

## M-LX-C

Brocade® (Formerly) M-LX Compatible TAA 1000Base-LX GBIC Transceiver (SMF, 1310nm, 10km, SC)

### Features:

- SFF-8053 Compliance
- Duplex SC Connector
- Single-mode Fiber
- Commercial Temperature 0 to 70 Celsius
- Hot Pluggable
- Metal with Lower EMI
- Excellent ESD Protection
- RoHS Compliant and Lead Free



### Applications:

- 1000Base-LX Ethernet
- 1x Fibre Channel
- Access and Enterprise

### Product Description

This Brocade® (Formerly) M-LX compatible GBIC transceiver provides 1000Base-LX throughput up to 10km over single-mode fiber (SMF) using a wavelength of 1310nm via a SC connector. It is guaranteed to be 100% compatible with the equivalent Brocade® (Formerly) transceiver. This easy to install, hot swappable transceiver has been programmed, uniquely serialized and data-traffic and application tested to ensure that it will initialize and perform identically. It is built to meet or exceed the specifications of Brocade® (Formerly), 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."



## Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Supply Voltage	V <sub>cc</sub>	-0.5	4.0	V
Storage Temperature	TS	-40	85	°C
Operating Humidity	RH	5	95	%

## Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power Supply Voltage	V <sub>cc</sub>	3.13	3.30	3.47	V
Power Supply Current	I <sub>cc</sub>			250	mA
Case Operating Temperature	T <sub>c</sub>	0		70	°C
Data Rate (Gigabit Ethernet)			1.25		Gbps
Data Rate (Fibre Channel)			1.063		Gbps
9/125µm SMF	L			10	km

## Electrical Characteristics (TOP=25°C, V<sub>cc</sub>=3.3V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
<b>Transmitter</b>						
Input differential impedance	R <sub>in</sub>	85	100	115	Ω	1
Single ended data input swing	V <sub>in</sub> , pp	250		1200	mV	
TX Disable-High		2		3.45	V	
TX Disable-Low		0		0.8	V	
TX Fault-High		2		V <sub>cc</sub> +0.3	V	
TX Fault-Low		0		0.5	V	
<b>Receiver</b>						
Single ended data output swing	V <sub>out</sub> , pp	300	400	800	mV	2
Data output rise time	t <sub>r</sub>			175	ps	3
Data output fall time	t <sub>f</sub>			175	ps	3
LOS-High		2		V <sub>cc</sub> +0.3	V	
LOS-Low		0		0.8	V	

### Notes:

1. AC coupled.
2. Into 100 ohm differential termination.
3. 20% - 80%

## Optical and Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
<b>Transmitter</b>						
Average Output Power	PO	-9		-3	dBm	1
Optical Wavelength	$\lambda$	1260	1310	1360	nm	
Spectral Width	$\sigma$			4	nm	
Optical Rise/Fall Time	tr/tf			260	ps	2
Total Jitter	TJ			56.5	ps	
Optical Extinction Ratio	ER	9			dB	
<b>Receiver</b>						
Receiver Sensitivity	RSENS			-20	dBm	3,4
Maximum Received Power	RX <sub>MAX</sub>	0			dBm	
Centre Wavelength	$\lambda_C$	1270		1600	nm	
LOS De-Assert	LOSD			-21	dBm	
LOS Assert	LOSA	-42			dBm	
LOS Hysteresis		0.5		5	dB	

### Notes:

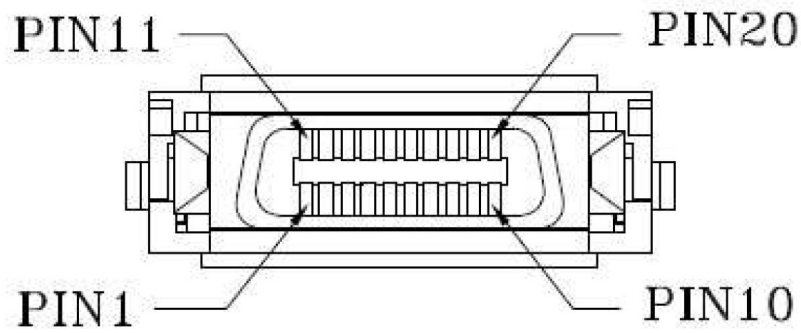
1. Class 1 Laser Safety.
2. Unfiltered, 20%-80%. Complies with GE and 1x FC eye masks when filtered.
3. Measured with conformance signals defined in FC-PI-2 Rev. 10.0 specifications.
4. Measured with PRBS 2<sup>7</sup>-1 at 10<sup>-10</sup> BER.

## Pin Descriptions

Pin	Symbol	Name/Descriptions	Ref.
1	RX_LOS	Receiver Loss of Signal, logic high, open collector compatible, 4.7K to 10K Ohm pullup to VDDT on host	2
2	RGND	Receiver Ground (may be connected with TGND in GBIC)	2
3	RGND	Receiver Ground (may be connected with TGND in GBIC)	2
4	MOD_DEF (0)	GBIC module definition and presence, bit 0, 4.7K to 10K Ohm pullup to VDDT on host	2
5	MOD_DEF (1)	GBIC module definition and presence, bit 1, 4.7K to 10K Ohm pullup to VDDT on host	2
6	MOD_DEF (2)	GBIC module definition and presence, bit 2, 4.7K to 10K Ohm pullup to VDDT on host	2
7	TX_DISABLE	Transmitter Disable, logic high, open collector compatible, 4.7K to 10K Ohm pullup to VDDT on GBIC	2
8	TGND	Transmitter Ground (maybe connected with RGND internally)	2
9	TGND	Transmitter Ground (maybe connected with RGND internally)	2
10	TX_FAULT	Transmitter Fault, logic high, open collector compatible, 4.7K to 10K Ohm pullup to VDDT on host	2
11	RGND	Receiver Ground (may be connected with TGND in GBIC)	1
12	-RX_DAT	Receive Data, Differential PECL	1
13	+RX_DAT	Receive Data, Differential PECL	1
14	RGND	Receiver Ground (may be connected with TGND in GBIC)	1
15	VDDR	Receiver +5 volt (maybe connected with VDDT in GBIC)	2
16	VDDT	Transmitter +5 volt (maybe connected with VDDR in GBIC)	2
17	TGND	Transmitter Ground (maybe connected with RGND internally)	1
18	+TX_DAT	Transmit Data, Differential PECL	1
19	-TX_DAT	Transmit Data, Differential PECL	1
20	TGND	Transmitter Ground (maybe connected with RGND internally)	1

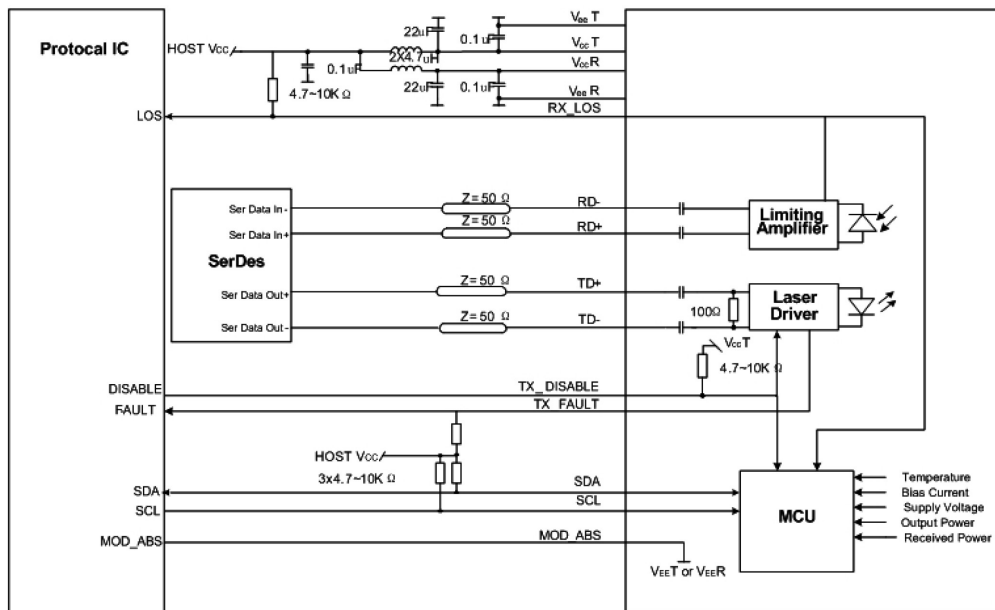
## Notes:

1. TX Fault is open collector/drain output, which should be pulled up externally with a 4.7K – 10KΩ resistor on the host board to supply <VccT+0.3V or VccR+0.3V. When high, this 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 input is used to shut down the laser output per the state table below. It is pulled up within the module with a 4.7-10K resistor. Low (0V-0.8V): Transmitter on between (0.8V and 2V): Undefined High (2.0-VccT): Transmitter Disabled Open: Transmitter Disabled.

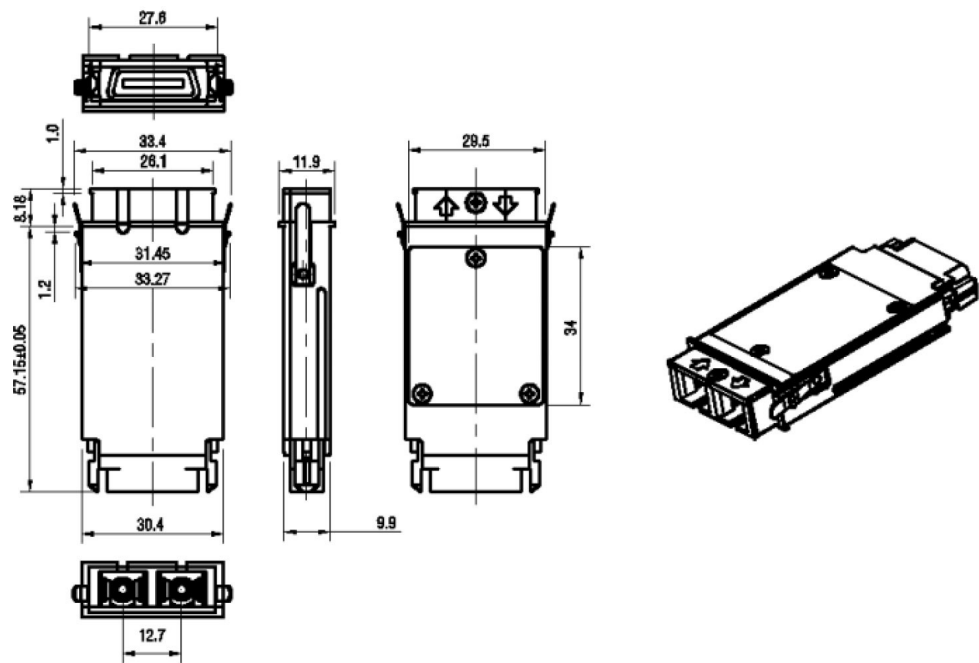


Pin-out of connector Block on Host board

### Recommended Circuit Schematic



Mechanical Specifications



EEPROM Information

EEPROM memory map specific data field description is as below:

2 wire address 1010000X (A0h)	2 wire address 1010001X (A2h)
0	0
Serial ID Defined by SFP MSA (96 bytes)	Alarm and Warning Thresholds (56 bytes)
95	55
Vendor Specific (32 bytes)	Cal Constants (40 bytes)
127	95
Reserved, SFF8079 (128 bytes)	Real Time Diagnostic Interface (24 bytes)
255	119
	127
	Vendor Specific (8 bytes)
	User Writable EEPROM (120 bytes)
	247
	255
	Vendor Specific (8 bytes)

## 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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