

Preliminary DATA SHEET

CFORTH-FE-100BX-D

Fast Ethernet SFP (Small Form Pluggable) Tx1550nm/Rx1310nm Bi-directional Transceiver

CFORTH-FE-100BX-D Overview

CFORTH-FE-100BX-D SFP-BIDI optical transceivers are based on IEEE 802.3ah 100Base-BX standard and provide a quick and reliable interface for the Fast Ethernet application. In addition, they comply with the Small Form Factor Pluggable Multi Sourcing Agreement (MSA) and SFF-8472.

Product Features

- Up to 125 MBd 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
- Built-in digital diagnostic functions
- 1550nm FP laser transmitter
- Up to 20km on 9/125um SMF
- Single power supply 3.3V
- RoHS Compliance
- Class 1 laser product complies with EN 60825-1
- Operating temperature range: 0°C to 70°C.

Applications

- Fast Ethernet

Ordering Information

<i>Part Number</i>	<i>Description</i>
CFORTH-FE-100BX-D	Fast Ethernet, SFP-BIDI, Single LC Connector, Tx1550nm/Rx1310nm, 10-20KM

General Specifications

<i>Parameter</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	<i>Remarks</i>
Data Rate	DR		125		MBd	IEEE 802.3
Bit Error Rate	BER			10^{-12}		
Operating Temperature	T_{OP}	0		70	°C	Case temperature
Storage Temperature	T_{STO}	- 40		85	°C	Ambient temperature
Supply Current	I_S		150	250	mA	For electrical power interface
Input Voltage	V_{CC}	3	3.3	3.6	V	
Maximum Voltage	V_{MAX}	- 0.5		4	V	For electrical power interface

Optical Characteristics – Transmitter $V_{CC}=3V$ to $3.6V$, $T_C=0^\circ C$ to $70^\circ C$

<i>Parameter</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	<i>Remarks</i>
Output Optical Power	P_{TX}	- 14		- 8	dBm	Class 1 Product
Optical Center Wavelength	λ_C	1470	1550	1570	nm	
Extinction Ratio	ER	9			dB	
Spectral Width (RMS)	$\Delta\lambda$			3	nm	
Optical Rise/Fall Time (20% - 80%)	T_{RF_IN}		1	2	ns	
Relative Intensity Noise	RIN			- 120	dB/Hz	

Optical Characteristics – Receiver $V_{CC}=3V$ to $3.6V$, $T_C=0^\circ C$ to $70^\circ C$

<i>Parameter</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	<i>Remarks</i>
Optical Receiver Power	P_{RX}			0	dBm	Average
Optical Center Wavelength	λ_C	1260		1360	nm	
Receiver Sensitivity	R_{X_SEN}			- 32	dBm	
Optical Return Loss	ORL	14			dB	
Optical Isolation	ISO			-40	dB	
Loss of Signal-Asserted	P_{LOS_A}	- 45			dBm	
Loss of Signal-Deasserted	P_{LOS_D}			- 32	dBm	
Loss of Signal-Hysteresis		0.5			dB	

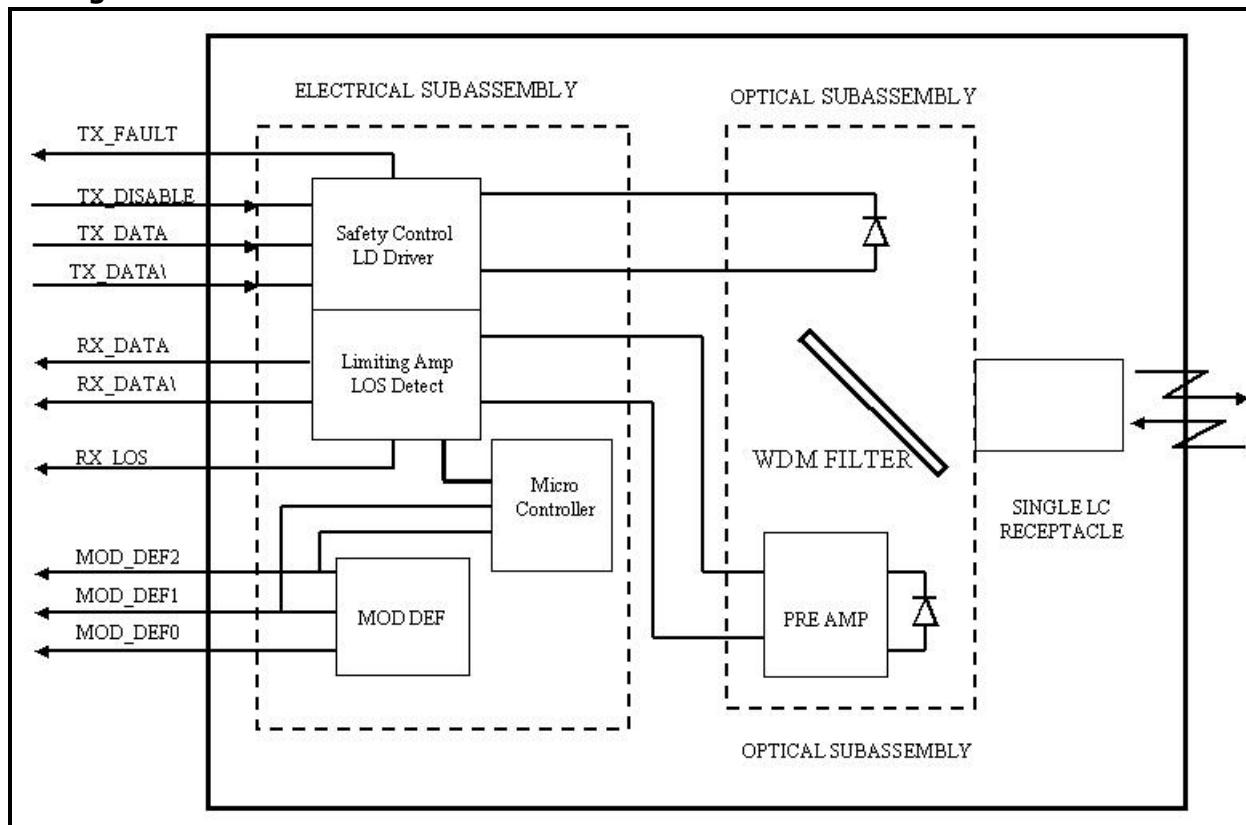
Electrical Characteristics – Transmitter $V_{CC}=3V$ to $3.6V$, $T_C=0^\circ C$ to $70^\circ C$

<i>Parameter</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	<i>Remarks</i>
Input differential impedance	R_{IN}		100		Ω	Non condensing
Single ended data input swing	V_{IN_PP}	250		1200	mV	
Transmit disable voltage	V_D	$V_{CC}-1.3$		V_{CC}	V	
Transmit enable voltage	V_{EN}	V_{EE}		$V_{EE}+0.8$	V	
Transmit disable assert time				10	us	

Electrical Characteristics – Receiver*V_{CC}=3V to 3.6V, T_c=0 °C to 70 °C*

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Single ended data output swing	V_{OUT_PP}	300	400	800	mV	
Data output rise/fall time (20%-80%)	T_R			300	ps	
LOS Fault	V_{LOS_Fault}	$V_{CC}-0.5$		V_{CC_HOST}	V	
LOS Normal	V_{LOS_normal}	V_{EE}		$V_{EE}+0.5$	V	

Block Diagram of Transceiver



Transmitter Section

The FP driver accept 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. 1550 nm FP 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.

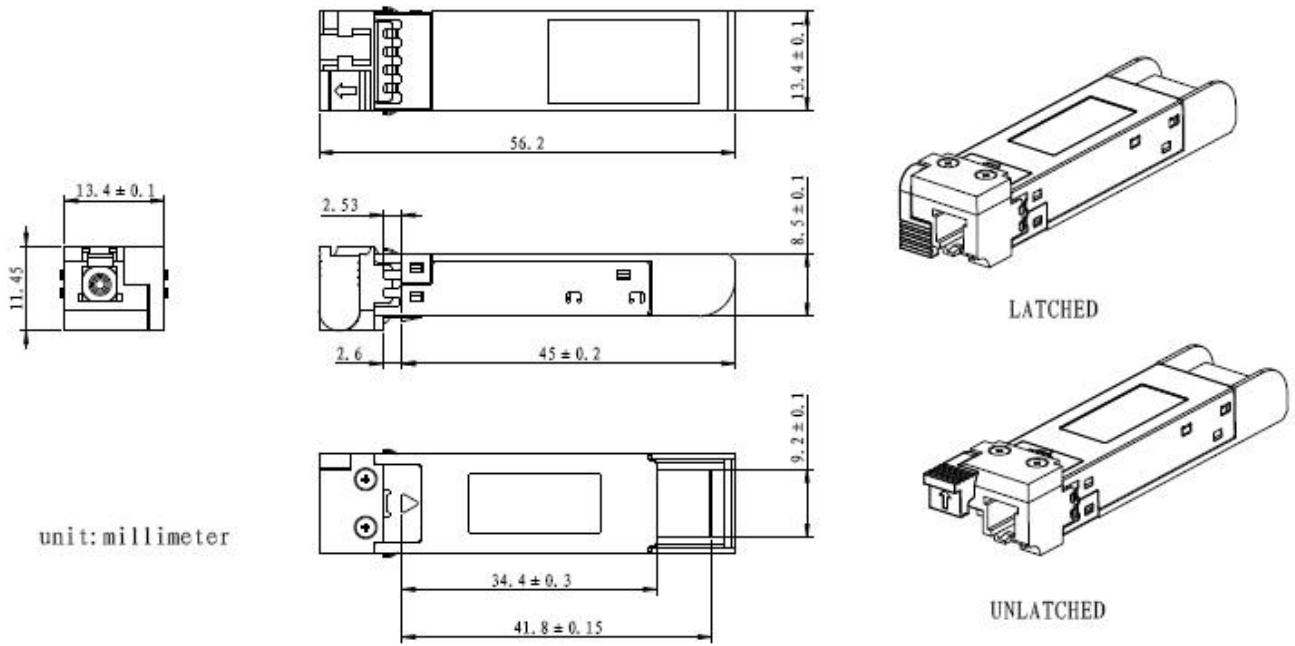
Receiver Section

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.

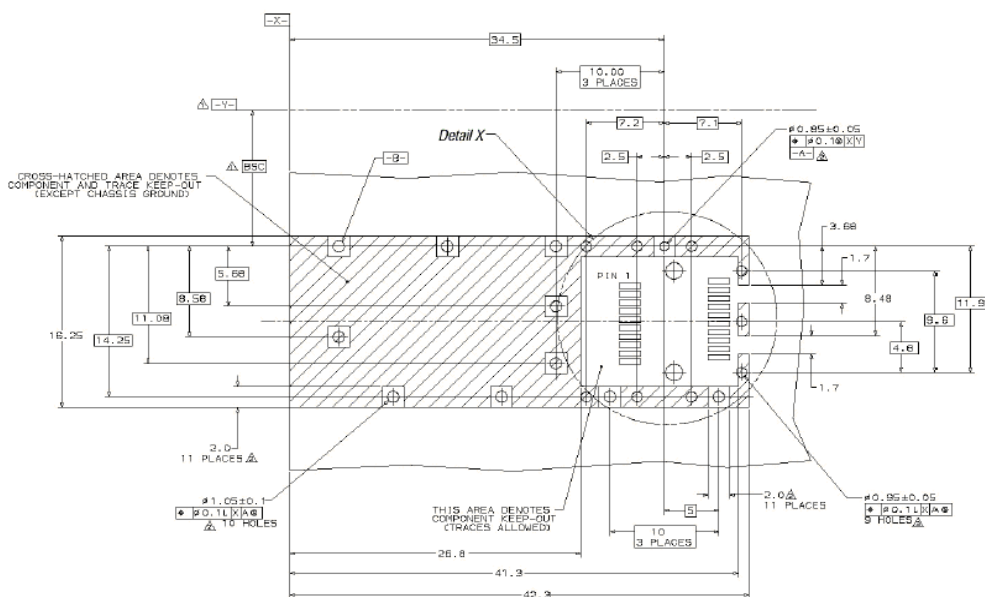
Dimensions



unit: millimeter

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

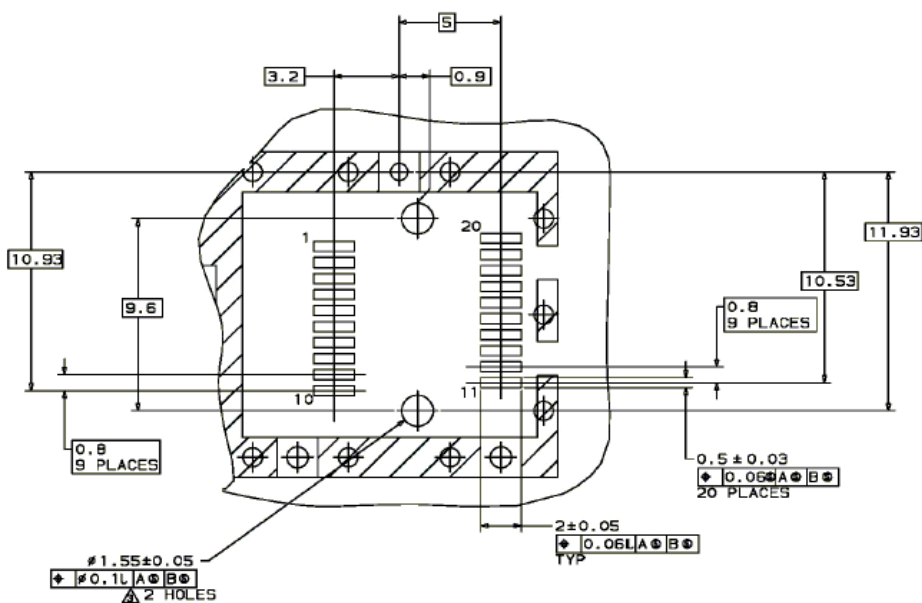
PCB Layout Recommendation



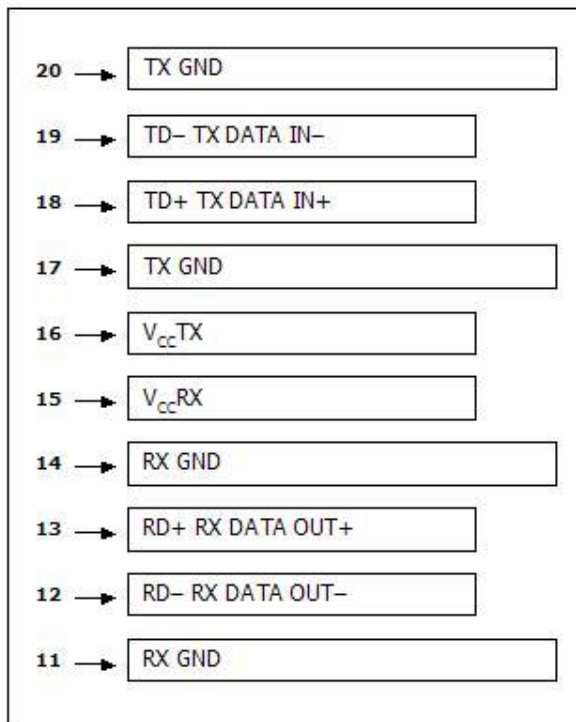
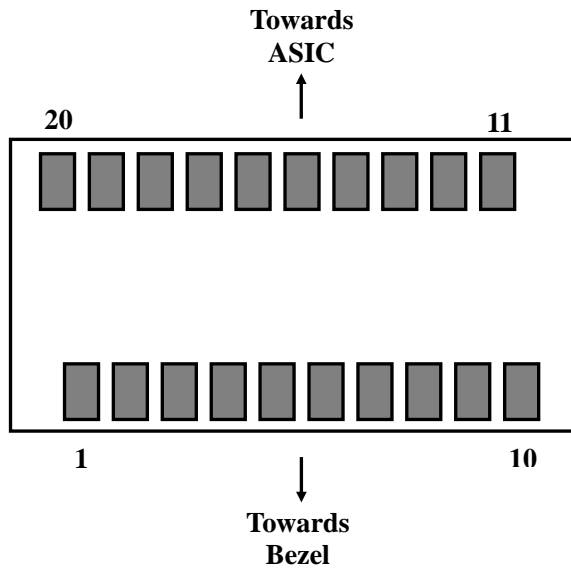
△ Datum and Basic Dimension Established by Customer

△ Rads and Vias are Chassis Ground, 11 Places

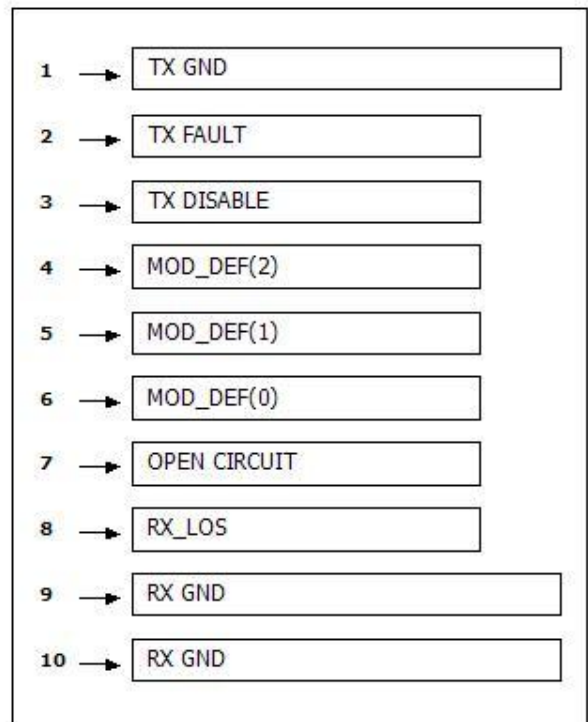
△ Through Holes are Unplated



Electrical Pad Layout



Top of Board



Bottom of Board

Pin Assignment

PIN #	Symbol	Description	Remarks
1	V _{EET}	Transmitter ground (common with receiver ground)	Circuit ground is isolated from chassis ground
2	T _{FAULT}	Transmitter Fault. Not supported	
3	T _{DIS}	Transmitter Disable. Laser output disable on high or open	Disabled: T _{DIS} >2V or open Enabled: T _{DIS} <0.8V
4	MOD_DEF (2)	Module Definition 2. Data line for serial ID	Should Be pulled up with
5	MOD_DEF (1)	Module Definition 1. Clock line for serial ID	4.7k – 10k ohm on host
6	MOD_DEF (0)	Module Definition 0. Grounded within the module	board to a voltage between 2V and 3.6V
7	Rate Select	No connection required	
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation	LOS is open collector output
9	V _{EER}	Receiver ground (common with transmitter ground)	
10	V _{EER}	Receiver ground (common with transmitter ground)	Circuit ground is isolated from chassis ground
11	V _{EER}	Receiver ground (common with transmitter ground)	
12	RD–	Receiver Inverted DATA out. AC coupled	
13	RD+	Receiver Non-inverted DATA out. AC coupled	
14	V _{EER}	Receiver ground (common with transmitter ground)	Circuit ground is isolated from chassis ground
15	V _{CCR}	Receiver power supply	
16	V _{CCT}	Transmitter power supply	
17	V _{EET}	Transmitter ground (common with receiver ground)	Circuit ground is connected to chassis ground
18	TD+	Transmitter Non-Inverted DATA in. AC coupled	
19	TD–	Transmitter Inverted DATA in. AC coupled	
20	V _{EET}	Transmitter ground (common with receiver ground)	Circuit ground is connected to chassis ground

References

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