

**Preliminary DATA SHEET**

**CFORTH-FE-100BX-D**

**125M SFP (Small Form Pluggable) Tx1550nm/Rx1310nm 20km BIDI Transceiver**

**CFORTH-FE-100BX-D Overview**

CFORTH-FE-100BX-D SFP BIDI optical transceivers are designed to comply with IEEE 802.3ah 100Base-BX standard. The CFORTH-FE-100BX-D SFP BIDI optical transceivers provide a quick and reliable interface for Fast Ethernet applications.

**Product Features**

- Up to 125Mb/s bi-directional data links
- Single LC connector
- Compliant with Fast Ethernet standard
- Compliant with IEEE 802.3ah 100Base-BX
- Compliant with SFP MSA
- Hot-pluggable SFP footprint
- 1550nm DFB laser transmitter
- Up to 20km on 9/125um SMF
- Single power supply 3.3V
- RoHS Compliant
- Class 1 laser product complies with EN 60825-1
- Operating temperature range: 0°C to 70°C.

**Applications**

- Fast Ethernet

**Ordering Information**

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<b>Part Number</b>	<b>Description</b>
CFORTH-FE-100BX-D	Fast Ethernet, SFP BIDI, Single LC Connector, Tx1550nm/Rx1310nm, 20km

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**General Specifications**

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Data Rate	DR		125		Mb/s	
Bit Error Rate	BER			10 <sup>-12</sup>		
Operating Temperature	T <sub>OP</sub>	0		70	°C	1
Storage Temperature	T <sub>STO</sub>	- 40		85	°C	2
Supply Current	I <sub>S</sub>		185	250	mA	3
Input Voltage	V <sub>CC</sub>	3.14	3.3	3.46	V	
Maximum Voltage	V <sub>MAX</sub>	- 0.5		4	V	3

**Notes:**

1. Case temperature
2. Ambient temperature
3. For electrical power interface

**Optical Characteristics – Transmitter**V<sub>CC</sub>=3.14V to 3.46V, T<sub>C</sub>=0°C to 70°C

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Output Optical Power	P <sub>TX</sub>	- 14		- 8	dBm	1
Optical Center Wavelength	λ <sub>C</sub>	1470	1550	1570	nm	
Extinction Ratio	ER	8.2			dB	
Spectral Width (- 20dB)	Δλ			1	nm	
Optical Rise/Fall Time (20% - 80%)	T <sub>RF_IN</sub>			2	ns	
Relative Intensity Noise	RIN			- 120	dB/Hz	
Output Eye			Compliant with IEEE802.3 standard			

**Notes:**

1. Class 1 Product

**Optical Characteristics – Receiver**V<sub>CC</sub>=3.14V to 3.46V, T<sub>C</sub>=0°C to 70°C

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Optical Receiver Power	P <sub>RX</sub>	- 30		0	dBm	1
Optical Center Wavelength	λ <sub>C</sub>	1260		1360	nm	
Receiver Sensitivity	R <sub>X_SEN</sub>			- 30	dBm	2
Optical Return Loss	ORL	14			dB	
Optical Isolation	ISO	35			dB	
LOS Assert	P <sub>LOS_A</sub>	- 45			dBm	
LOS De-Assert	P <sub>LOS_D</sub>			- 32	dBm	
LOS Hysteresis		0.5			dB	

**Notes:**

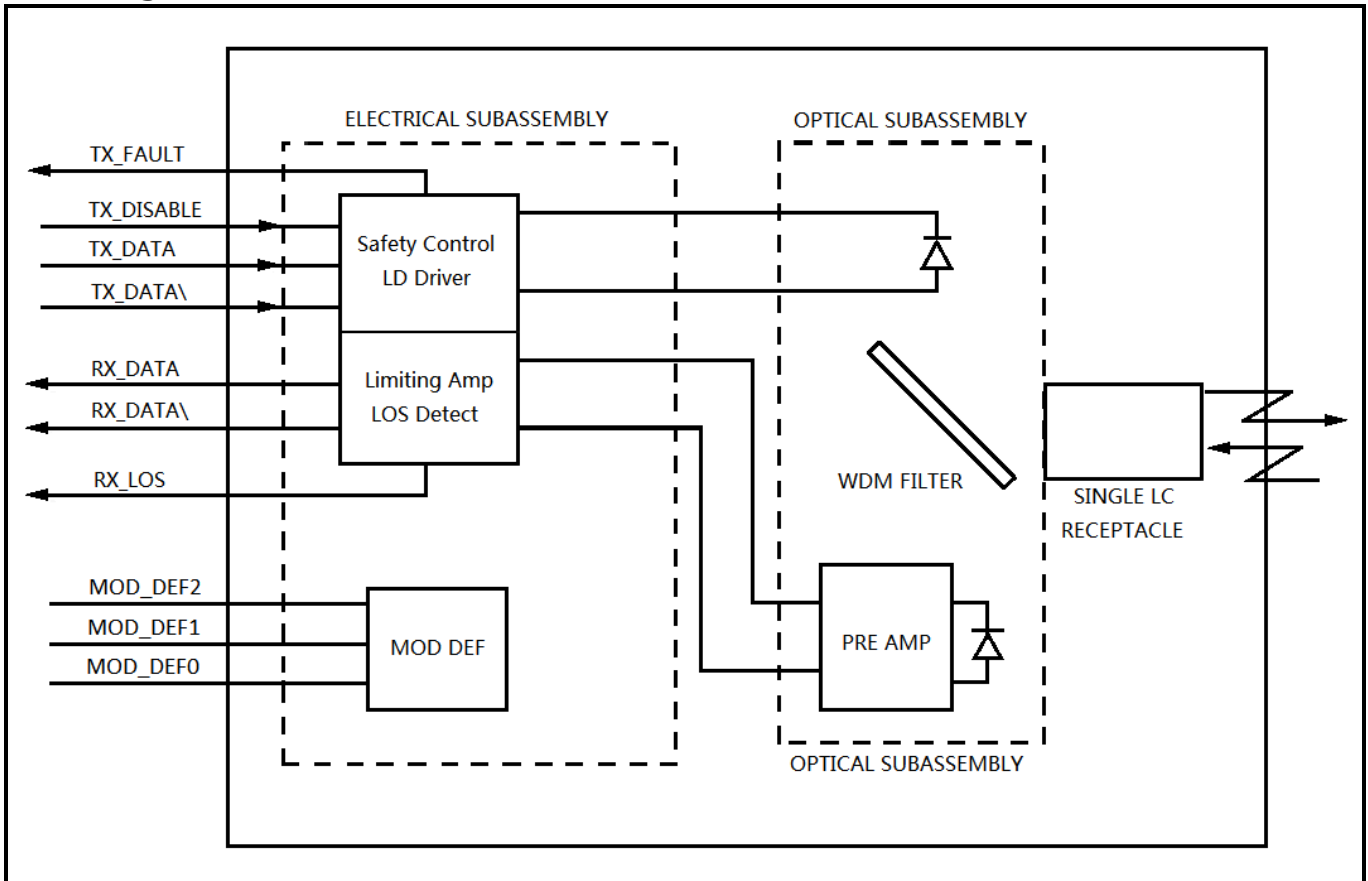
1. Average
2. PRBS 2<sup>23</sup>-1

**Electrical Characteristics – Transmitter****V<sub>CC</sub>=3.14V to 3.46V, T<sub>C</sub>=0°C to 70°C**

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Input differential impedance	R <sub>IN</sub>		100		Ω	
Single ended data input swing	V <sub>IN_PP</sub>	250		1200	mV	
Transmit disable voltage	V <sub>D</sub>	V <sub>CC</sub> -1.3		V <sub>CC</sub>	V	
Transmit enable voltage	V <sub>EN</sub>	V <sub>EE</sub>		V <sub>EE</sub> +0.8	V	
Transmit disable assert time				10	us	

**Electrical Characteristics – Receiver****V<sub>CC</sub>=3.14V to 3.46V, T<sub>C</sub>=0°C to 70°C**

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Single ended data output swing	V <sub>OUT_PP</sub>	300	400	800	mV	
Data output rise/fall time (20%-80%)	T <sub>R</sub>			300	ps	
LOS Assert	V <sub>LOS_A</sub>	V <sub>CC</sub> - 0.5		V <sub>CC_HOST</sub>	V	
LOS De-Assert	V <sub>LOS_D</sub>	V <sub>EE</sub>		V <sub>EE</sub> +0.5	V	

**Block Diagram of Transceiver****Transmitter Section**

The DFB driver accepts differential input data and provide bias and modulation currents for driving a laser. An automatic power-control (APC) feedback loop is incorporated to maintain a constant average optical power. 1490 nm DFB in an eye safe optical subassembly (OSA) mates to the fiber cable.

**TX\_DISABLE**

The TX\_DISABLE signal is high (TTL logic "1") to turn off the laser output. The laser will turn on within 1ms when TX\_DISABLE is low (TTL logic "0").

**TX\_FAULT**

When the TX\_FAULT signal is high, output indicates a laser fault of some kind. Low indicates normal operation.

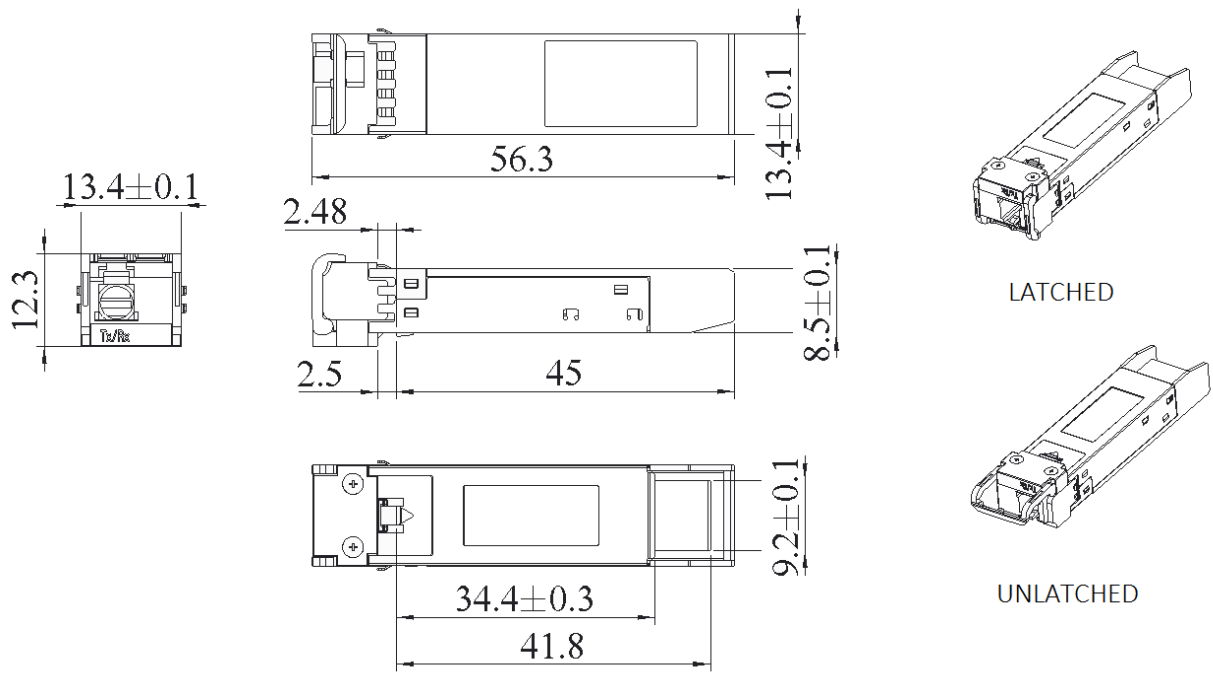
**Receiver Section**

The receiver utilizes a PIN detector integrated with a trans-impedance preamplifier in an OSA. This OSA is connected to a Limiting Amplifier which providing post-amplification quantization, and optical signal detection. The limiting Amplifier is AC-coupled to the transimpedance amplifier, with internal 100Ω differential termination.

**Receive Loss (RX\_LOS)**

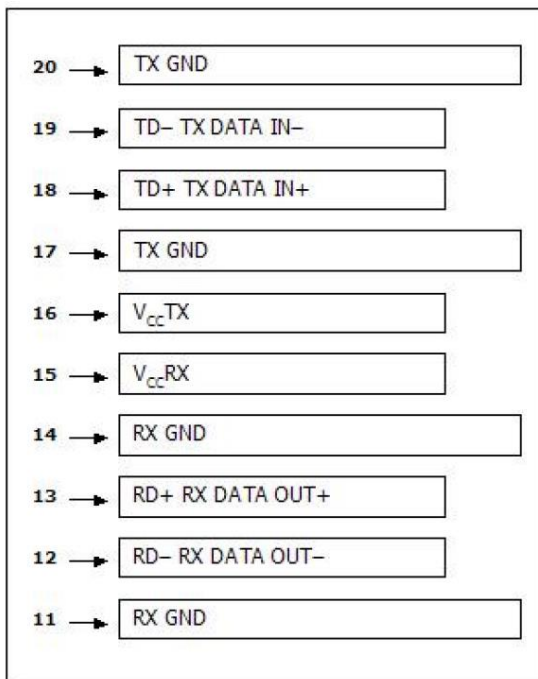
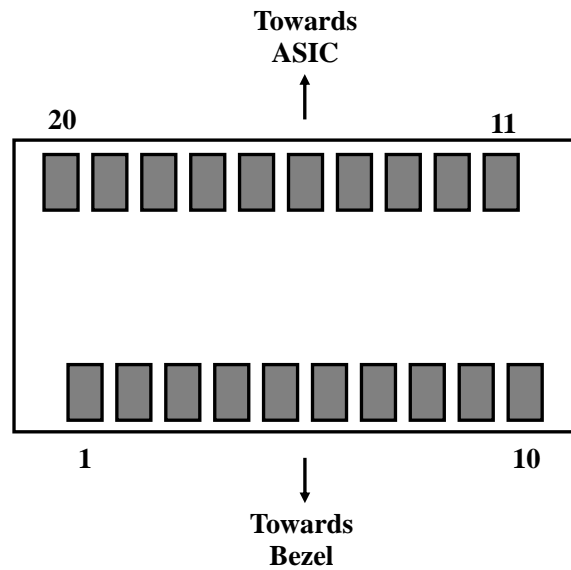
The RX\_LOS is high (logic "1") when there is no incoming light from the companion transceiver. This signal is normally used by the system for the diagnostic purpose. The signal is operated in TTL level.

**Dimensions**

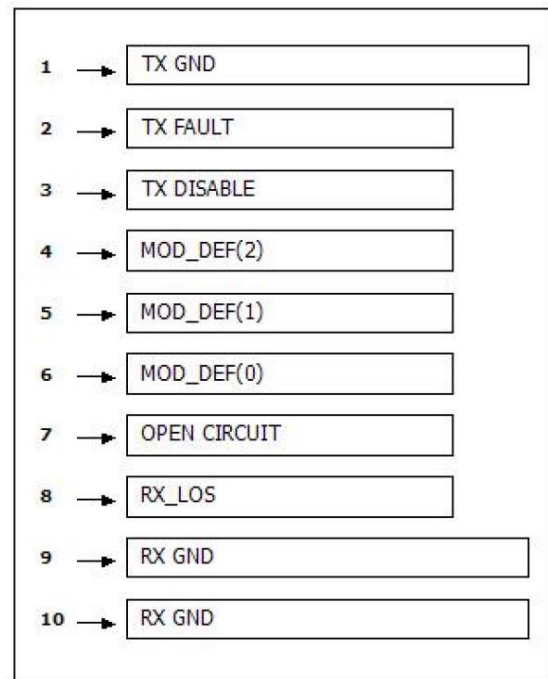


**ALL DIMENSIONS ARE ±0.2mm UNLESS OTHERWISE SPECIFIED  
UNIT: mm**

**Electrical Pad Layout**



Top of Board



Bottom of Board

**Pin Assignment**

PIN #	Symbol	Description	Remarks
1	V <sub>EET</sub>	Transmitter ground (common with receiver ground)	1
2	T <sub>FAULT</sub>	Transmitter Fault. Not supported	
3	T <sub>DIS</sub>	Transmitter Disable. Laser output disabled on high or open	2

**CFORTH-FE-100BX-D Specification Rev. 002**

4	MOD_DEF (2)	Module Definition 2. Data line for serial ID	3
5	MOD_DEF (1)	Module Definition 1. Clock line for serial ID	3
6	MOD_DEF (0)	Module Definition 0. Grounded within the module	3
7	Rate Select	No connection required	
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation	4
9	V <sub>EER</sub>	Receiver ground (common with transmitter ground)	1
10	V <sub>EER</sub>	Receiver ground (common with transmitter ground)	1
11	V <sub>EER</sub>	Receiver ground (common with transmitter ground)	1
12	RD-	Receiver Inverted DATA out. AC coupled	
13	RD+	Receiver Non-inverted DATA out. AC coupled	
14	V <sub>EER</sub>	Receiver ground (common with transmitter ground)	1
15	V <sub>CCR</sub>	Receiver power supply	
16	V <sub>CCT</sub>	Transmitter power supply	
17	V <sub>EET</sub>	Transmitter ground (common with receiver ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC coupled	
19	TD-	Transmitter Inverted DATA in. AC coupled	
20	V <sub>EET</sub>	Transmitter ground (common with receiver ground)	1

**Notes:**

1. Circuit ground is isolated from chassis ground
2. Disabled: T<sub>DIS</sub>>2V or open, Enabled: T<sub>DIS</sub><0.8V
3. Should Be pulled up with 4.7k – 10k ohm on host board to a voltage between 2V and 3.6V
4. LOS is open collector output

**References**

1. IEEE standard 802.3. IEEE Standard Department, 2005.
2. Small Form Factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA), September 2000.