



## Epic 10/100/1000BASE-T SFP Transceiver



### Description

The Epic 10/100/1000BASE-T Copper Small Form Pluggable (SFP) is based on the SFP Multi Source Agreement (MSA). It is compatible with the Gigabit Ethernet and 10/100/1000BASE-T standards as specified in IEEE Std 802.3

*ALL OF OUR TRANSCEIVERS ARE TIER 1 LASERS, MANUFACTURED TO OEM SPECIFICATIONS, ROHS (LEAD FREE), TAA COMPLIANT AND COMPLIANT WITH THE SFP MSA (MULTISOURCE AGREEMENT) AND COME WITH A LIFETIME WARRANTY.*

### Features

- Support 10/100/1000BASE-T operation in host systems with SGMII interface.
- Up to 1.25Gbps bi-direction data links.
- Hot-pluggable SFP footprint.
- Fully metallic enclosure for low EMI.
- Low power dissipation (1.05 W typical).
- Compact RJ-45 connector assembly.
- 100m transmission over unshielded twisted pair(UTP) Category 5 Cable
- Access to physical layer IC via 2-wire serial bus

### Applications

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

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## Absolute Maximum Ratings

| Parameter              | Symbol | Min. | Typ | Max. |
|------------------------|--------|------|-----|------|
| Maximum Supply Voltage | Vcc    | -0.5 |     | 4.0  |
| Storage Temperature    | Vcc    | -40  |     | 85   |

## Normal Operating Conditions

| Parameter             | Symbol | Min. | Typical | Max. | Unit |
|-----------------------|--------|------|---------|------|------|
| Operating Temperature | Top    | 0    |         | 70   | °C   |
| Supply Voltage        | Vcc    | 3.14 | 3.3     | 3.46 | V    |

## Electrical Characteristics

| Parameter   | Symbol                | Min.           | Typical | Max.           | Unit | Notes/Conditions  |
|---|-----------------------|----------------|---------|----------------|------|---|
| <b>+3.3 Volt Electrical Power Interface</b>                   |                       |                |         |                |      |   |
| Supply Current  | Icc                   |                | 300     | 3350           | mA   |   |
| Input Voltage   | Vcc                   | 3.13           | 3.3     | 3.47           | V    |   |
| Surge Current   | I <sub>surge</sub>    |                |         | 30             | mA   |   |
| <b>Low-Speed Signals, Electronic Characteristics</b>          |                       |                |         |                |      |   |
| 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.      |
| <b>High-Speed Electrical Interface, Transmission Line-SFP</b> |                       |                |         |                |      |   |
| Line Frequency  | fL                    |                | 125     |                | MHz  | 5-level encoding, per IEEE 802.3                                    |
| Tx Output Impedance   | Z <sub>out</sub> , Tx |                | 100     |                | Ohm  | Differential, for all frequencies between 1 MHz and 125MHz          |
| Rx Input Impedance  | Z <sub>in</sub> , RX  |                | 100     |                | Ohm  | Differential, for all frequencies between 1 MHz and 125MHz          |

## Electrical Characteristics

| Parameter  | Symbol | Min. | Typical | Max. | Unit | Notes/Conditions |
|--|--------|------|---------|------|------|------------------|
| <b>High-Speed Electrical Interface, Host-SFP</b> |        |      |         |      |      |                  |
| Single ended data input swing                    | Vin    | 250  |         | 1200 | mV   | Single Ended     |
| Single ended data output swing                   | Vout   | 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

| Parameter | Symbol | Min. | Typical | Max. | Unit | Notes/Conditions                          |
|-----------|--------|------|---------|------|------|---|
| Datarate  |        | 10   |         | 1000 | Mbps |   |
| Distance  |        |      |         | 100  | m    | Category 5 UTP.<br>BER <10 <sup>-12</sup> |

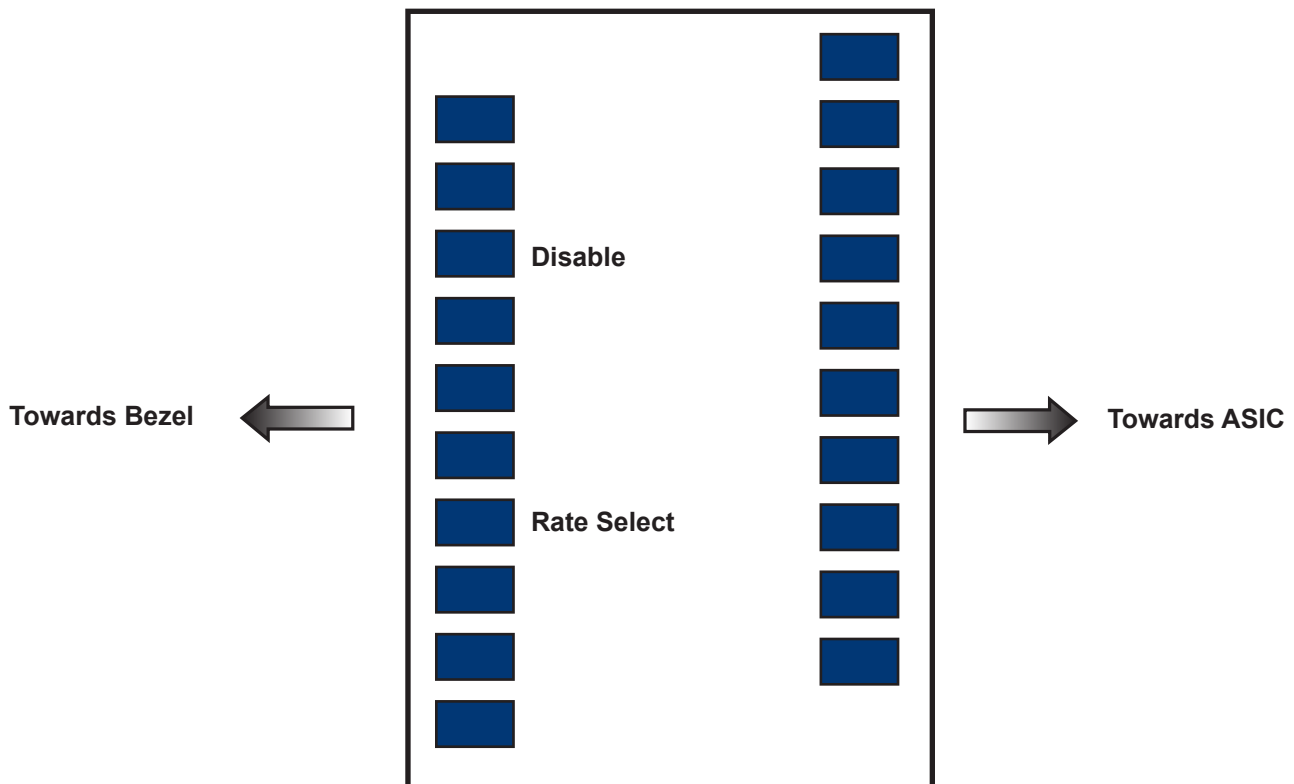
## Pin Function Definitions

| Pin Number | Name        | Function                     | Plug Seq. | Notes                  |
|------------|-------------|------------------------------|-----------|------------------------|
| 1          | Vee T       | Transmitter Ground           | 1         |                        |
| 2          | TX Fault    | Transmitter Fault Indication | 3         | Not used               |
| 3          | TX Disable  | Transmitter Disable          | 3         | 1                      |
| 4          | MOD-DEF2    | Module Definition 2          | 3         | 2                      |
| 5          | MOD-DEF1    | Module Definition 1          | 3         | 2                      |
| 6          | MOD-DEF0    | Module Definition 0          | 3         | 2                      |
| 7          | Rate Select | Not Connect                  | 3         | Function not available |
| 8          | LOS         | Loss of Signal               | 3         | Not used               |
| 9          | VeeR        | Receiver Ground              | 1         |                        |
| 10         | VeeR        | Receiver Ground              | 1         |                        |
| 11         | VeeR        | Receiver Ground              | 1         |                        |
| 12         | RD-         | Inv. Received Data Out       | 3         |                        |
| 13         | RD+         | Received Data Out            | 3         |                        |
| 14         | VeeR        | Receiver Ground              | 1         |                        |
| 15         | VccR        | Receiver Power               | 2         |                        |
| 16         | VccT        | Transmitter Power            | 2         |                        |
| 17         | VeeT        | Transmitter Ground           | 1         |                        |
| 18         | TD+         | Transmit Data In             | 3         |                        |
| 19         | TD-         | Inv. Transmit Data In        | 3         |                        |
| 20         | VeeT        | Transmitter Ground           | 1         |                        |

## Notes:

- 1) PHY disabled on TDIS > 2.0V or open, enabled on TDIS < 0.8V, used to reset the module.
- 2) Should be pulled up with 4.7k – 10k Ohms on host board to a voltage between 2.0V and 3.6V. MOD\_DEF(0) pulls line low to indicate module is plugged in.

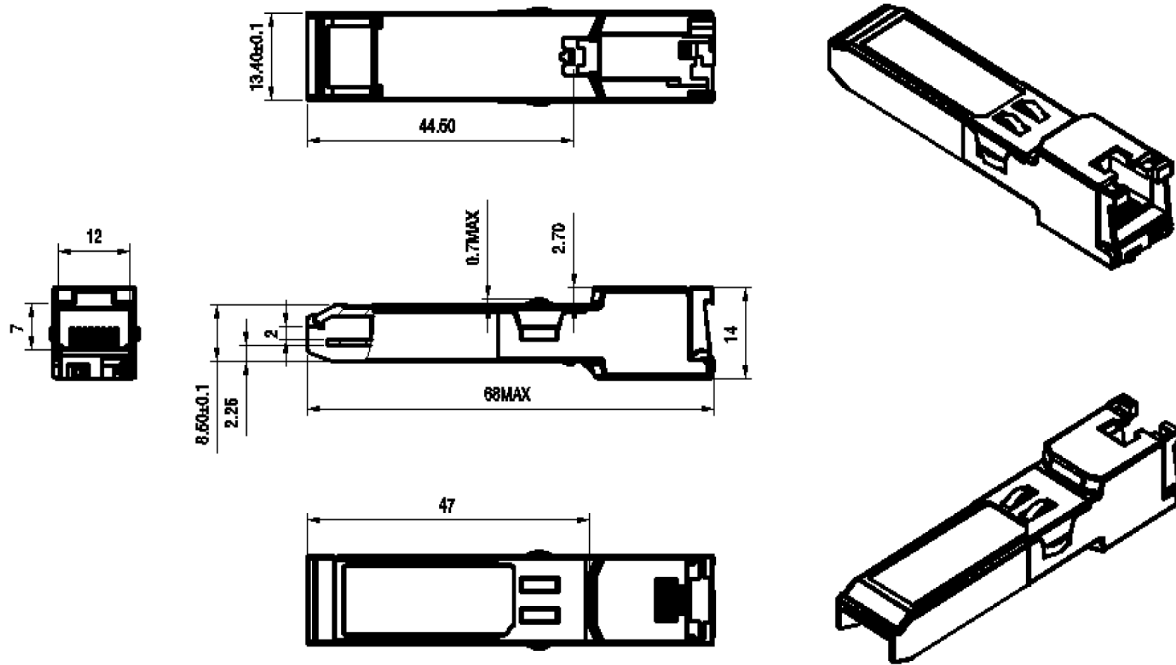
## SFP Transceiver Electrical Pad Layout



## Serial Communication Protocol

The Epic 1000BASE-T Copper SFP supports the 2-wire serial communication protocol outlined in the SFP MSA. This SFP uses a 128 byte EEPROM with an address of A0h. The 10/100/1000BASE-T physical layer IC can also be accessed via the 2-wire serial bus at address ACh.

## Mechanical Specifications



| Pin Number | Data Rate    | Link type | Distance | Connector |
|------------|--------------|-----------|----------|-----------|
| 1000BASE-T | 10/100/1000M | Cat 5     | 100m     | RJ45      |

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