

## TS-SFP-T-A

### 1000BASE-T Copper SFP Transceiver

#### Features

- Support 1000BASE-T Operation in Host Systems
- For 100m Reach over Cat 5 UTP Cable
- Hot-Pluggable SFP Footprint
- Fully Metallic Enclosure for Low EMI
- Low Power Dissipation (1.05W Typical)
- Compact RJ-45 Connector Assembly
- Access to Physical Layer IC via 2-Wire Serial Bus
- Detailed Product Information in EEPROM
- Compliant with SFP MSA
- Compliant with IEEE Std 802.3-2002
- Operating case temperature range of 0°C to +70°C (Standard) or -40°C to +85°C (Industrial)



#### Applications

- LAN 1000Base-T
- Gigabit Ethernet over Cat 5 Cable
- Switch to Switch Interface
- Router/Server interface

#### Description

TONGSION's TS-SFP-T-A 1000BASE-T Copper Small Form Pluggable (SFP) modules are based on the SFP Multi Source Agreement (MSA). It is compliant with the Gigabit Ethernet and 1000BASE-T standards as specified in IEEE STD 802.3 and 802.3ab.

#### Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.5	4.5	V
Storage Temperature	Ts	-40	+85	°C

**Recommended Operating Conditions**

Parameter		Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Standard	Tc	0		+70	°C
	Industrial		-40		+85	°C
Supply Voltage		Vcc	3.14	3.3	3.46	V

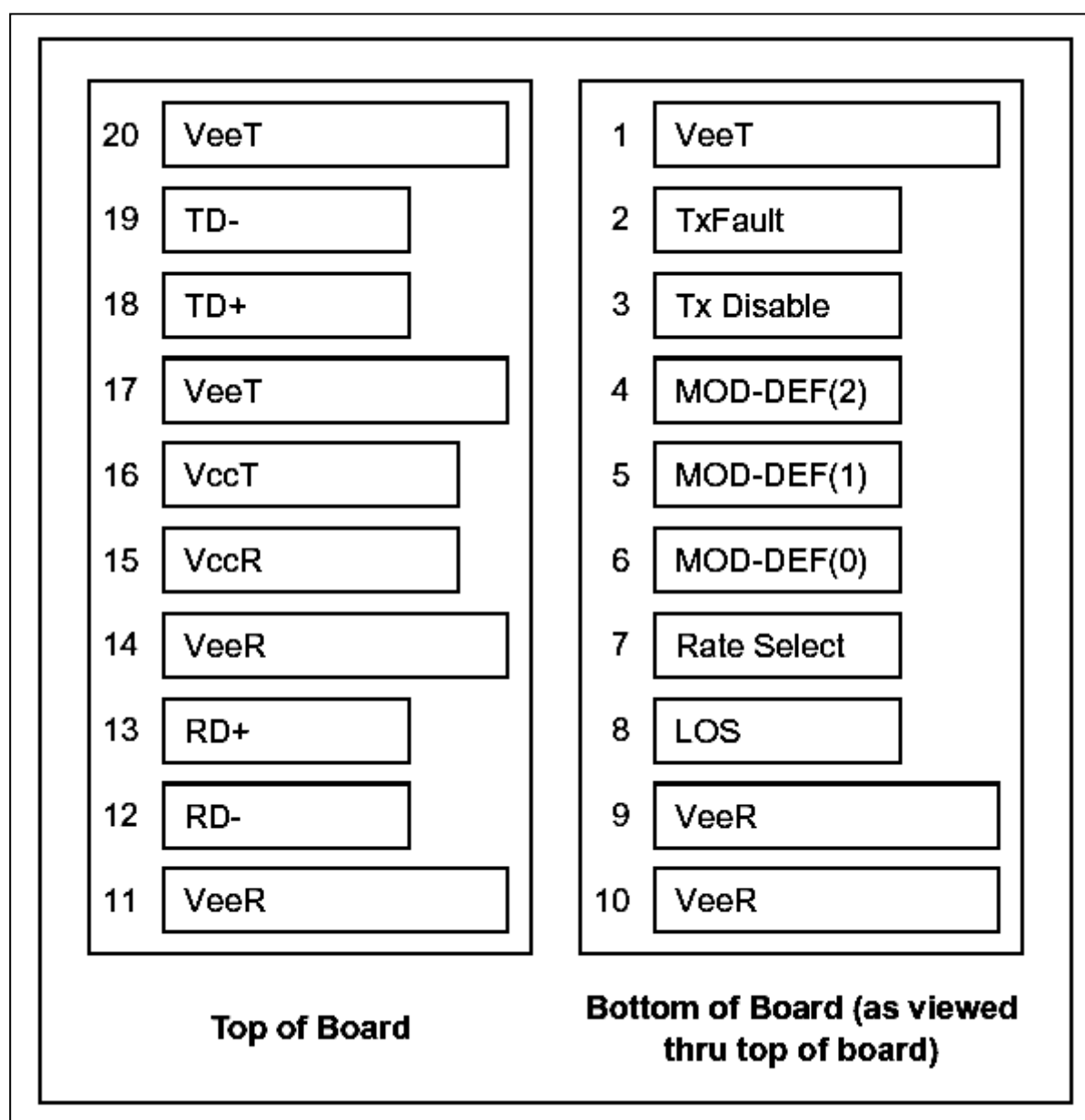
**Electrical Characteristics**

Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
<b>+3.3 Volt Electrical Power Interface</b>						
Supply Current	Icc		300	350	mA	
Input Voltage	Vcc	3.13	3.3	3.47	V	
Surge Current	I <sub>surge</sub>			30	mA	
<b>Low-Speed Signals, Electronic Characteristics</b>						
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
<b>High-Speed Electrical Interface, Transmission Line-SFP</b>						
Line Frequency	fL		125		MHz	5-level encoding, per IEEE 802.3
Tx Output impedance	Z <sub>out, TX</sub>		100		Ohm	Differential, for all frequencies between 1MHz and 125MHz
Rx Input Impedance	Z <sub>in, RX</sub>		100		Ohm	Differential, for all frequencies between 1MHz and 125MHz
<b>High-Speed Electrical Interface, Host-SFP</b>						
Single ended data input swing	V <sub>in</sub>	250		1200	mV	Single ended
Single ended data output swing	V <sub>out</sub>	350		800	mV	Single ended
Rise/Fall Time	T <sub>r</sub> , T <sub>f</sub>		175		psec	20%-80%
Tx Input Impedance	Z <sub>in</sub>		50		Ohm	Single ended
Rx Output Impedance	Z <sub>out</sub>		50		Ohm	Single ended

### General specifications

Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
Data rate			1000		Mbps	
Distance				100	m	Category 5 UTP. BER<10 <sup>-12</sup>

### SFP Transceiver Electrical Pad Layout



**Pin Descriptions**

Pin	Signal Name	Description	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	
2	TX Fault	Transmitter Fault Indication	3	Not used
3	TX Disable	Transmitter Disable	3	1
4	MOD_DEF(2)	Module Definition 2	3	2
5	MOD_DEF(1)	Module Definition 1	3	2
6	MOD_DEF(0)	Module Definition 0	3	2
7	Rate Select	Not Connect	3	
8	LOS	Loss of Signal	3	Not used
9	VeeR	Receiver ground	1	
10	VeeR	Receiver ground	1	
11	VeeR	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	
13	RD+	Received Data Out	3	
14	VeeR	Receiver ground	1	
15	VccR	Receiver Power Supply	2	
16	VccT	Transmitter Power Supply	2	
17	VeeT	Transmitter Ground	1	
18	TD+	Transmit Data In	3	
19	TD-	Inv. Transmit Data In	3	
20	VeeT	Transmitter Ground	1	

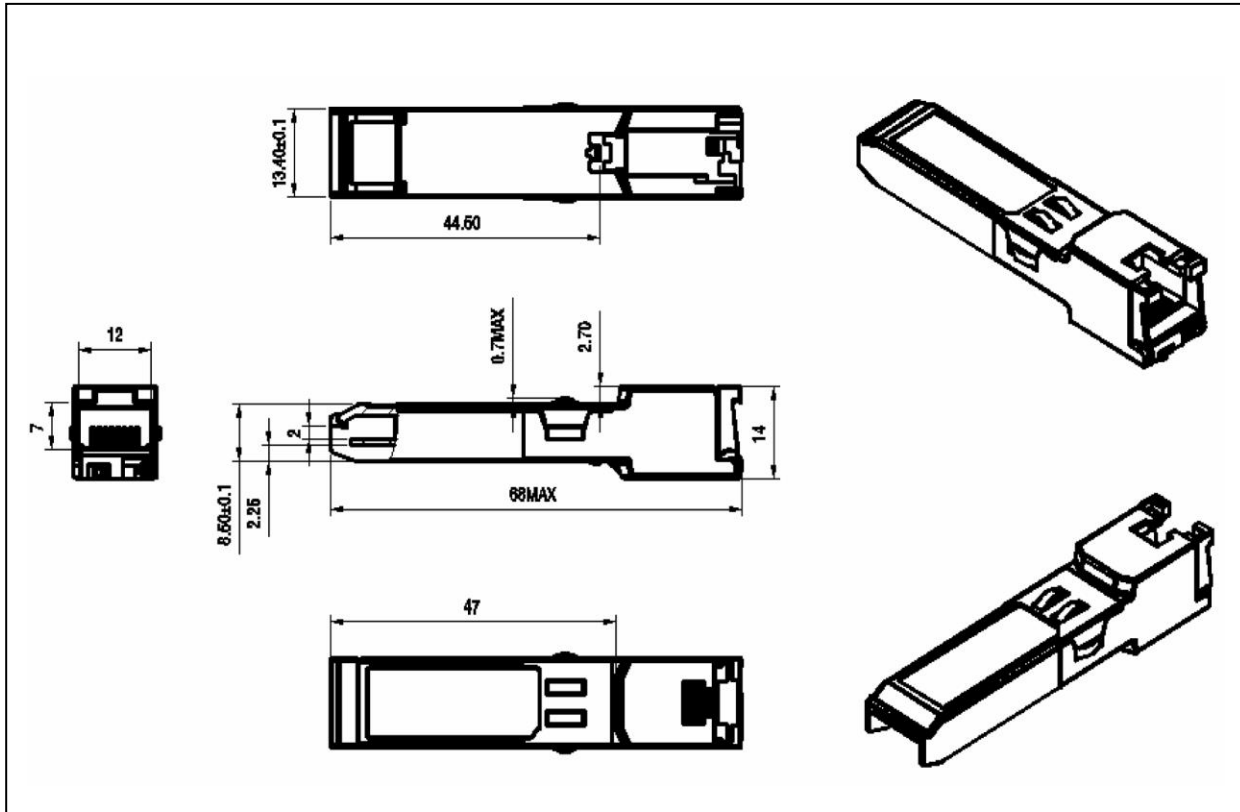
**Notes:**

1. PHY disabled on TDIS > 2.0V or open, enabled on TDIS < 0.8V, used to reset the module.
2. Should be pulled up with 4.7k ~ 10k Ohm on host board to a voltage between 2.0V and 3.6V. MOD\_DEF(0) pulls line low to indicate module is plugged in.

**Serial Communication Protocol**

TONGSION Copper SFPs support the 2-wire serial communication protocol outlined in the SFP MSA. These SFP use a 128 byte EEPROM with an address of A0H. The 1000BASE-T physical layer IC can also be accessed via the 2-wire serial bus at address ACH.

### Mechanical Dimensions



### Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>500 V) Isolation with the case
Electromagnetic Interference (EMI)	FCC Part 15 Class B	Compatible with standards
Component Recognition	UL and CUL	UL file E317337
Green Products	2002/95/EC 2005/618/EC	RoHS6

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**Ordering information**

Part Number	Product Description
TS-SFP-T-A	1000Mbps, RJ45, 100m, 0°C~+70°C
TS-SFP-T-AI	1000Mbps, RJ45, 100m, -40°C~+85°C

**References**

1. Small Form Factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA), September 2000.

**Important Notice**

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