1000 BASE-T Copper SFP Transceiver

Features

- Up to 1.25 Gb/s bi-directional data links
- Link lengths at 1.25 Gb/s up to 100 meter
- 1000 BASE-T operation in host systems with SERDES interface
- Support TX_ disable and no Link function
- Compliant with SFP MSA
- Compact RJ-45 connector assembly
- Hot-pluggable SFP Footprint
- Single + 3.3V Power Supply
- Fully Metallic Enclosure for Low EMI
- Low power dissipation(1.05W typical)
- RoHS-10 compliant and lead-free
- Operating case temperature

  Commercial: 0 ~ +70°C

  Extended: -10 ~ +80°C

  Industrial: -40 ~ +85°C

Applications

- LAN 1000Base-T
- Switch to Switch Interface
- Router/Server interface
- Switched backplane applications

Part Number Ordering Information

Part Number	Data Rate (Gb/s)	Transmission Distance(m)	Link Indicator on RX_ LOS pin	TX_ disable with PHY	Temperature (°C) (Operating Case)
DO-GLC-T-C	1.25	100	No	Yes	0~70 commercial
DO-GLC-T-E	1.25	100	No	Yes	-10~80 Extended
DO-GLC-T-I	1.25	100	No	Yes	-40~85 Industrial

I. Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min	Max	Unit	Notes
Storage Temperature	T_S	-40	85	°C	
Power Supply Voltage	V_{CC}	-0.5	3.6	V	
Relative Humidity (non-condensation)	RH	5	95	%	

II. Recommended Operating Conditions and Power Supply Requirements

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Operating Case Temperature	T_{OP}	0		70	°C	commercial
		-10		80		extended
		-40		85		industrial
Power Supply Voltage	V_{CC}	3.135	3.3	3.465	V	
Data Rate			1.25		Gb/s	
Link Distance (SMF)	D			100	m	

III. General Description

Do-networks' DO-GLC-T Copper Small Form Pluggable (SFP) transceivers are based on the SFP Multi Source Agreement (MSA). They are compatible with the Gigabit Ethernet standards as specified in IEEE STD 802.3. The 1000 BASE-T physical layer IC (PHY) can be accessed via I2C, allowing access to all PHY settings and features.

The 1000 BASE-T is compatible with 1000BASE-X auto-negotiation and support a SERDES, but does not have a link indication feature.

IV. Pin Assignment and Pin Description

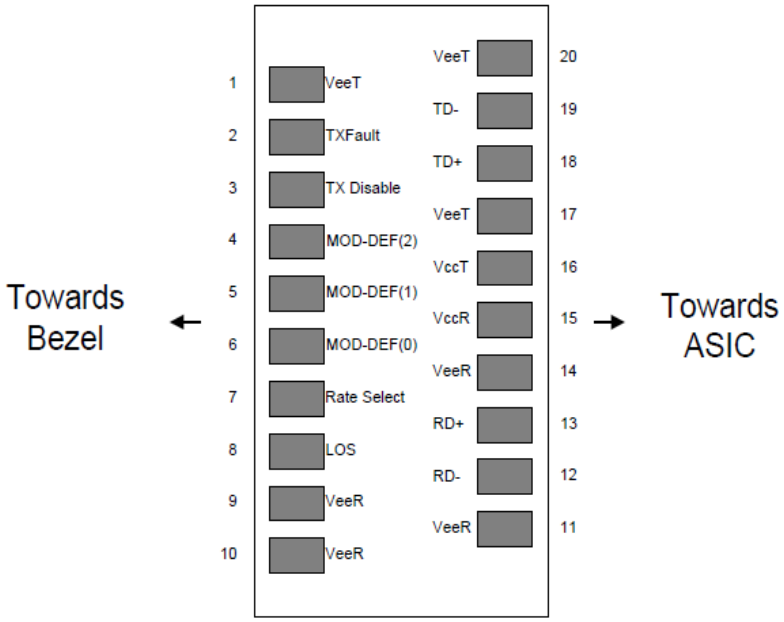

Figure1. Diagram of host board connector block pin numbers and names

PIN	Name	Name/Description	Notes
1	VEET	Transmitter Ground (Common with Receiver Ground)	1
2	TXFAULT	Transmitter Fault.	
3	TXDIS	Transmitter Disable. Laser output disabled on high or open.	
4	MOD_DEF(2)	Module Definition 2. Data line for Serial ID.	2
5	MOD_DEF(1)	Module Definition 1. Clock line for Serial ID.	2
6	MOD_DEF(0)	Module Definition 0. Grounded within the module.	2
7	Rate Select	No connection required	
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	3
9	VEER	Receiver Ground (Common with Transmitter Ground)	1

10	VEER	Receiver Ground (Common with Transmitter Ground)	1
11	VEER	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	VEER	Receiver Ground (Common with Transmitter Ground)	1
15	VCCR	Receiver Power Supply	
16	VCCT	Transmitter Power Supply	
17	VEET	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	VEET	Transmitter Ground (Common with Receiver Ground)	1

Notes:

1. Circuit ground is connected to chassis ground

2. Should be pulled up with 4.7k - 10k Ohms on host board to a voltage between 2.0 V and 3.6 V. MOD_DEF (0) pulls line low to indicate module is plugged in.

3. LVTTL compatible with a maximum voltage of 2.5V.

V. Power Supply Interface Electronic Characteristics

The 1000 BASE-T has an input voltage range of 3.3 V ± 5%. The 4 V maximum voltage is not allowed for continuous operation.

Parameter	Symbol	Min.	Typical	Max	Unit	Notes

Power Consumption				1.2	W	
Supply Current	Icc			375	mA	
Input Voltage Tolerance		-0.3		4.0	V	
Surge	Surge		30		mV	
Current		current See caution note				

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

VI. Low-Speed Signals Electronic Characteristics

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_ $V_{CC.}$

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
SFP Output LOW	VOL	0		0.5	V	4.7k to 10k pull-up to host_ Vcc.
SFP Output HIGH	VOH	host_ Vcc -0.5		host_ Vcc +0.3	V	4.7k to 10k pull-up to host_ Vcc.
SFP Input LOW	VIL	0		0.8	V	4.7k to 10k pull-up to Vcc.
SFP Input HIGH	VIH	2		Vcc + 0.3	V	4.7k to 10k pull-up to Vcc.

VII. High-Speed Electrical Interface

All high-speed signals are AC-coupled internally.

High-Speed Electrical Interface, Transmission Line-SFP						
Parameter	**Symbol**	**Min.**	**Typical**	**Max**	**Unit**	**Notes**
Line Frequency	fL		125		MHz	5-level encoding, per

						IEEE 802.3
Tx Output Impedance	Zout,TX		100		Ohm	Differential
Rx Input Impedance	Zin,RX		100		Ohm	Differential
High-Speed Electrical Interface, Host-SFP						
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		ps	20%-80%
Tx Input Impedance	Zin		50		Ohm	Single ended
Rx Output Impedance	Zout		50		Ohm	Single ended

VIII. General Specifications

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
Data Rate	BR	10		1000	Mb/s	IEEE 802.3 compatible
Cable Length	L			100	m	Category 5 UTP. BER <10-12

Notes:

1. Clock tolerance is +/- 50 ppm

2. By default, the 1000 BASE-T is a full duplex device in preferred master mode

3. Automatic crossover detection is enabled. External crossover cable is not required

4. By default, 1000 BASE-T operation requires the host system to have an SERDES interface with no clocks.

IX. Serial Communication Protocol

1000 BASE-T supports the 2-wire serial communication protocol outlined in the SFP MSA. It uses an Atmel AT24C02D 256 byte EEPROM with an address of A0h

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
I 2C Clock Rate		0		100000	Hz	

X. Mechanical Dimensions

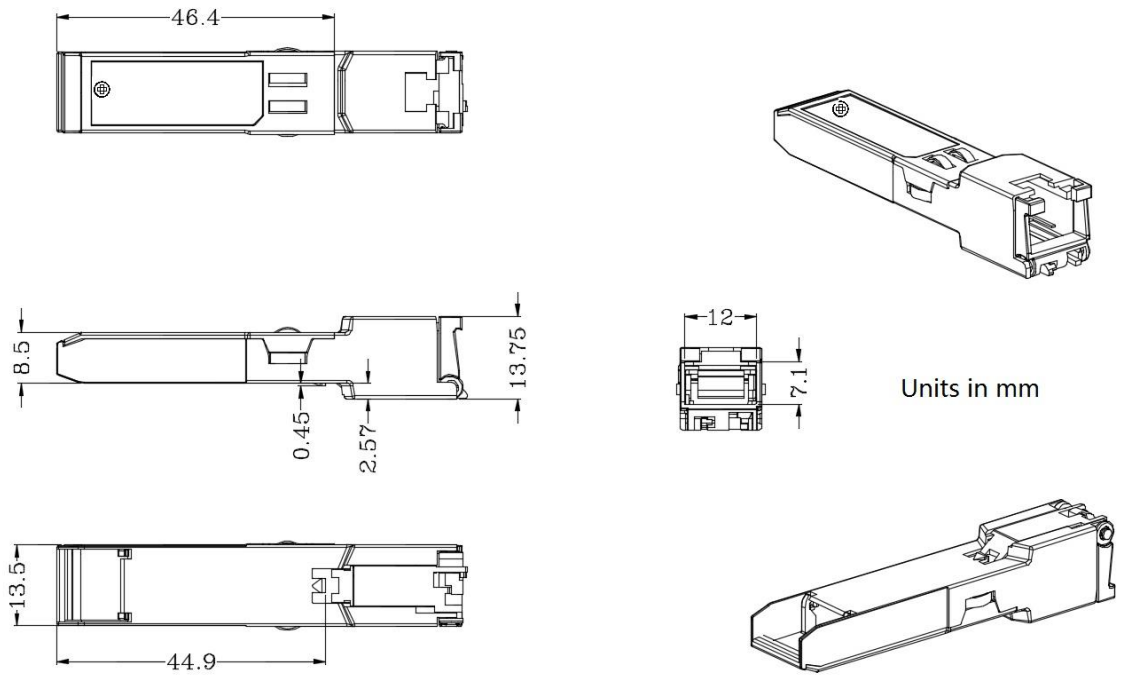

Figure2. Mechanical Outline

IX. Precautions

a. This device 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.

b. Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.