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SFP-C Copper SFP Transceiver (UTP Connector)

10/100/1000Mbps, SGMII interface, Copper SFP with Spring Latch



Features

- Up to 1.25Gb/s bi-directional data links
- Hot-pluggable SFP footprint
- Extended temperature range (0°C to +70°C)
- Metallic enclosure for low EMI
- Low power dissipation (1.05 W typical)
- Compact RJ-45 connector assembly
- Access to physical layer IC via 2-wire serial bus
- 10/100/1000Mbps compliant in host systems with SGMII interface

Applications

- 1.25 Gigabit Ethernet over Cat 5 cable

Description

Aaxeon's SFP-C Copper Small Form Pluggable (SFP) transceivers are a high performance, cost effective module compliant with the Gigabit Ethernet and 1000BASE-T standards as specified in IEEE 802.3-2002 and IEEE 802.3ab, which supports 1000Mbps data-rate up to 100 meters over unshielded twisted-pair category 5 cable. The module supports 1000 Mbps full duplex data-links with 5-level Pulse Amplitude Modulation (PAM) signals. All four pairs in the cable are used with a 250Mbps signal rate on each pair. The module provides standard serial ID information compliant with SFP MSA, which can be accessed by the address of A0h via the 2 wire serial CMOS EEPROM protocol. The physical IC can also be accessed via 2 wire serial bus at address A0h.

Absolute Maximum Rating

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	NOTES/CONDITION
Operating Temperature	T_{op}	0		70	°C	Case temperature
Storage Temperature	T_{sto}	-40		85	°C	Ambient temperature

General Specification

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	NOTES/CONDITION
Data Rate	BR	10		1,000	Mb/sec	IEEE 802.3 compatible. See Notes 2 through 4 below
Cable Length	L			100	m	Category 5 UTP. BER <10^{-12}

Notes:

1. Clock tolerance is +/- 50 ppm
2. By default, the SFP-C is a full duplex device in preferred master mode
3. Automatic crossover detection is enabled. External crossover cable is not required
4. 1000 BASE-T operation requires the host system to have an SGMII interface with no clocks, and the module PHY to be configured.

+3.3V Volt Electrical Power Interface

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	NOTES/CONDITION
Supply Current	Is		320	375	mA	1.2W max power over full range of voltage and temperature. See caution note below
Input Voltage	Vcc	3.13	3.3	3.47	V	Referenced to GND
Maximum Voltage	Vmax			4	V	
Surge Current	Isurge			30	mA	Hot plug above steady state current. See caution note below

Caution: Power consumption and surge current are higher than the specified values in the SFP MSA

Low-Speed Signals (Electronic Characteristics)

MOD_DEF(1) (SCL) and MOD_DEF(2) (SDA), are open drain CMOS signals (see section VII, “Serial Communication Protocol”). Both MOD_DEF(1) and MOD_DEF(2) must be pulled up to host_Vcc.

PARAMETER	SYMBOL	MIN	MAX	UNIT	NOTE/CONDITION
SFP Output LOW	VOL	0	0.5	V	4.7k to 10k pull-up to host_Vcc, measured at host side of connector
SFP Output HIGH	VOH	host_Vcc - 0.5	host_Vcc + 0.3	V	4.7k to 10k pull-up to host_Vcc, measured at host side of connector
SFP Input LOW	VIL	0	0.8	V	4.7k to 10k pull-up to Vcc, measured at SFP side of connector
SFP Input HIGH	VIH	2	Vcc + 0.3	V	4.7k to 10k pull-up to Vcc, measured at SFP side of connector

High-Speed Electrical Interface (Transmission line-SFP)

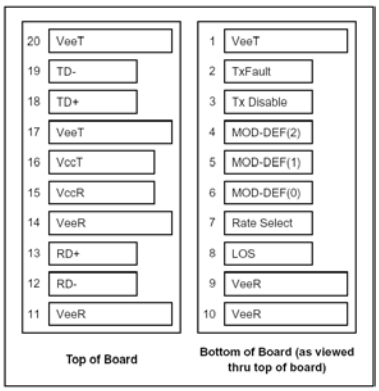
All high-speed signals are AC-coupled internally.

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	NOTES/CONDITION
Line Frequency	fL		125		MHz	5-level encoding, per IEEE 802.3
Tx Output Impedance	Zout,TX		100		Ohm	Differential, for all Frequencies between 1MHz and 125MHz
Rx Input Impedance	Zin,RX		100		Ohm	Differential, for all Frequencies between 1MHz and 125MHz

High-speed electrical interface (Host-SFP)

Parameter	Symbol	Min	Typ	Max	Unit	Notes/Condition
Single ended data input swing	Vinsing	250		1200	mV	Single ended
Single ended data output swing	Voutsing	350		800	mV	Single ended
Rise/Fall Time	Tr,Tf		175		psec	20%-80%
Tx Input Impedance	Zin		50		Ohm	Single ended
Rx Output Impedance	Zout		50		Ohm	Single ended

Pin Assignment



Pin Descriptions

PIN	SIGNAL NAME	DESCRIPTION	PLUG SEQ.	NOTE
1	V_{EET}	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note1
3	TX DISABLE	Transmitter Disable	3	Note2
4	MOD_DEF(2)	SDA Serial Data Signal	3	Note3
5	MOD_DEF(1)	SCL Serial Clock Signal	3	Note3
6	MOD_DEF(0)	TTL Low	3	Note3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note 4
9	V_{EER}	Receiver ground	1	
10	V_{EER}	Receiver ground	1	
11	V_{EER}	Receiver ground	1	
12	RX-	Inv. Received Data Out	3	Note 5
13	RX+	Received Data Out	3	Note 5
14	V_{EER}	Receiver ground	1	
15	V_{CCR}	Receiver Power Supply	2	
16	V_{CCT}	Transmitter Power Supply	2	
17	V_{EET}	Transmitter Ground	1	
18	TX+	Transmit Data In	3	Note 6
19	TX-	Inv. Transmit Data In	3	Note 6
20	V_{EET}	Transmitter Ground	1	

Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

1) TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.
2) TX Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7 ¨C 10 K resistor. Its states are:

   Low (0 to 0.8V): Transmitter on

   (>0.8, < 2.0V): Undefined

   High (2.0 to 3.465V): Transmitter Disabled

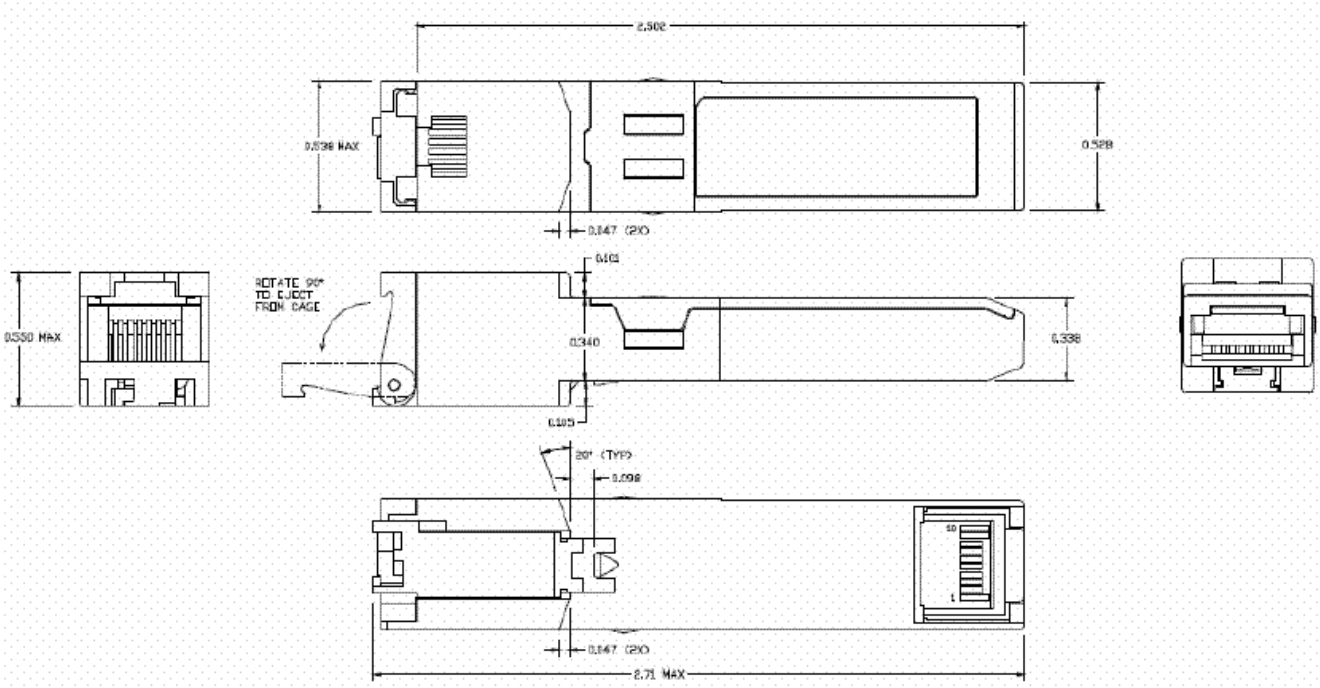
   Open: Transmitter Disabled
3) Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7K to 10K resistor on the host board. The pull-up voltage shall be VccT or VccR

   Mod-Def 0 is grounded by the module to indicate that the module is present

   Mod-Def 1 is the clock line of two wire serial interface for serial ID

   Mod-Def 2 is the data line of two wire serial interface for serial ID
4) LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K to 10K 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 <0.8V.
5) RD-/+: These are the differential receiver outputs. They are AC coupled 100 differential lines which should be terminated with 100 (differential).
6) TD-/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100 differential termination inside the module.

Dimensions (mm)



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