

## NT-SFP-1G-T

10/100/1000BASE-T SFP Transceiver, Copper, 100m Reach

### Features

- Up to 1.25Gb/s bi-directional data links
- Hot-pluggable SFP footprint
- Fully 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
- ROHS compliant and Lead Free
- Operating Temperature: Standard 0~70°C



### Applications

- Gigabit Ethernet over Cat 5 cable
- Switch to Switch Interface
- Router/Server Interface

### Description

Netiks NT-SFP-1G-T is high performance, cost-effective Copper Small Form Pluggable (SFP) transceiver module compliant with the Gigabit Ethernet and 1000BASE-T standards as specified in IEEE 802. 3-2002 and IEEE 802.3ab, which supporting 1000Mbps data-rate up to 100 meters reach over unshielded twisted-pair category 5 cables. The module supports 10/100/1000Mbps full duplex data-links with 5-level Pulse Amplitude Modulation (PAM) signals. All four pairs in the cable are used with symbol rate at 250Mbps on each pair. The module provides standard serial ID information compliant with SFP MSA, which can be accessed with the address of A0h via the 2wire serial CMOS EEPROM protocol.

### Related Products

- NT-SFP-1G-SX [-IND]: 1.25Gb/s SFP SX Transceiver Module, Multi mode, 850nm, 550m, LC
- NT-SFP-1G-LX-20 [-IND]: 1.25Gb/s SFP LX Transceiver Module, Single mode, 1310nm, 20km, LC
- NT-SFP-1G-EX [-IND]: 1.25Gb/s SFP EX Transceiver Module, Single mode, 1310nm, 40km, LC
- NT-SFP-1G-ZX [-IND]: 1.25Gb/s SFP ZX Transceiver Module, Single mode, 1550nm, 80km, LC
- NT-SFP-1G-ZX-120 [-IND]: 1.25Gb/s SFP EZX Transceiver Module, Single mode, 1550nm, 120km, LC

## Absolute Maximum Ratings

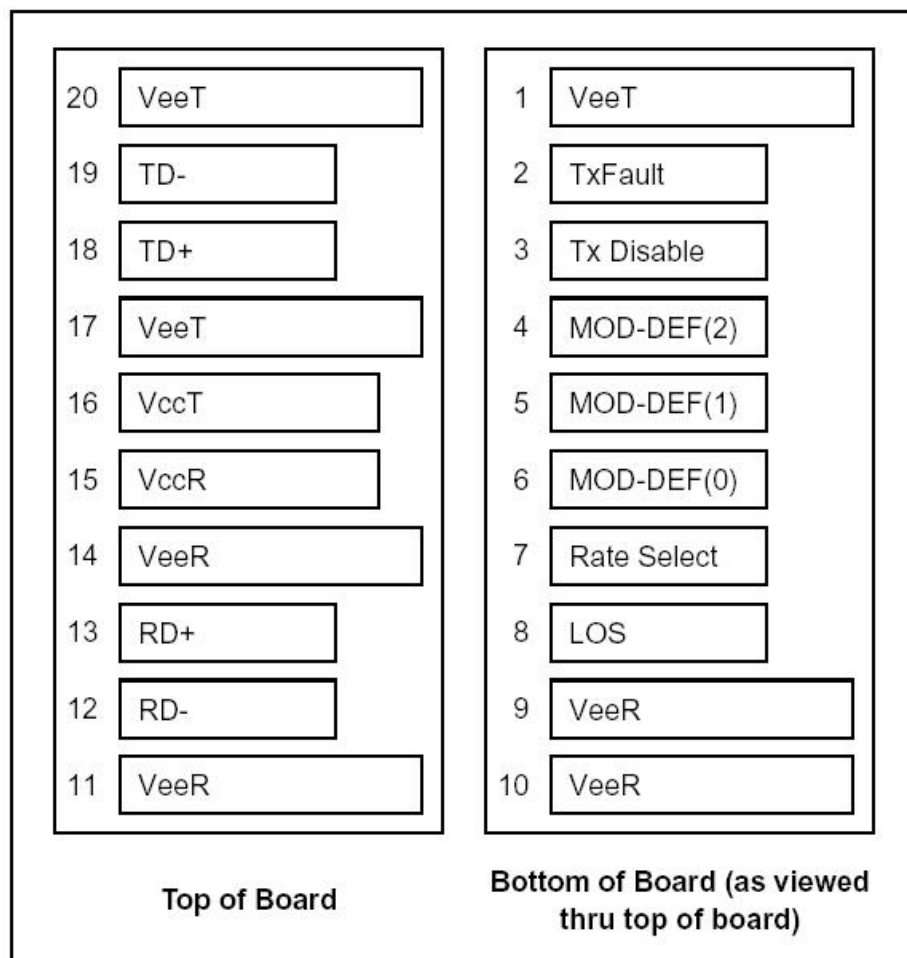
Parameter	Symbol	Min	Max	Unit	Notes
Maximum Supply Voltage	V <sub>cc</sub>	-0.5	4.0	V	
Storage Temperature	T <sub>s</sub>	-40	85	°C	
Operating Humidity	RH	5	95	%	

## Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage	V <sub>cc</sub>	3.13	3.3	3.47	V	
Power Supply Current	I <sub>cc</sub>		320	375	mA	
Case Operating Temperature	T <sub>c</sub>	0		70	°C	Standard
		-5		85	°C	Extended
Data Rate		10		1000	Mbps	
			1000		Mbps	
Transmission Distance				100	m	Category 5 UTP. BER <10 <sup>-12</sup>

## Pin Definitions

### Pin Diagram



## Pin Descriptions

Pin	Signal Name	Description	Plug Seq.	Notes
1	V <sub>EET</sub>	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 <sub>EER</sub>	Receiver ground	1	
10	V <sub>EER</sub>	Receiver ground	1	
11	V <sub>EER</sub>	Receiver ground	1	
12	RX-	Inv. Received Data Out	3	Note 5
13	RX+	Received Data Out	3	Note 5
14	V <sub>EER</sub>	Receiver ground	1	
15	V <sub>CCR</sub>	Receiver Power Supply	2	
16	V <sub>CCT</sub>	Transmitter Power Supply	2	
17	V <sub>EET</sub>	Transmitter Ground	1	
18	TX+	Transmit Data In	3	Note 6
19	TX-	Inv. Transmit Data In	3	Note 6
20	V <sub>EET</sub>	Transmitter Ground	1	

### Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

- 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 V<sub>cc</sub>+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.
- 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
- 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 V<sub>ccT</sub> or V<sub>ccR</sub>  
 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) at the user SERDES.
- 6) TD-/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100 differential termination inside the module.

### +3.3V Volt Electrical Power Interface

The copper SFP module has an input voltage range of +3.3V +/- 5%. The 4V maximum voltage is not allowed for continuous operation.

#### +3.3V Volt electrical power interface

+3.3V volt Electrical Power Interface						
Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
Supply Current	Icc		320	375	mA	1.2W max power over full range of voltage and temperature.
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

### Low-Speed Signals

MOD\_DEF(1) (SCL) and MOD\_DEF(2) (SDA), are open drain CMOS signals. Both MOD\_DEF(1) and MOD\_DEF(2) must be pulled up to host\_Vcc.

#### Low-speed signals, electronic characteristics

Low-Speed Signals, Electronic Characteristics					
Parameter	Symbol	Min	Max	Units	Notes
SFP Output Low	VOL	0	0.5	V	1
SFP Output High	VOH	host_Vcc - 0.5	host_Vcc + 0.3	V	1
SFP Input Low	VIL	0	0.8	V	2
SFP Input High	VIH	2	Vcc + 0.3	V	2

#### Notes:

4.7k to 10k pull-up to host\_Vcc, measured at host side of connector

4.7k to 10k pull-up to Vcc, measured at SFP side of connector

## High-Speed Electrical Interface

### High-speed electrical interface, transmission line-SFP

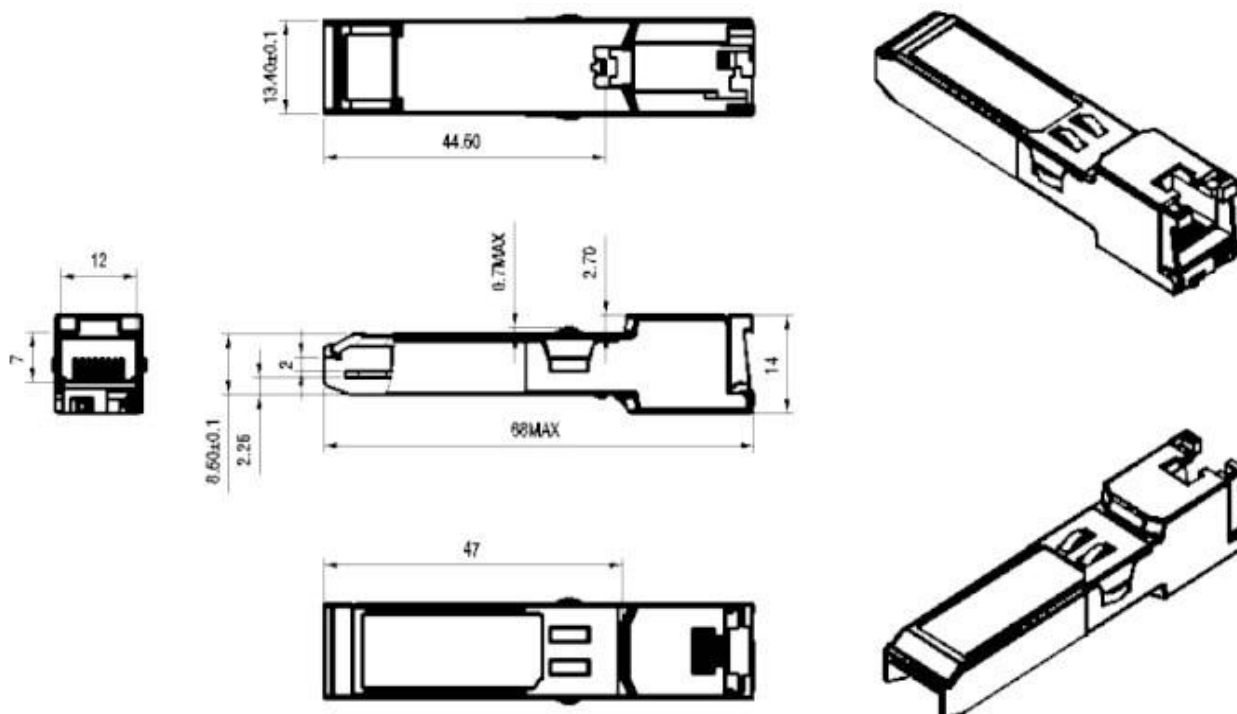
High-Speed Electrical Interface Transmission Line-SFP						
Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
Line Frequency	fL		125		MHz	5-level encoding, per IEEE 802.3
Tx Output Impedance	Zout,TX		100		Ohm	Differential, for all Frequencies between 1MHz and 125MHz
Rx Input Impedance	Zin,RX		100		Ohm	Differential, for all Frequencies between 1MHz and 125MHz

### High-speed electrical interface, host-SFP

High-Speed Electrical Interface, Host-SFP						
Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
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

## Mechanical Dimensions

The host-side of the 10/1001000BASE-T Copper SFP module conforms to the mechanical specifications outlined in the SFP MSA. The front portion of the SFP (part extending beyond the face plate of the host) is larger to accommodate the RJ-45 connector. See Figure 2 below for details, dimensions are in *mm*.



## Ordering information

Part number	Description
NT-SFP-1G-T	10/100/1000BASE-T SFP Transceiver, Copper, 100m, SGMII Interface, RJ-45, 0~70°C

## Warnings

### Process plug

The transceiver optics is supplied with a dust cover. This plug protects the transceiver optics during standard manufacturing processes by preventing contamination from air borne particles. It is recommended that the dust cover remain in the transceiver whenever an optical fiber connector is not inserted.

### Handling Precautions

The transceiver optics is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

### Laser Safety

The transceiver optics is a Class 1 laser product per international standard IEC 60825-1. Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

## Standards

Netiks optical transceivers comply with the requirements set out in the Council Directive relating to Electromagnetic Compatibility Directive on (2014/30/EU). For the evaluation regarding the EMC, the following standards were applied:

**EN 55032 (2012+AC: 2013)**

**EN 61000-3-2 (2014)**

**EN 61000-3-3 (2013)**

**EN 55024 (2010)**

For more product information, visit us on the web at [www.netiks.rs](http://www.netiks.rs)



Copyright © 2021 Netiks. All rights reserved. NT-SFP and Netiks logo are registered trademarks of Netiks Co., Ltd. All other brands, product names, or trademarks mentioned are the property of their respective owners. Specifications and product availability are subject to change without notice. Netiks assumes no responsibility for inaccuracies contained herein.

