

## SFP-1/10GB-LR-MX-C

Mellanox® Compatible TAA 1/10GBase-LR SFP+ Dual-Rate Transceiver (SMF, 1310nm, 10km, LC, DOM)

### Features:

- Supports Rate Selectable 1.25Gbps or 9.83Gbps to 11.3Gbps Bit Rates
- Compliant with IEEE 802.3.2-2012 10GBASE-LR/LW and 1000BASE-LX
- Compliant with SFF-8431
- Hot-Pluggable SFP+ Footprint
- 1310 DFB Laser Transmitter
- Built-In Digital Diagnostic Functions
- Duplex LC Connector
- Up to 10km on SMF
- 3.3V Power Supply
- Operating Temperature: 0 to 70 Celsius
- RoHS Compliant and Lead-Free



### Applications:

- 10GBase Ethernet

### Product Description

This Mellanox® compatible SFP+ transceiver provides 1/10GBase-LR throughput up to 10km over single-mode fiber (SMF) using a wavelength of 1310nm via an LC connector. It can operate at temperatures between 0 and 70C. All of our transceivers are built to comply with Multi-Source Agreement (MSA) standards and are uniquely serialized and tested for data-traffic and application 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.")



## Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Maximum Supply Voltage	V <sub>CC</sub>	-0.5		4	V	1
Storage Temperature	T <sub>stg</sub>	-40		85	°C	
Operating Case Temperature	T <sub>c</sub>	0		70	°C	
Data Rate (RS0 = Low)	DR		1.25		Gbps	2
Data Rate (RS0 = High)	DR	9.83	10.3125	11.3	Gbps	2
Bit Error Rate	BER			10 <sup>-12</sup>		

### Notes:

1. For the electrical power interface.
2. IEEE 802.3-2012.

## Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Module Supply Voltage	V <sub>CC</sub>	3.14	3.3	3.46	V	
Module Supply Current	I <sub>CC</sub>		290	380	mA	1
Power Dissipation	P <sub>DISS</sub>		1.0	1.3	W	
<b>Transmitter</b>						
Input Differential Impedance	R <sub>IN</sub>		100		Ω	
Differential Data Input Swing	V <sub>IN,pp</sub>	180		700	mVp-p	
Transmit Disable Voltage	V <sub>D</sub>	2		Host_V <sub>CC</sub>	V	
Transmit Enable Voltage	V <sub>EN</sub>	V <sub>EE</sub>		V <sub>EE</sub> +0.8	V	
<b>Receiver</b>						
Differential Data Output Swing	V <sub>OUT,pp</sub>	300		850	mVp-p	
Data Output Rise/Fall Time (20-80%)	T <sub>r</sub> /T <sub>f</sub>	28			ps	
LOS Assert	V <sub>LOSA</sub>	2		Host_V <sub>CC</sub>	V	
LOS De-Assert	V <sub>LOSD</sub>	V <sub>EE</sub>		V <sub>EE</sub> +0.5	V	

### Notes:

1. For the electrical power interface.

## Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
<b>Transmitter</b>						
Output Optical Power @1.25Gbps	PTX1	-9.5		-3	dBm	1
Output Optical Power @10.3Gbps	PTX2	-8.2		0.5	dBm	1
Optical Center Wavelength	$\lambda_C$	1260		1355	nm	
Optical Modulation Amplitude	OMA	-5.2			dBm	2
Extinction Ratio @1.25Gbps	ER1	9			dB	
Extinction Ratio @10.3Gbps	ER2	3.5			dB	
Spectral Width (-20dB)	$\Delta\lambda$			1	nm	
Side-Mode Suppression Ratio	SMSR	30			dB	
Relative Intensity Noise	RIN			-128	dB/Hz	
Transmitter Dispersion Penalty	TDP			3.2	dB	
Launch Power of Off Transmitter	P <sub>off</sub>			-30	dBm	1
Transmitter Jitter						2
<b>Receiver</b>						
Optical Center Wavelength	$\lambda_C$	1260		1600	nm	
Receive Overload	POL	0.5			dBm	
Receiver Sensitivity @1.25Gbps	RX_SEN1			-19	dBm	3
Receiver Sensitivity @10.3Gbps	RX_SEN2			-14.4	dBm	4
Receiver Reflectance	TR <sub>RX</sub>			-12	dB	
LOS Assert @1.25Gbps	LOSA	-30			dBm	
LOS Assert @10.3Gbps	LOSA	-30			dBm	
LOS De-Assert @1.25Gbps	LOSD			-17	dBm	
LOS De-Assert @10.3Gbps	LOSD			-17	dBm	
LOS Hysteresis	LOSH	0.5			dB	

### Notes:

1. Average.
2. According to IEEE 802.3ae requirements.
3. Average. Test the resulting value using the minimum ER value within the defined range: BER<10<sup>-12</sup> and 2<sup>7</sup>-1 PRBS.
4. Average. Test the resulting value using the minimum ER value within the defined range: BER<10<sup>-12</sup> and 2<sup>31</sup>-1 PRBS.

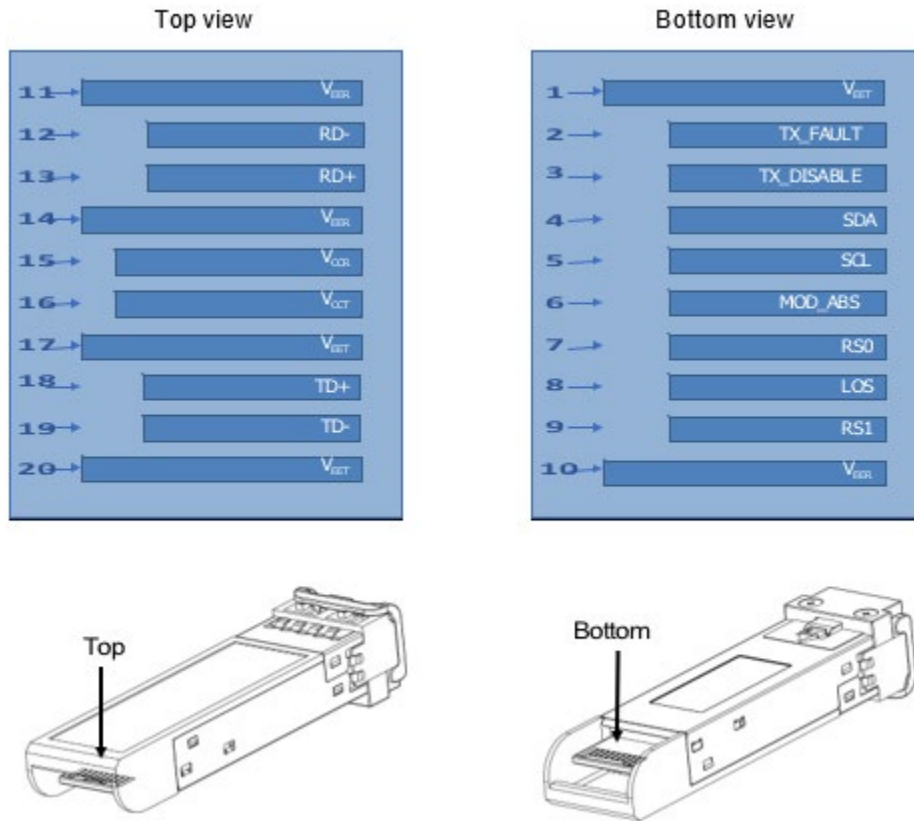
## Pin Descriptions

Pin	Symbol	Name/Description	Notes
1	VeeT	Transmitter Ground (Common with Receiver Ground).	1
2	Tx_Fault	Transmitter Fault.	2
3	Tx_Disable	Transmitter Disable. Laser output disables on “high” or “open.”	3
4	SDA	2-Wire Serial Interface Data.	4
5	SCL	2-Wire Serial Interface Clock.	4
6	MOD_ABS	Module Absent. Grounded within the module.	4
7	RS0	Module Rate Selection: “Open” or “Low” Level = 1.25Gbps rate (low bandwidth). “High” Level = 9.95-10.31Gbps rate (high bandwidth).	
8	LOS	Loss of Signal Indication. “Logic 0” indicates normal operation.	5
9	RS1	No Connection Required.	1
10	VeeR	Receiver Ground (Common with Transmitter Ground).	1
11	VeeR	Receiver Ground (Common with Transmitter Ground).	1
12	RD-	Inverse Receiver Data Out. AC Coupled.	
13	RD+	Received Data Out. AC Coupled.	
14	VeeR	Receiver Ground (Common with Transmitter Ground).	1
15	VccR	Receiver Power Supply.	
16	VccT	Transmitter Power Supply.	
17	VeeT	Transmitter Ground (Common with Receiver Ground).	1
18	TD+	Transmitter Data In. AC Coupled.	
19	TD-	Inverse Transmitter Data In. AC Coupled.	
20	VeeT	Transmitter Ground (Common with Receiver Ground).	1

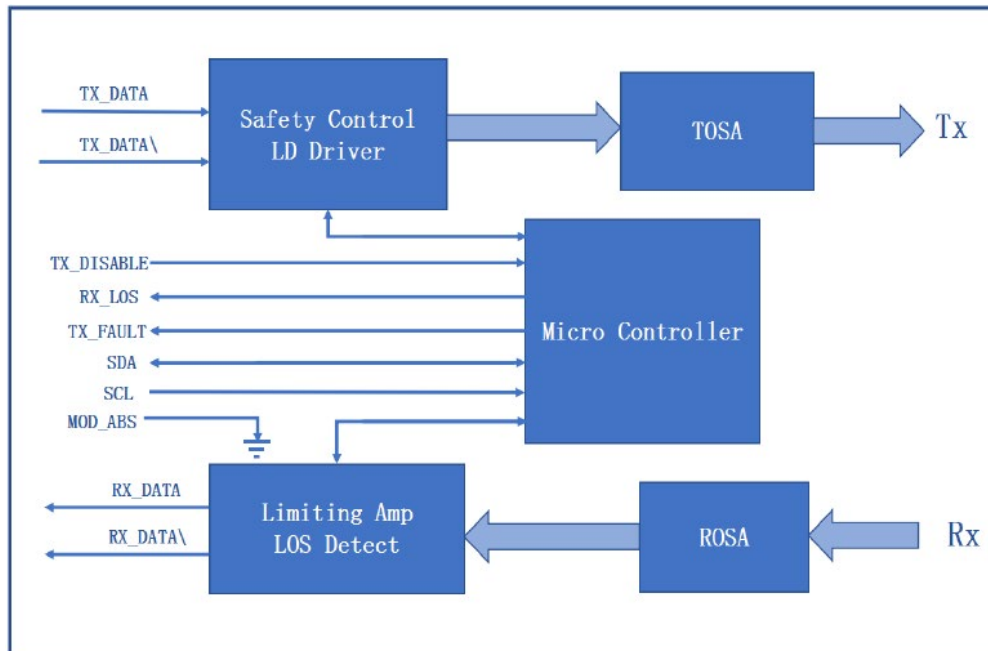
### Notes:

1. The circuit ground is isolated from the chassis ground.
2. Tx\_Fault is the open collector output and should be pulled up with 4.7kΩ to 10kΩ on the host board to a voltage between 2V and Vcc+0.3V.
3. Disabled: T<sub>DIS</sub>>2V or open. Enabled: T<sub>DIS</sub><0.8V.
4. Should be pulled up with 4.7kΩ to 10kΩ on the host board to a voltage between 2V and Vcc+0.3V.
5. LOS is an open collector output and should be pulled up with 4.7kΩ to 10kΩ on the host board to a voltage between 2V and Vcc+0.3V. “Logic 0” indicates normal operation. “Logic 1” indicates that the receiver signal is lost.

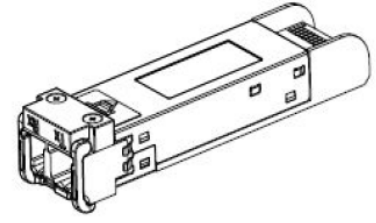
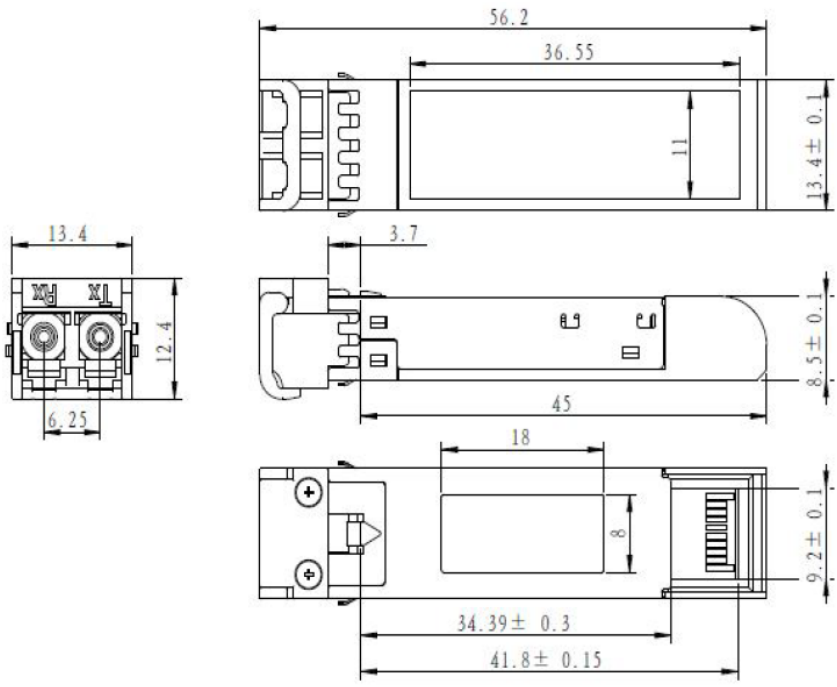
## Electrical Pin-Out Details



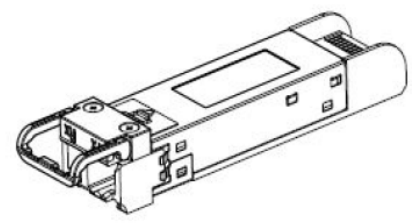
## Block Diagram



# Mechanical Specifications



LATCHED



UNLATCHED

## 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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