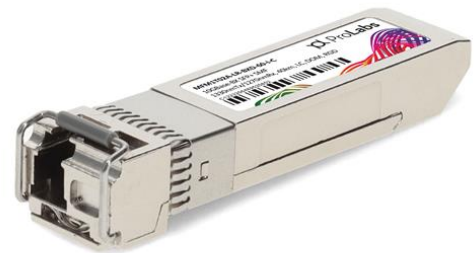


### **MFM1T02A-LR-BXD-60-I-C**

Mellanox® MFM1T02A-LR-BXD-60-I Compatible TAA 10GBase-BX SFP+ Transceiver (SMF, 1330nmTx/1270nmRx, 60km, LC, DOM, -40 to 85C)

#### **Features:**

- SFF-8432 and SFF-8472 Compliance
- Simplex LC Connector
- Single-mode Fiber
- Industrial Temperature -40 to 85 Celsius
- Hot Pluggable
- Metal with Lower EMI
- Excellent ESD Protection
- RoHS Compliant and Lead Free



#### **Applications:**

- 10GBase-BX Ethernet
- 8x/10x Fibre Channel
- Access, Metro and Enterprise

#### **Product Description**

This Mellanox® MFM1T02A-LR-BXD-60-I compatible SFP+ transceiver provides 10GBase-BX throughput up to 60km over single-mode fiber (SMF) using a wavelength of 1330nmTx/1270nmRx via an LC connector. This bidirectional unit must be used with another transceiver or network appliance of complementing wavelengths. It is capable of withstanding rugged environments and can operate at temperatures between -40 and 85C. Our transceiver is built to meet or exceed OEM specifications and is guaranteed to be 100% compatible with Mellanox®. It has been programmed, uniquely serialized, and tested for data-traffic and application to ensure that it will initialize and perform identically. All of our transceivers comply with Multi-Source Agreement (MSA) standards to provide 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.")



### 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	Notes
Maximum Supply Voltage	V <sub>CC</sub>	-0.3		4	V	
Storage Temperature	T <sub>S</sub>	-40		85	°C	
Operating Case Temperature	T <sub>C</sub>	-40		85	°C	1
Operating Humidity	RH	5		95	%	
Receiver Power	R <sub>MAX</sub>			-6	dBm	
Data Rate	BR		10.3125	11.3	Gbps	
Transmission Distance	TD			60	Km	
Coupled Fiber	Single mode fiber					9/125um SMF

### Notes:

1. Without air flow

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage	Vcc	3.14	3.3	3.47	V	
Power Supply Current	Icc			450	mA	
Power Consumption	P <sub>DISS</sub>			1.5	W	
Signal Input Voltage		Vcc-0.3		Vcc+0.3	V	
<b>Transmitter</b>						
Differential Data Input Voltage	VDT	180		700	mVp-p	
Input differential impedance	Zin	85	100	115	Ω	
Transmitter Fault Output-High	VFaultH	2.4		Vcc	V	
Transmitter Fault Output-Low	VFaultL	-0.3		0.8	V	
Transmitter Disable Voltage- High	VDisH	2		Vcc+0.3	V	
Transmitter Disable Voltage- Low	VDisL	-0.3		0.8	V	
<b>Receiver</b>						
Differential Data Output Voltage	VDR	300		850	mVp-p	
Output differential impedance	Zin	80	100	120	Ω	
Receiver LOS Pull up Resistor	RLOS	4.7		10	KOhm	
Data Output Rise/Fall time	tr/tf			38	Ps	
LOS Fault	VLOS fault	Vcc-1.3		VccHOST	V	
LOS Normal	VLOS norm	Vee		Vee+0.8	V	

## Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
<b>Transmitter</b>						
Optical Power (average)	PO	0		5	dBm	
Average Launched Power (Laser Off)	Poff			-30	dBm	1
Optical Extinction Ratio	ER	3.5			dB	2
Center Optical Wavelength	$\lambda_C$	1320	1330	1340	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Spectrum Bandwidth (-20dB)	$\sigma$			1	nm	
Output Eye Mask	Compliant with IEEE 802.3ae					2
<b>Receiver</b>						
Receiver Sensitivity	Psen			-20	dBm	3
Input Saturation Power (Overload)	Psat	-6			dBm	3
Receiver wavelength	$R\lambda$	1260	1270	1280	nm	
LOS Assert	LOSA	-38			dBm	
LOS De-assert	LOSD			-21	dBm	
LOS -Hysteresis	Phys	0.5		5	dB	

### Notes:

1. The optical power is launched into SMF
2. Measured with RPBS 2<sup>31</sup>-1 test pattern @10.3125Gbs
3. Measured with RPBS 2<sup>31</sup>-1 test pattern @10.3125Gbs BER=<10<sup>-12</sup>

## Pin Descriptions

Pin	Symbol	Name/Descriptions	Ref.
1	VeeT	Transmitter Ground (Common with Receiver Ground).	1
2	TX Fault	Transmitter Fault. LVTTTL-O	2
3	TX Disable	Transmitter Disable. Laser output disabled on high or open. LVTT-I.	3
4	SDA	2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i). LVTTTL-I/O.	
5	SCL	2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i). LVTTTL-I.	
6	MOD_ABS	Module Absent, Connect to VeeT or VeeR in Module.	4
7	RS0	Rate Select 0. Not used	5
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation. LVTTTL-O.	2
9	RS1	Rate Select 1. Not used	5
10	VeeR	Receiver Ground (Common with Transmitter Ground).	1
11	VeeR	Receiver Ground (Common with Transmitter Ground).	1
12	RD-	Receiver Inverted DATA out. AC Coupled. CML-O.	
13	RD+	Receiver Non-inverted DATA out. AC Coupled. CML-O.	
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 Non-Inverted DATA in. AC Coupled. CML-I.	
19	TD-	Transmitter Inverted DATA in. AC Coupled. CML-O.	
20	VeeT	Transmitter Ground (Common with Receiver Ground).	1

### Notes:

1. The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.
2. This contact is an open collector/drain output and should be pulled up to the Vcc\_Host with resistor in the range 4.7KΩ to 10KΩ. Pull ups can be connected to one or several power supplies, however the host board design shall ensure that no module contract has voltage exceeding module VccT/R +0.5.V.
3. Tx\_Disable is an input contact with a 4.7KΩ to 10KΩ pull-up resistor to VccT inside module.
4. Mod\_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull the contract up to Vcc\_Host with a resistor in the range from 4.7KΩ to 10KΩ. Mod\_ABS is asserted "High" when the SFP+ module is physically absent from a host slot.
5. Internally pulled down per SFF-8431



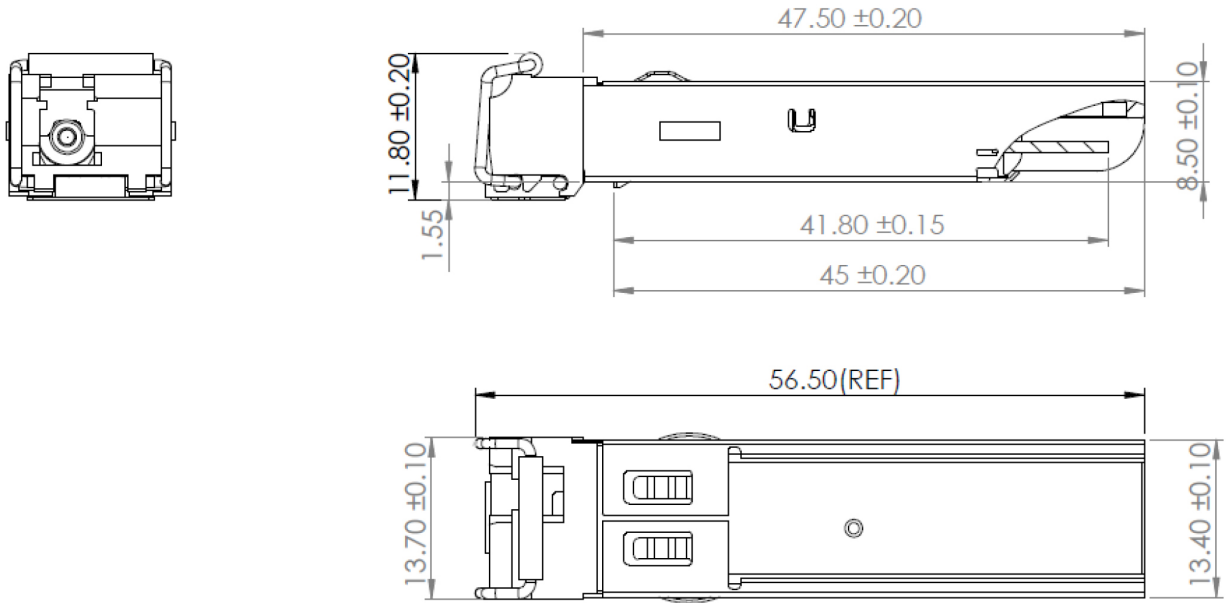
Pin-out of connector Block on Host board

### Recommended Circuit Schematic



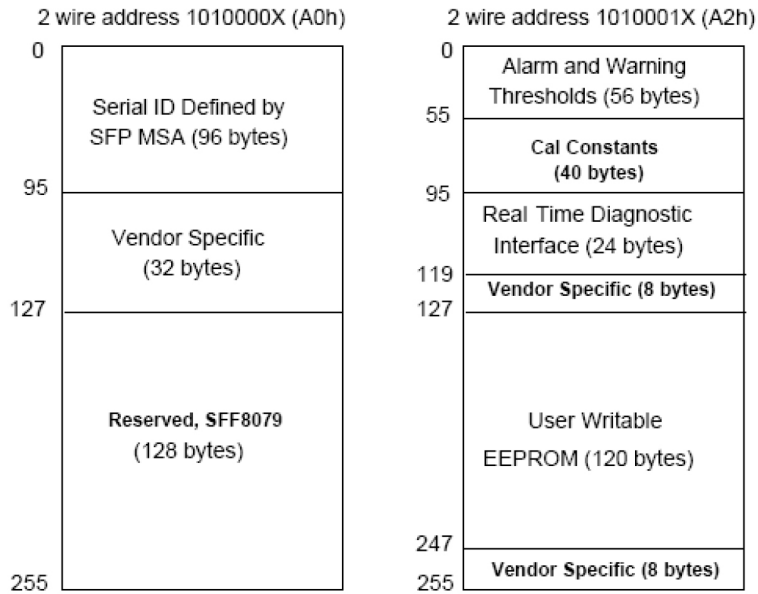
### Mechanical Specifications

Small Form Factor Pluggable (SFP) transceivers are compatible with the dimensions defined by the SFP Multi-Sourcing Agreement (MSA).



### EEPROM Information

EEPROM memory map specific data field description is as below:



## 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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