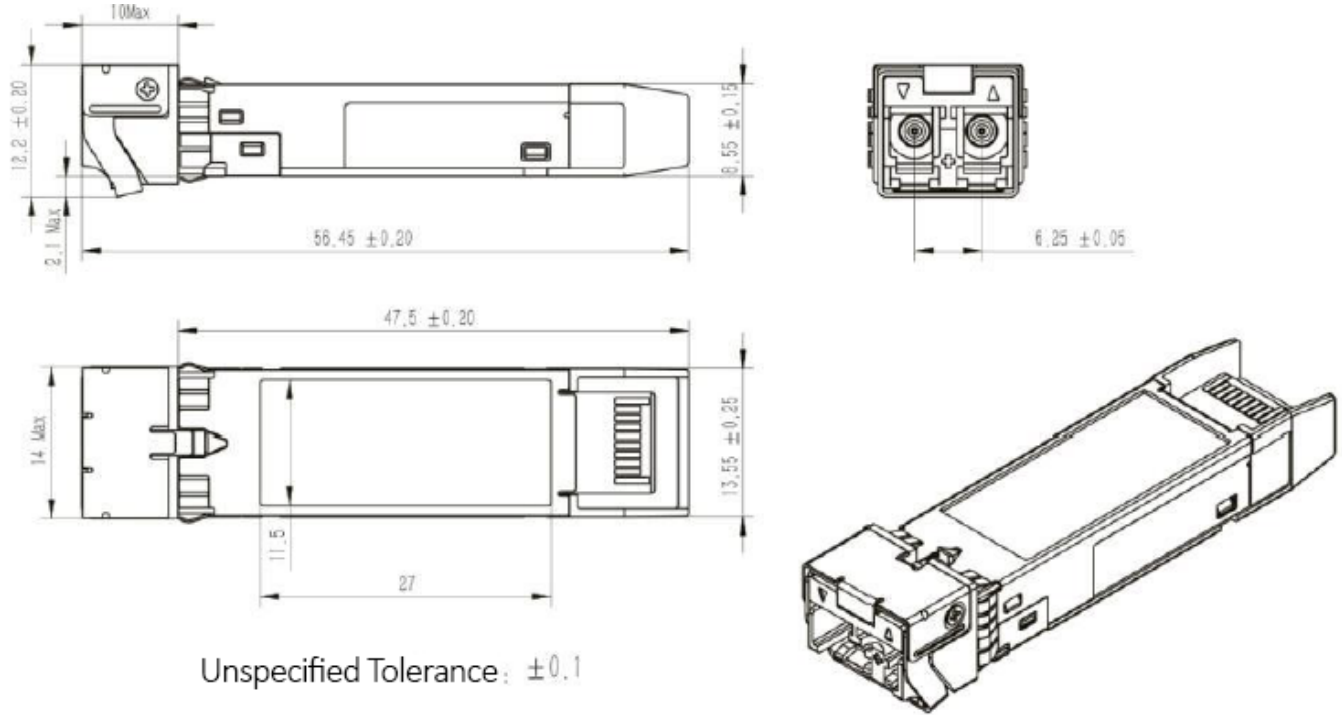
Electrical Pin-Out Details



Recommended Circuit Schematic



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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