

### **CSFP-1GB-BX-D-40-I-EC-C**

Edge-corE® Compatible TAA 1000Base-BX 2-Channel SFP Transceiver (SMF, 1490nmTx/1310nmRx, 40km, LC, DOM, -40 to 85C)

#### **Features:**

- INF-8074 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:**

- 1000Base-BX Ethernet
- 1x Fibre Channel
- Access (FTTx) and Enterprise

#### **Product Description**

This Edge-corE® SFP transceiver provides 1000Base-BX 2-Channel throughput up to 40km over single-mode fiber (SMF) using a wavelength of 1490nmTx/1310nmRx via an LC connector. It is guaranteed to be 100% compatible with the equivalent Edge-corE® 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. 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' 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
Maximum Supply Voltage		V <sub>cc</sub>	-0.5		3.6	V
Storage Temperature		T <sub>S</sub>	-40		85	°C
Operating Case Temperature		T <sub>c</sub>	-40		85	°C
Operating Relative Humidity		RH			95	%
Data Rate	FE			100		Mbps
	OC-3/STM-1			155		Mbps
	STM-4			622		Mbps
	FC			1063		Mbps
	GBE			1250		Mbps

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

Parameter		Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage		Vcc	3.15	3.3	3.45	V	
Power Supply Current		Icc			300 per channel	mA	
Power Dissipation		Pd			1.5	W	
Transmitter							
LVPECL Compatible Inputs (Differential)		Vin	400		2000	mVpp	AC coupled inputs (Note 5)
Input Impedance (Differential)		Zin	85	100	115	ohm	Rin > 100kΩ @DC
TX_FAULT	Fault		2		Vcc+0.3	V	
	Normal		0		0.5		
TX_Dis	Disable		2		Vcc+0.3	V	
	Enable		0		0.8		
Receiver							
CML Outputs (Differential)		Vout	400		800	mVpp	AC coupled outputs (Note 5)
Output impedance (Differential)		Zout	85	100	115	ohm	
RX_LOS	LOS		2		Vcc+0.3	V	
	Normal		0		0.8	V	
MOD_DEF (0:2)		VoH	2.5			V	With Serial ID
		VoL	0		0.5	V	

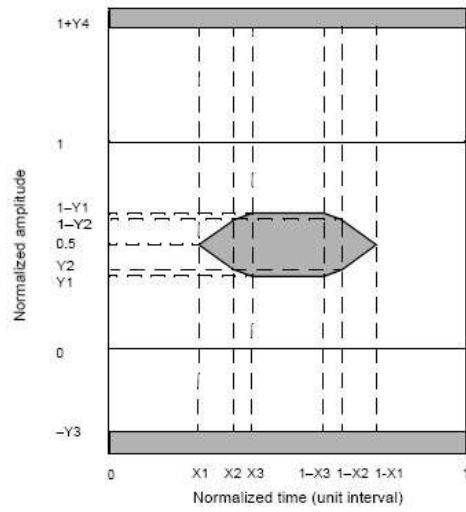
## Optical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Notes
9μm Core Diameter SMF	L		40		km	
Data Rate			100~1250		Mbps	
Transmitter						
Center Wavelength	$\lambda_c$	1480	1490	1500	nm	
Spectral Width (-20dB)	$\Delta\lambda$			1	nm	
Average Output Power	P <sub>out</sub>	-5		0	dBm	1
Extinction Ratio @ 1250Mbps	ER	6			dB	
Side Mode Suppression Ratio	SMSR	30			dB	
Rise/Fall Time (20%~80%)	Tr/tf			0.26	ns	
Output Optical Eye (Note 2)	Compliant with IEEE 803ah-2004					5
TX_Disable Assert Time	t <sub>off</sub>			10	us	
Pout@TX_Disable Asserted	P <sub>out</sub>			-45	dBm	
Receiver						
Center Wavelength	$\lambda_c$	1260	1310	1360	nm	
Receiver Sensitivity @1250Mbps	P <sub>min</sub>			-24	dBm	4
Receiver Overload	P <sub>max</sub>	-3			dBm	
Return Loss		12			dB	
Optical Path Penalty				1	dB	
LOS De-Assert @1250Mbps	LOSD			-25	dBm	
LOS Assert	LOSA	-35			dBm	
LOS Hysteresis		0.5			dB	6

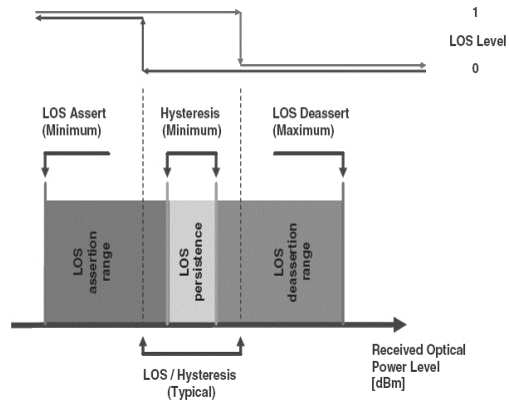
### Notes:

1. Output is coupled into a 9/125μm single-mode fiber.
2. Filtered measured with a PRBS 2<sup>7</sup>-1.
3. LVPECL logic, internally AC coupled.
4. Minimum average optical power measures at BER less than 1E-12, with a 2<sup>7</sup>-1 PRBS and ER=9 dB

## 5. Eye Pattern Mask



## 6. LOS Hysteresis



## Pin Descriptions

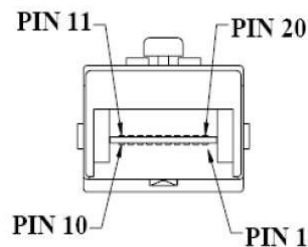
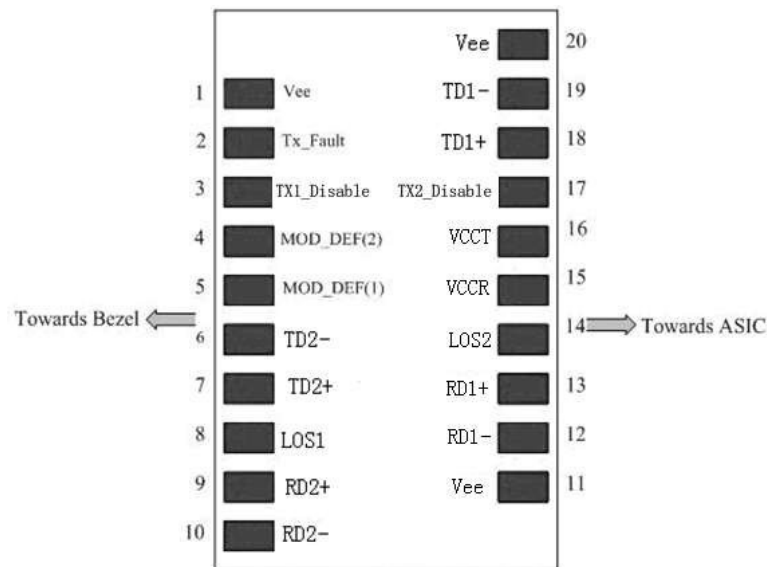
Pin	Symbol	Channel No.	Function	Ref.
1	VeeT	Common	Transmitter Ground	Note 3
2	TX Fault	Common	Transmitter Fault Indication	Note 8
3	TX1_Disable	1	Transmitter Disable of Ch1	Note 1, module disables on high or open
4	MOD-DEF2	Common	Two-Wires Interface Data	Note 2, 2wire serial ID interface SDA
5	MOD-DEF1	Common	Two-Wires Interface Clock	Note 2, 2wire serial ID interface SCL
6	TD2-	2	Inverted Transmit Data Input of Ch2	Note 6
7	TD2+	2	Transmit Data Input of Ch2	Note 6
8	LOS1	1	Loss of Signal of CH1.	Note 7
9	RD2+	2	Received Data output of Ch2	Note 4
10	RD2-	2	Inverted Received Data output of Ch2	Note 4
11	VEE	Common	Transceiver Ground	Note 3
12	RD2-	1	Inverted received Data output of Ch1.	Note 4
13	RD2-	2	Received Data output of Ch1	Note 4
14	LOS2	2	Loss of Signal of CH2	Note 7
15	VCCR	Common	Receiver power	Note 5, 3.3V 5%
16	VCCT	Common	Transmitter Power	Note 5, 3.3V 5%
17	TX2_Disable	2	Transmitter Disable of Ch2	Note 1, Module disables on high or open
18	TD1+	1	Transmit Data Input of Ch1	Note 6
19	TD1-	1	Inverted Transmit Data Input of Ch1	Note 6
20	VEE	Common	Transceiver Ground	Note 6

### Notes:

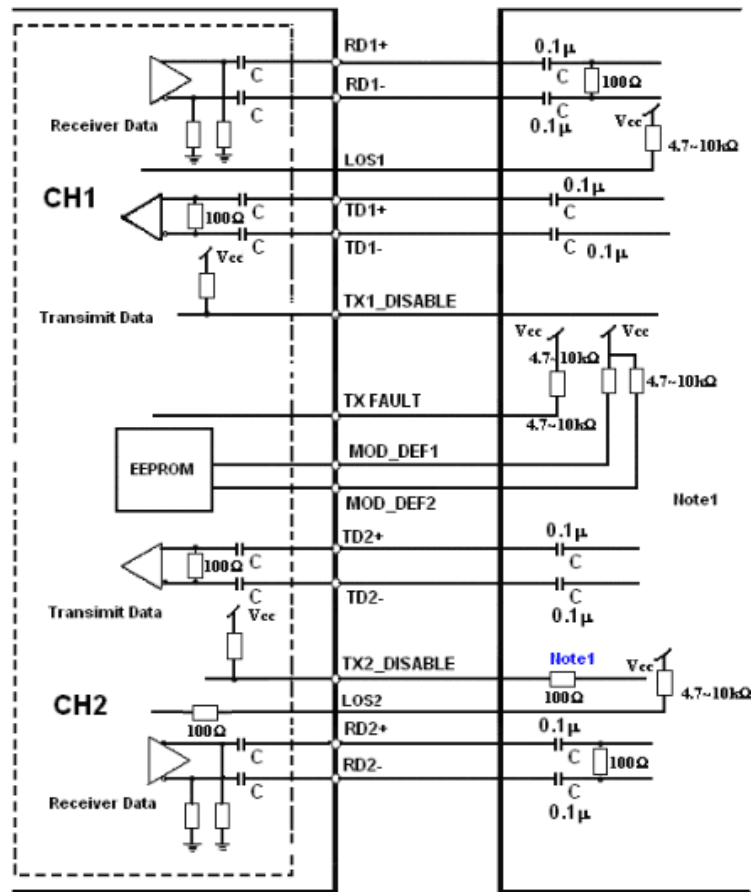
- TX\_Disable1,2 are an input that us used to shut down the transmitter optical output. It is pulled up within the module with a 4.7K-10K\_resistor. It's states are:  
Low (0-0.8V): Transmitter on  
(>0.8, <2.0V): Undefined  
High (2.0-3.465V): Transmitter Disabled  
Open: Transmitter Disabled
- Mod-Def 1,2. These are the module definition pins. They should be pulled up with a 4.7K-10K\_resistor on the host board. The pull-up voltage shall be VccT or VccR.  
Mod-Def 1 is the clock line of two wire serial interfaces for serial ID. Mod-Def 2 is the data line of two wire serial interface for serial ID.
- VEE may be internally connected within the SFO module.
- RD1, 2-/+: These are the differential receiver outputs. They are AC couples 100\_ differential lines which should be terminated with 100\_(differential) at the user SERDES. The AC coupling is done inside the

module and is this not required on the host board.

5. VccT, VccR are the power supplies. They are defined as 3.3V  $\pm$ 5% at the SFP connector pin. Maximum supply current is 600mA@3.3V. Vcc may be internally connected within the SFP transceiver module.
6. TD1, 2-/+: These are the differential transmitter inputs. They are AC coupled, differential lines with 100\_ohm differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.
7. LOS 1,2 (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K— 10K $\Omega$  resistor. Pull up voltage between 2.0V and VccT, R+0.3V. When high, this output indicates 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 <0.4V.
8. TX Fault report transceiver status as following:  
TX Fault is an open collector/drain output, which should be pulled up with a 4.7K–10K\_ resistor on the host board. Pull up voltage between 2.0V and VccT, R+0.3V. When high, output indicated a laser fault of some kind either in Channel 1 or Channel 2. The Host shall read Channel1/2: A2H/AAH: 110 for details: TX Fault from channel 1 if bit 2 is set in [A2H:110]; TX Fault from channel 2 if bit 2 is set in [B2H: 110]. Low indicated normal operation. In the low state, the output will be pulled to < 0.8V.



Recommended Circuit Schematic

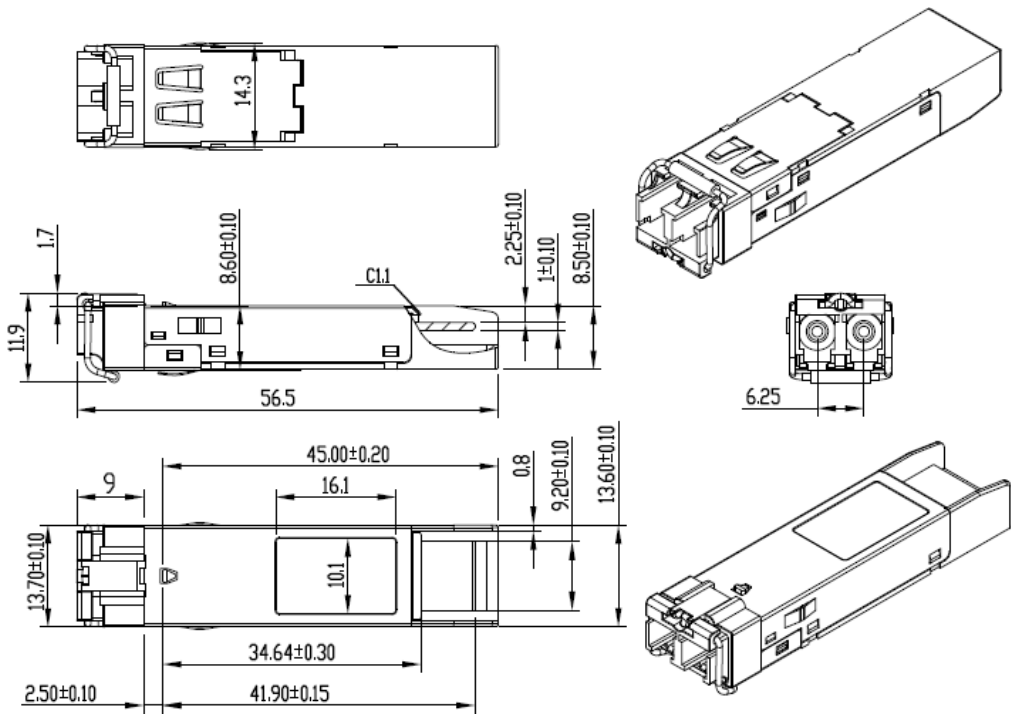


Laser Emission



**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:

2 wire address 1010000X	2 wire address 1010001X	2 wire address 10110000X	2 wire address 10110001X
<div><div>0</div><div>Serial ID Defined by SFP MSA (96 bytes)</div><div>95</div><div>Vendor Specific (32 bytes)</div><div>127</div><div>Reserved (128 bytes)</div><div>255</div></div>	<div><div>0</div><div>Alarm and Warning Thresholds (56 bytes)</div><div>55</div><div>Cal Constants (40 bytes)</div><div>95</div><div>Real Time Diagnostic Interface (24 bytes)</div><div>119</div><div>Vendor Specific (8 ytes)</div><div>127</div><div>User Writable EEPROM (120 bytes)</div><div>247</div><div>Vendor Specific (8 ytes)</div><div>255</div></div>	<div><div>0</div><div>Serial ID Defined by SFP MSA (96 bytes)</div><div>95</div><div>Vendor Specific (32 bytes)</div><div>127</div><div>Reserved (128 bytes)</div><div>255</div></div>	<div><div>0</div><div>Alarm and Warning Thresholds (56 bytes)</div><div>55</div><div>Cal Constants (40 bytes)</div><div>95</div><div>Real Time Diagnostic Interface (24 bytes)</div><div>119</div><div>Vendor Specific (8 ytes)</div><div>127</div><div>User Writable EEPROM (120 bytes)</div><div>247</div><div>Vendor Specific (8 ytes)</div><div>255</div></div>
A0H (CH1)	A2H (CH1)	B0H (CH2)	B2H (CH2)



## 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.



## Contact Information

ProLabs US

Email: [sales@prolabs.com](mailto:sales@prolabs.com)

Telephone: 952-852-0252

ProLabs UK

Email: [salesupport@prolabs.com](mailto:salesupport@prolabs.com)

Telephone: +44 1285 719 600