# 10/100/1000M Copper SFP Transceiver(RJ45)


## 1. FEATURES

- Up to 1.0Gb/s data rate
- Hot-pluggable SFP
- Fully metallic case for low EMI
- Low power consumption(0.5W typical)
- Compact RJ-45 connector assembly
- 10/100/1000Mbps compliant in host systems with SGMII interface
- Compatible with RoHS and lead-free
- Case operating temperature: 0° C to +70° C

## 2.Applications

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

## 3. Description

SFP-GE-COPPER 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 supporting 1000Mbps data- rate up to 100meters reach over unshielded twisted-pair category 5 cable. The module supports 10/100/1000Mbps auto negotiation data-links when the SFP interface support SGMII also. The module provides standard serial ID information compliant with SFP MSA, which can be accessed with address of 0xA0- 0xA2 via the IIC BUS protocol.

## 3.Pin Definitions

**Pin Diagram**

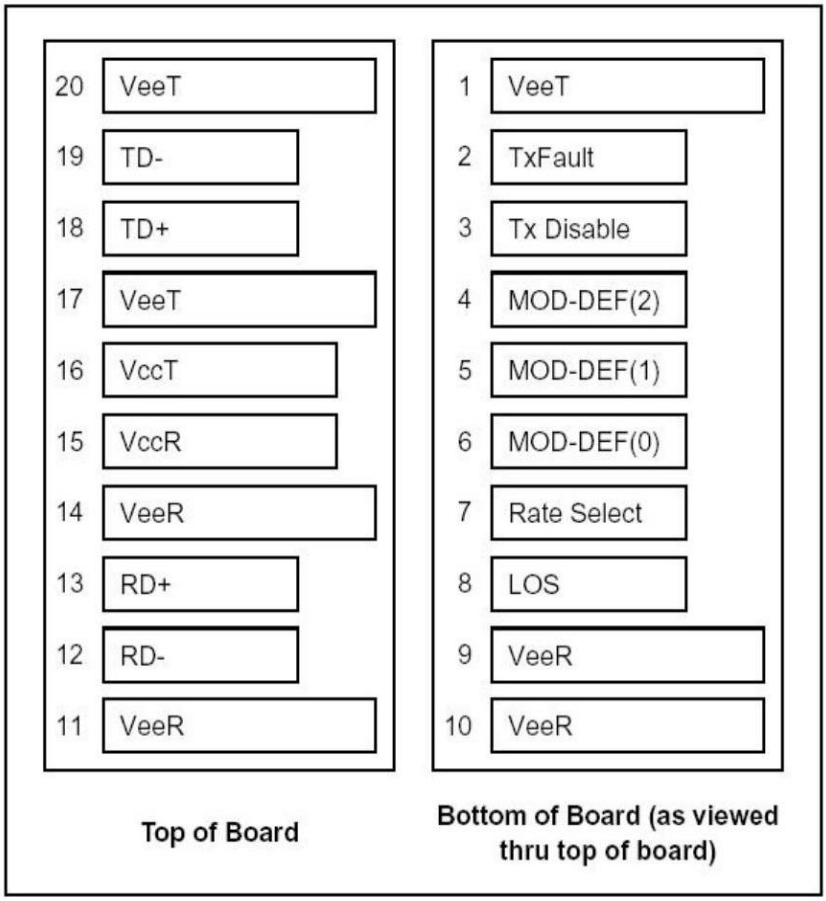


**Figure1**

**Pin Descriptions**

| Pin Descriptions | | | | |
|---|---|---|---|---|
| Pin | Signal Name | Description | Plug Seq. | Notes |
| 1 | VeeT | 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 | Veer | Receiver ground | 1 | |
| 10 | Veer | Receiver ground | 1 | |

| | | | | |
|---|---|---|---|---|
| 11 | Veer | Receiver ground | 1 | |
| 12 | RX- | Inv. Receiver Date Out | 3 | Note5 |
| 13 | RX+ | Receiver Date Out | 3 | Note5 |
| 14 | VeeR | Receiver ground | 1 | |
| 15 | VccR | Receiver Power Supply | 2 | |
| 16 | VccT | Transmitter Power Supply | 2 | |
| 17 | VeeT | Transmitter Ground | 1 | |
| 18 | TX+ | Transmit Date In | 3 | Note6 |
| 18 | TX- | Inv. Transmit Date In | 3 | Note6 |
| 20 | VeeT | Transmitter Ground | 1 | |

Notes:Plug Seq.: Pin engagement sequence during hot plugging.

1) TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor.

2) TX Disable is an input that is used to shut down the strong power. It is pulled up within the module with a 4.7k~10kΩ resistor.

3) Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7K~10K resistor on the host board.

Mod-Def 0 is grounded by the module to indicate that the module is present and ready.

Mod-Def 1 is the clock line of two wire serial interface for serial ID(iic_clock)

Mod-Def 2 is the data line of two wire serial interface for serial ID(iic_data)

4) LOS (Loss of Signal) is an open collector/drain output, it should be pulled up with a 4.7K~10K resistor on the host board.

5) RD-/+: These are the differential receiver outputs. They are AC coupled 100R differential lines which should be terminated with 100R (differential) at the user SERDES.

6) TD-/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100R differential termination inside the module.

## 4. 3.3V Volt Electrical Power Interface

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

| 3.3V Electrical PowerInterface | | | | | | |
|---|---|---|---|---|---|---|
| Parameter | Symbol | Min | Typ | Max | unit | Notes/Conditions |
| Supply Current | Is | | 300 | 350 | mA | |
| Input Voltage | Vcc | 3.13 | 3.3 | 3.47 | V | |
| 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

## 5. 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.

| Low-Speed Signals, Electronic Characteristics | | | | | |
|---|---|---|---|---|---|
| Parameter | Symbol | Min | Max | unit | 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 |

## 6. High-Speed Electrical Interface

All high-speed signals are AC-coupled internally.

| High-Speed Electrical Interface, Transmission Line-SFP | | | | | | |
|---|---|---|---|---|---|---|
| Parameter | Symbol | Min | Typ | Max | unit | 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 |

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

| High-Speed Electrical Interface, Host-SFP | | | | | | |
|---|---|---|---|---|---|---|
| Parameter | Symbol | Min | Typ | Max | unit | 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 | $T_r$,$T_f$ | | 175 | | psec | 20%-80% |

| | | | | | | |
|---|---|---|---|---|---|---|
| Tx Input Impedance | Zin | | 50 | | Ohm | Single ended |
| Rx Output Impedance | Zout | | 50 | | Ohm | Single ended |

## 8. General Specifications

| General | | | | | | |
|---|---|---|---|---|---|---|
| Parameter | Symbol | Min | Typ | Max | unit | Notes/Conditions |
| Data Rate | BR | 10 | | 1000 | Mb/sec | IEEE 802.3 compatible. See Notes2 through 4 below |
| Cable Length | L | | | 100 | m | Category 5UTP.BER<10-12 |

Notes:

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

2. SFP-GE-COPPER support SGMII and 1000Base-FX SERDES interface . With a SERDES the module will operate at 10/100/1000 BASE-TX or 1000BASE-TX by smart process handle .

## 9. Mechanical Specifications(Unit:mm)