# SFP-5000-RJ45

Copper 10/100Base-TX only SFP Transceiver

## Features

- Hot-pluggable SFP footprint
- Extended case temperature range (0°C to +70°C )
- Fully metallic enclosure for low EMI
- Compact RJ-45 connector assembly
- It supports RX_LOS(Loss of Signal) function
- Compatible with IEEE802.3u
- Access to physical layer IC via 2-wire serial bus
- A 10/100BASE-TX/ 100BASE-FX converter


## Applications

- This 100Base-TX Copper SFP Transceiver supports the SFP based switch100Base-FX ports that accept standard 100Base-FX optics SFP.

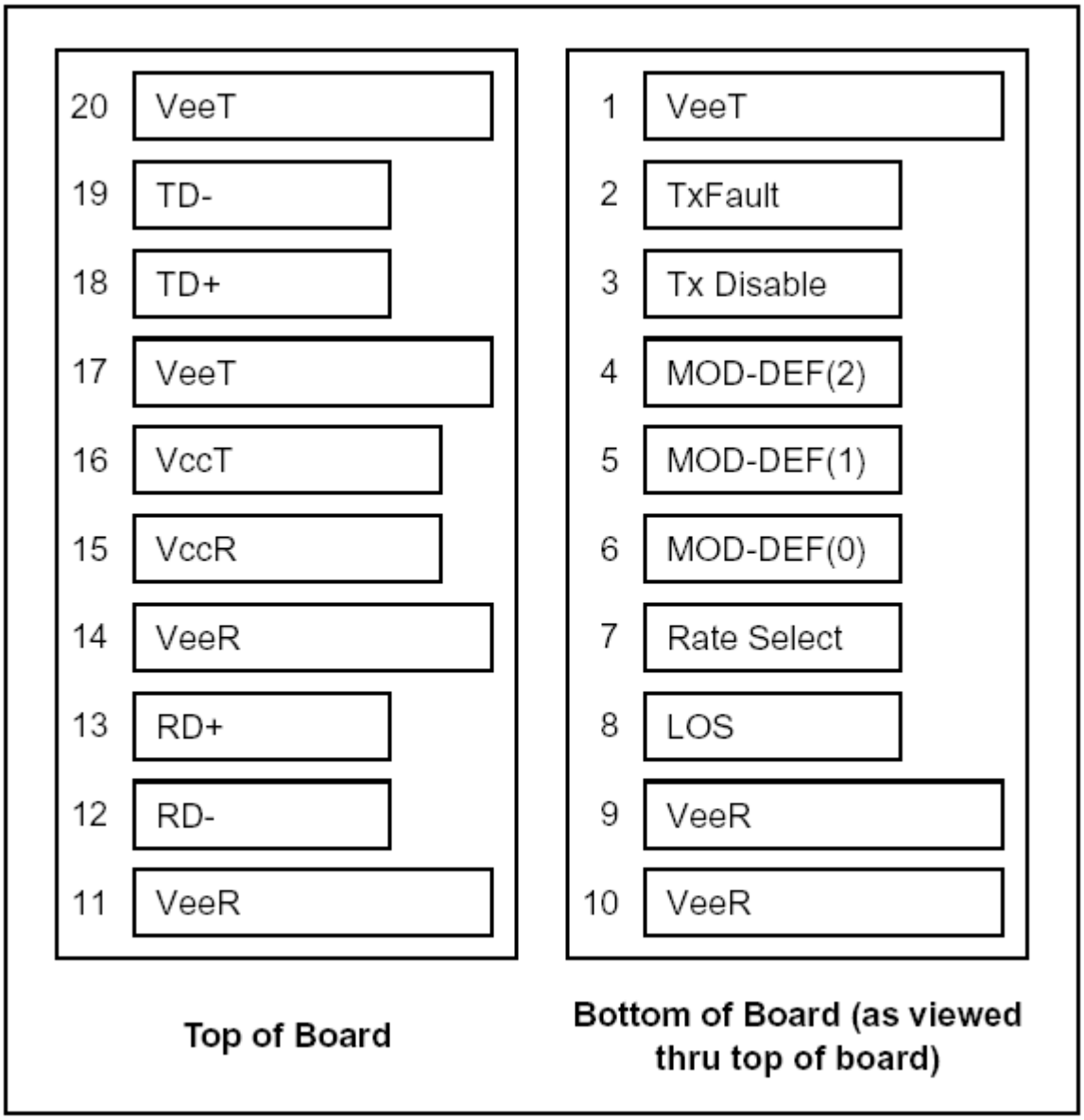
## Description

The SFP-5000-RJ45 Copper Small Form Pluggable (SFP) transceiver module is specifically designed for converting 100Base-FX NRZI port interface to 10/100Base-TX interface with RJ45 connector. The transceiver module is compliant with the SFP MultiSource Agreement (MSA) and IEEE802.3u. With the hot pluggability, the module offers a flexible and easy way to be installed into SFP MSA compliant ports at any time without the interruption of the host equipments operating online.

The Copper SFP transceivers use an integrated RJ-45 connector with transformer and PHY IC.

## Pin Definitions

### Pin Diagram



## 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 | Note 4 |
| 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 not supported and is always connected to ground.
2) 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
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 an open collector output, which should be pulled up with a 4.7k~10kΩ resistor. Pull up voltage between 2.0V and Vcc+0.3V. Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low state, the output will be pulled to less than 0.8V.
5) RD-/+: These are the differential receiver outputs. They are AC-coupled, differential lines with 100 differential termination inside the module.
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

| +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 | |

## 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, 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 802.3u |
| 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 |

## General specifications

| General | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Min** | **Typ** | **Max** | **Units** | **Notes/Conditions** |
| Data Rate | BR | 10 | | 100 | Mb/sec | IEEE802.3u |
| Cable Length | L | | | 100 | m | Category 5 UTP. BER <$10^{-12}$ |

**Notes:**
1. Clock tolerance is +/- 50 ppm
2. By default, the SFP-5000-RJ45 is a full duplex device in preferred master mode
3. Automatic crossover detection is enabled. External crossover cable is not required

## 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 |

## Mechanical Specifications

The host-side of the SFP-5000-RJ45 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.

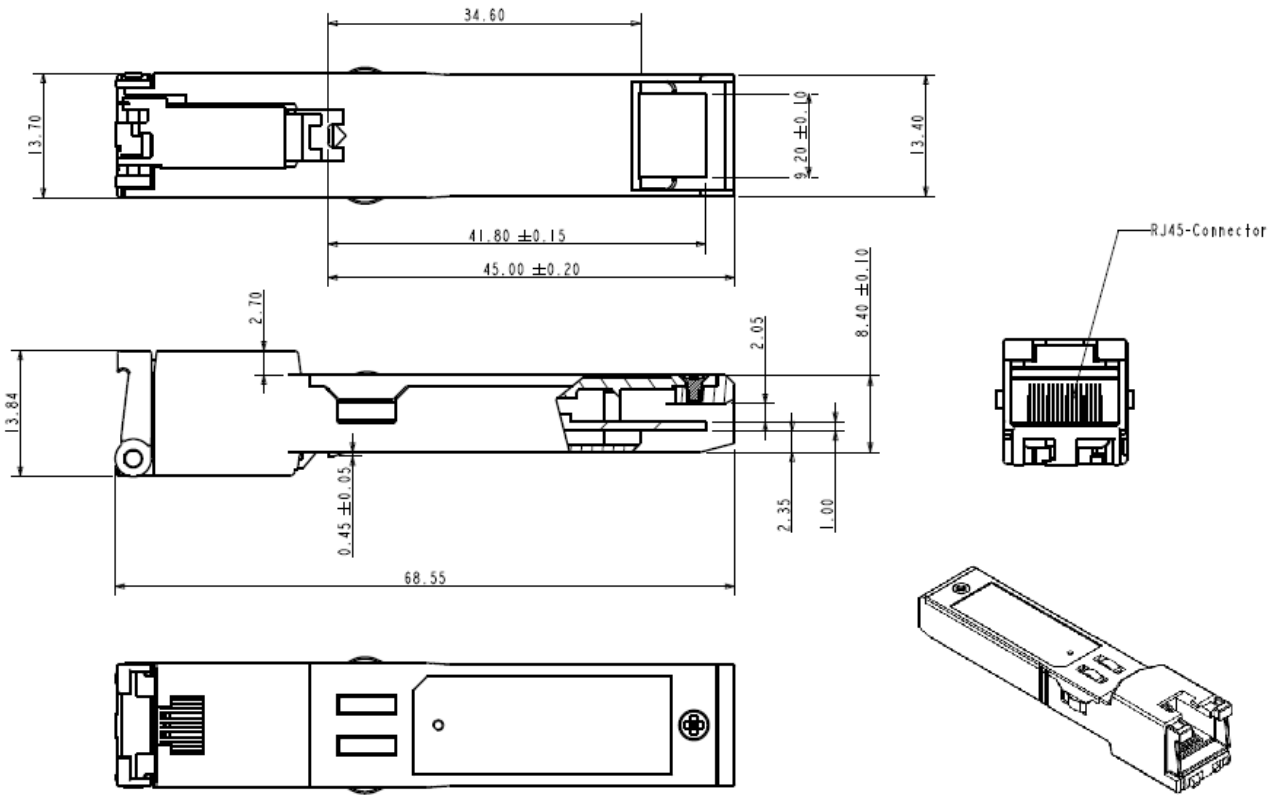



**Figure 2. SFP-5000-RJ45 mechanical dimensions**

## Regulatory Compliance

The SFP-Coper transceiver is designed to be Class I Laser safety compliant and is certified per the following standards:

| Feature | Agency | Standard | Certificate / Comments |
|---|---|---|---|
| Environmental protection | SGS | RoHS Directive 2002/95/EC | GZ090319751A/CHEM |

## Ordering information

| Part number | Operating Case temperature |
|---|---|
| SFP-5000-RJ45 | 10/100Mbps, Copper SFP with spring latch |

## References


1. Small Form Factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA), September 2000.
2. IEEE802.3u – 2002.
3. “AT24C01A/02/04/08/16 2-Wire Serial CMOS E2PROM”, Atmel Corporation.



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