GS-Tx
Copper SFP Transceiver

Features

- Up to 1.25Gb/s bi-directional data links
- Hot-pluggable SFP footprint
- Extended case temperature range (0°C to +70°C)
- 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
- 1000 BASE-T operation in host systems with SERDES interface
- 10/100/1000Mbps compliant in host systems with SGMII interface

Applications
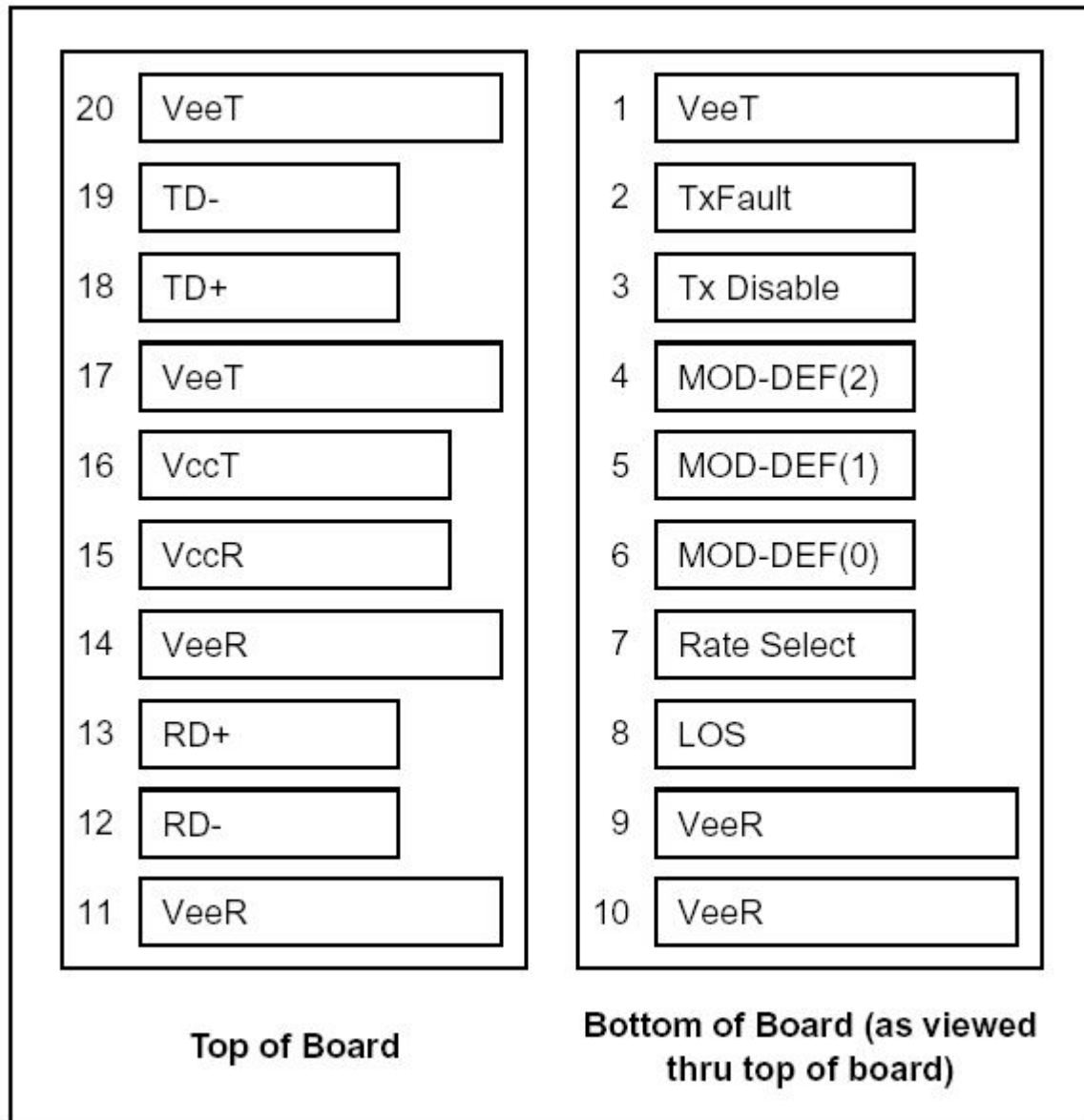
- 1.25 Gigabit Ethernet over Cat 5 cable

Description

Gezhi Photonics GS-Tx Copper Small Form Pluggable (SFP)transceivers is 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 supp- orting 1000Mbps data- rate up to 100 meters reach over unshielded twisted-pair category 5 cable. The module supports1000 Mbps 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 address of A0h via the 2wire serial CMOS EEPROM protocol. The physical IC can also be accessed via 2wire serial bus at address ACh.

Pin Definitions

Pin Diagram

Top of Board	Bottom of Board (as viewed thru top of board)
20 VeeT	1 VeeT
19 TD-	2 TxFault
18 TD+	3 Tx Disable
17 VeeT	4 MOD-DEF(2)
16 VccT	5 MOD-DEF(1)
15 VccR	6 MOD-DEF(0)
14 VeeR	7 Rate Select
13 RD+	8 LOS
12 RD-	9 VeeR
11 VeeR	10 VeeR

Top of Board

Bottom of Board (as viewed thru top of board)

Pin Descriptions

Pin	Signal Name	Description	Plug Seq.	Notes
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	Note4
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 is not supported and is always connected to ground.

2) TX Disable is not supported.

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 is not supported in 10/100/1000base-T (GS-T1)

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 GS-Tx has an input voltage range of +5V +/- 5%. The 3.3V maximum voltage is not allowed for continuous operation.

Table 1. +3.3V Volt electrical power interface

+3.3V volt Electrical Power Interface						
Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
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

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.

Table 2. Low-speed signals, electronic characteristics

Low-Speed Signals, Electronic Characteristics					
Parameter	Symbol	Min	Max	Units	Notes/Conditions
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

All high-speed signals are AC-coupled internally.

Table 3. 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

Table 4. 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

General Specifications

Table 5. General specifications

General						
Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
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 GS-Tx is a full duplex device in preferred master mode
3. Automatic crossover detection is enabled. External crossover cable is not required

Environmental Specifications

Table 6. Environmental specifications

Environmental Specifications						
Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
Operating Temperature	Top	0		70	°C	Case temperature
Storage Temperature	Tsto	-40		85	°C	Ambient temperature

References

1. Gigabit Interface Converter (SFP) Transceiver Multi-Source Agreement (MSA),
2. IEEE Std 802.3, 2002 Edition. IEEE Standards Department, 2002.
3. "AT24C01A/02/04/08/16 2-Wire Serial CMOS E2PROM", Atmel Corporation.
4. "Alaska Ultra 88E1111 Integrated 10/100/1000 Gigabit Ethernet Transceiver",Marvell Corporation.

Mechanical Specifications

The host-side of the GS-Tx conforms to the mechanical specifications outlined in the SFP MSA1. The front portion of the SFP (part extending beyond the face plate of the host) is larger to accommodate the RJ-45 connector.
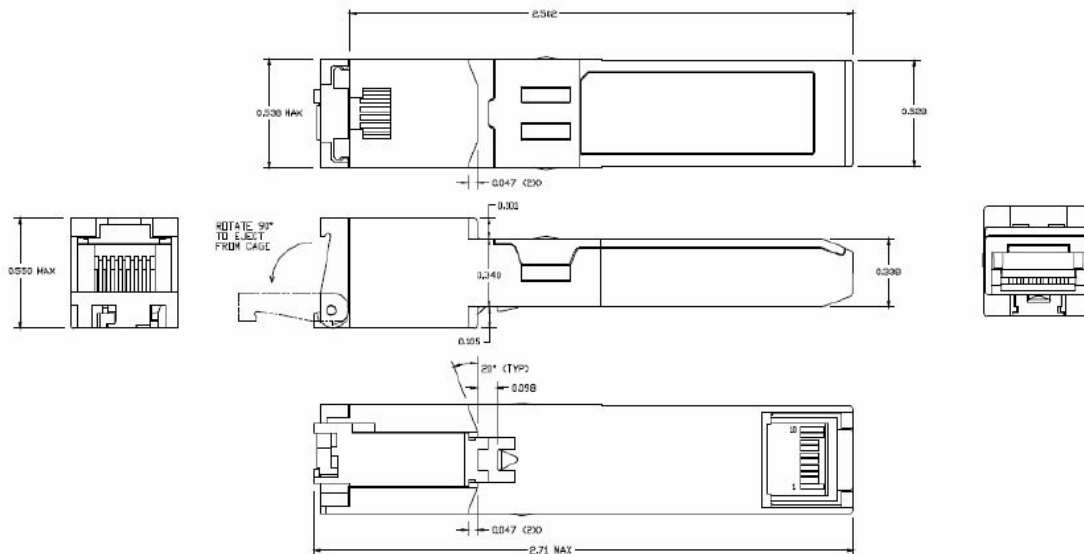
Figure 2. GS-Tx **mechanical dimension**

Ordering information

Part number	Operating Case temperature
GS-T2	10/100/1000Mbps, SGMII interface, Copper SFP with spring latch
GS-T1	1000Mbps only, SERDES interface, Copper SFP with spring latch