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1000BASE-T 100m SFP Copper

1. Purpose

The 1G copper SFP is a electrical small form factor pluggable (SFP) transceiver module for the high performance integrated full duplex data link at 1.25Gbps over four pair Category 5 UTP. The transceiver module is compliant with the SFP multi source agreement (MSA) and IEEE802.3:2002. With the hot pluggability, the module offers a flexible and easy way to be installed into SFP MSA compliant ports at any time without the interruption of the host equipments operating online.

2. General Description

1G Base T SFP Transceiver

Part Number	Data Rate	Distance	Media	Mode	Connector	Tem.
ZFTA1TA0000A0ST	1G	100m	Cat 5 cable	SGMII	RJ45	C

3. Feature

- 1.25 Gigabit Ethernet over Cat 5 cable
- Electrical interface specifications per SFF-8431
- Management interface specifications per SFF-8432 and SFF-8472
- 10/100/1000M BASE-T auto-negotiation operation in host sys-tems with SGMII interface
- Up to 100m over Cat 5 cable
- Single +3.3V power supply
- 1.2W maximum power consumption with established link
- Operating temperature Options: 0~85℃
- RoHS Compliant

4. Applications

- High speed storage area networks
- Switched Backplane Applications
- Switch to Switch Interface

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5. Absolute Maximum Rating

Parameter	Min	Max	Unit	Notes
Operating Temperature	0	70	℃	Case temperature (C temp.)
Operating Temperature	0	85	℃	Case temperature (I temp.)
Storage Temperature	-40	85	℃	Ambient temperature
Operating Relative Humidity	5	95	%	

6. Recommended Operating Conditions

Parameter	Min	Typ	Max	Unit
Supply Current	-	320	400	mA
Input Voltage	3.13	3.3	3.47	V
Maximum Voltage	-	-	3.8	V
I2C	0	-	100,000	Hz

7. +3.3V Electrical Power Interface

Parameter	Symbol	Min	Typ	Max	Units	Notes
Supply Current	IS	-	320	400	mA	
Input Voltage	VCC	3.13	3.3	3.47	V	
Maximum Voltage	VMAX	-	-	3.8	V	

Low-Speed Signals ,Electronic Characteristics

Parameter	Symbol	Min	Max	Units	Notes
SFP Output LOW	VOL	0	0.5	V	
SFP Output HIGH	VOH	Host_V_{CC}-0.5	Host_V_{CC}+0.3	V	4.7k to 10k pull-up to host_VCC

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SFP Input LOW	VIL	0	0.8	V	measured at host side of connector
SFP Input HIGH	VIH	2	$V_{CC}+0.3$	V	

8. Low-Speed Signals ,Electronic Characteristics

Parameter	Symbol	Min	Typ	Max	Units	Conditions / Notes
Line Frequency	Lf	-	125	-	MHz	5-level encoding, per IEEE802.3
Tx Output Impedance	ZOUT,TX		100		Ohm	
Rx Input Impedance	ZIN,RX	-	100	-	Ohm	

High-Speed Electrical Interface, Host-SFP

Parameter	Symbol	Min	Typ	Max	Units	Conditions / Notes
Transmitter Differential Input Voltage	VIN	500	-	2400	mV	Differential voltage swings
Receiver Differential Output Voltage	VOUT	700	-	1600	mV	Differential voltage swings
Rise and Fall Time	tr / tf	-	175	-	ps	20% - 80%
Tx Input Impedance	ZIN	-	50	-	Ohm	Single ended
Rx Output Impedance	ZOUT	-	50	-	Ohm	Single ended

General

Parameter	Symbol	Min	Typ	Max	Units	Conditions / Notes
Data Rate	BR	10		1000	Mb/sec	IEEE802.3 compatible.
Cable Length	L	-	-	100	m	Category 5 UTP. BER <1E-12

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9. Power supply and voltage detection circuitry
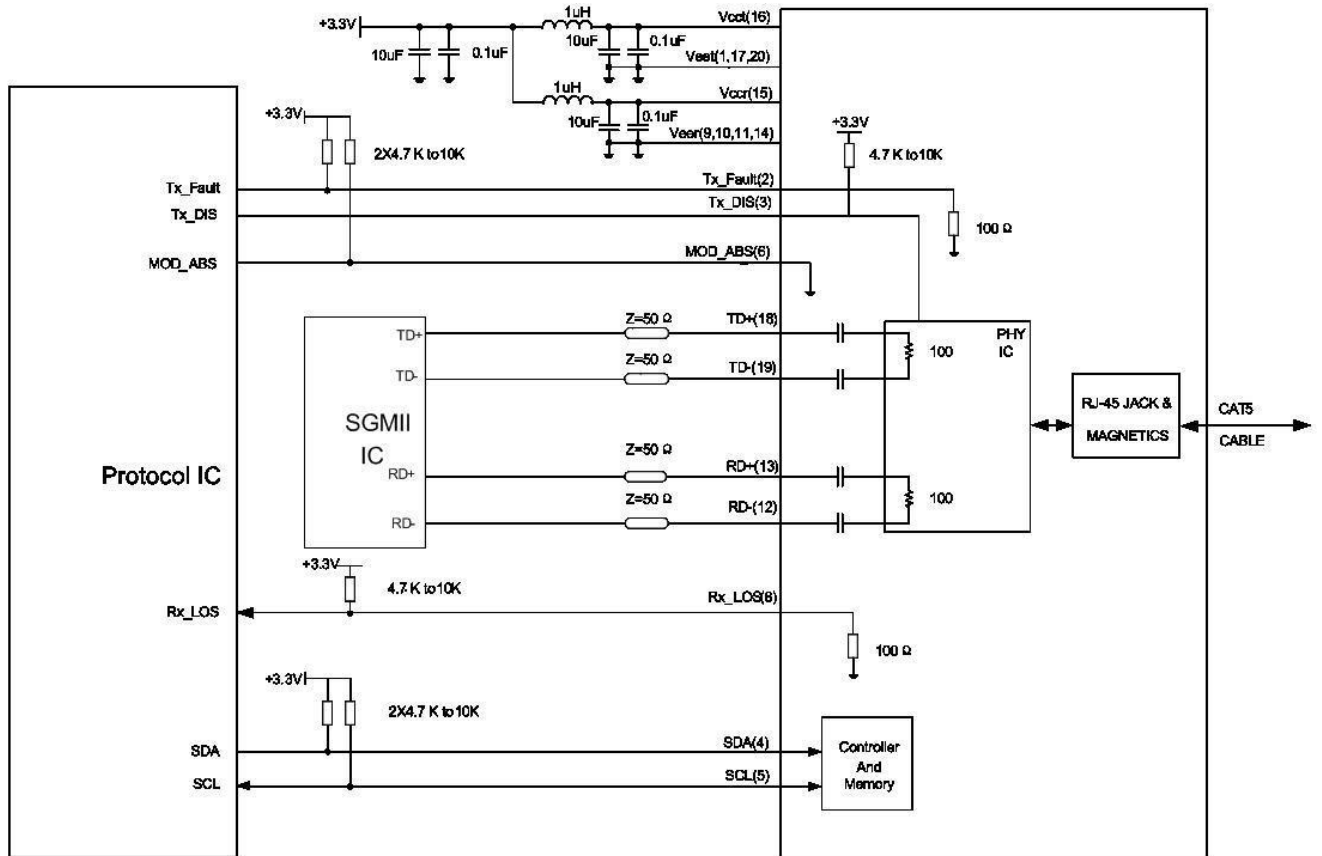
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Serial Communication Protocol

EEPROM Serial ID Memory Contents at address A0

All ZCables SFP support the 2-wire serial communication protocol outlined in the SFP MSA. These

SFP use an 128 byte E2PROM with an address of A0h.

Internal ASIC Registers

The 1000BASE-T physical layer IC can also be accessed via the 2-wire serial bus at address A0h.

10. Pin Description
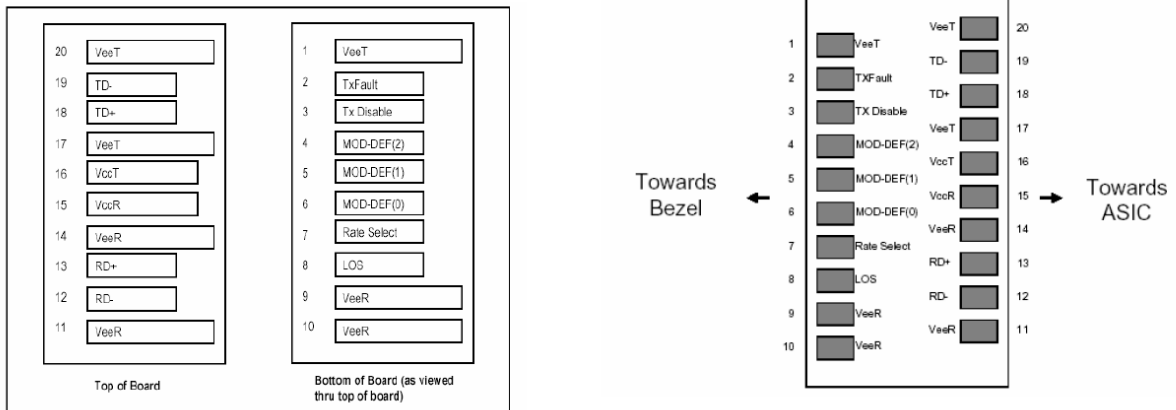
11. Module Pin Definitions

Pin No.	Pin Name	Function	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	
2	TX Fault	Transmitter Fault Indication	3	1
3	TX Disable	Transmitter Disable	3	2
4	MOD_DEF 2	Module Definition 2	3	3
5	MOD_DEF 1	Module Definition 1	3	3

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6	MOD_DEF 0	Module Definition 0	3	3
7	Rate Select	Not connected 3 4	3	4
8	RX_LOS	Receiver Loss of Signal	3	5
9	VeeR	Receiver Ground	1	6
10	VeeR	Receiver Ground	1	6
11	VeeR	Receiver Ground	1	6
12	RD -	Inv. Received Data Out	3	7
13	RD +	Received Data Out	3	7
14	VeeR	Receiver Ground	1	6
15	VccR	Receiver Power	2	8
16	VccT	Transmitter Power	2	8
17	VeeT	Transmitter Ground	1	6
18	TD +	Transmit Data In	3	9
19	TD -	Inv. Transmit Data In	3	9
20	VeeT	Transmitter Ground	1	6

Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

1.TX Fault is not supported.

2.TX disable, an input used to reset the transceiver module, is pulled up within the module with a 4.7 – 10

K. resistor. Its states are: Low (0 – 0.8V): transceiver module on. (>0.8, < 2.0V): Undefined. High (2.0 – 3.465V):

transceiver module disabled.

Open: transceiver module disabled.

3.Mod-Def 0,1,2, are the module definition pins, which 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 0 is grounded in 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.Rate select is not required for connection.

5.RX_LOS (Loss of Signal): LVTTL compatible with a maximum voltage of 2.5V.

6.VeeR and VeeT may be internally connected within the SFP module.

7.RD-/+, the differential receiver outputs, are AC coupled 100Ω differential lines which should be

terminated with 100 M differential at the user SerDes.

8.VccR and VccT are the receiver and transmitter power supplies defined as 3.3V ±5% at the SFP connectorpin.
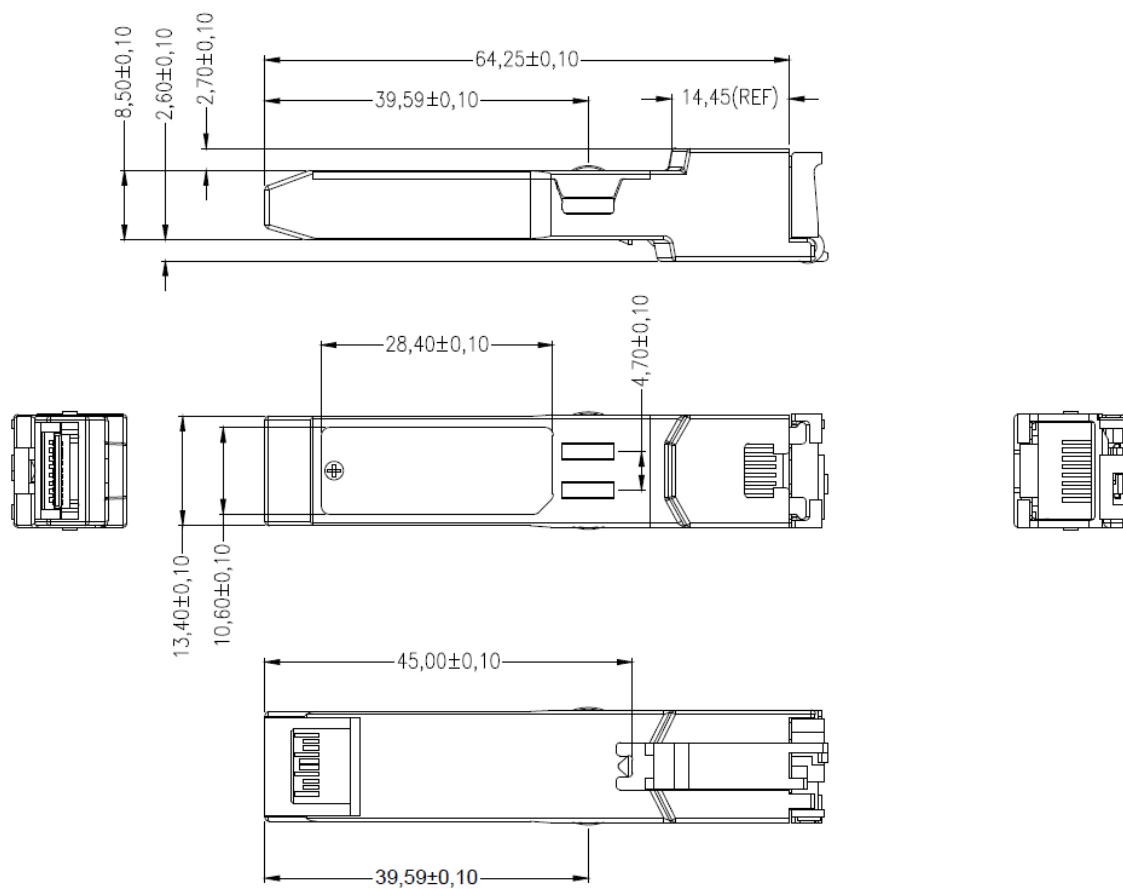
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Maximum supply current is 400 mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1 M should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply filtering network is used, hot plugging of the SFP transceiver module will result in an inrush current of no more than 30 mA greater than the steady state value. VccR and VccT may be internally connected within the

SFP transceiver module.

9.TD-/+, the differential transmitter inputs, are AC-coupled differential lines with 100M differential termination inside the module. The AC coupling is done inside the module, thus not required on the host board. The inputs will accept differential swings of 500 – 2400mV (250 mV - 1200 mV single ended), though it is recommended that values between 500 and 1200mV differential (250 – 600mV single ended) be used for best EMI performance.

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12. Mechanical Design Diagram

Units: mm