

HTSFP-24-11xxxF

10/100/1000Base-T or 1000Base-T only Copper SFP Transceiver
Hot Pluggable, With Small Form Pluggable Low Voltage 3.3 V
Used twisted pair category 5 cable, Link lengths at 10/100/1000Base up to 100m
Temperature applications as 0°C to +70°C 0r-40°C to +85°C



HTSFP-24-11xxxF

Copper SFP Transceiver

DataSheet

Descriptions:

Hi-Optel HTSFP-24-11xxxF 10/100/1000Base-T or 1000Base-T only Copper SFP Transceiver 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 supports 1000Mb/s data-rate up to 100 meters reach over twisted-pair category 5 cable.

HTSFP-24-11x1xF is the 10/100/1000Base-T Copper SFP Transceiver

HTSFP-24-11x2xF is the 1000Base-T only Copper SFP Transceiver

The HTSFP - 24 - 11xxxF supports 1000 Mb/s full duplex data-links with 5-level Pulse Amplitude Modulation (PAM) signals. All four pairs in the cable are used with symbol rate at 250Mb/s on each pair.

The HTSFP- 24 - 11xxxF provides standard serial ID information compliant with SFP MSA, which can be accessed with address of A0h via the 2-wire serial CMOS EEPROM protocol. The physical IC can also be accessed via 2-wire serial bus at address ACh. The address of the PHY is 1010110x, where x is the R/W bit.

Features:

- ✧ Hot-pluggable SFP Footprint
- ✧ Fully Metallic Enclosure for Low EMI
- ✧ Low Power Dissipation
- ✧ Compact RJ-45 Connector Assembly
- ✧ Detailed Product Information in EEPROM
- ✧ +3.3V Single Power Supply
- ✧ Access to Physical Layer IC via 2-wire Serial Bus
- ✧ 10/100/1000 BASE-T Operation in Host Systems with SGMII Interface
- ✧ Compliant with SFP MSA
- ✧ Compliant with IEEE Std 802.3TM-2002
- ✧ Compliant with FCC 47 CFR Part 15, Class B
- ✧ Compliant with RoHS.
- ✧ Temperature range 0°C to +70°C or -40°C to +85°C



Applications:

- ✧ 1.25 Gigabit Ethernet over Category 5 Cable
- ✧ Switch/Route to Switch/Route Link
- ✧ High Speed I/O for File Servers

HTSFP-24-11xxF

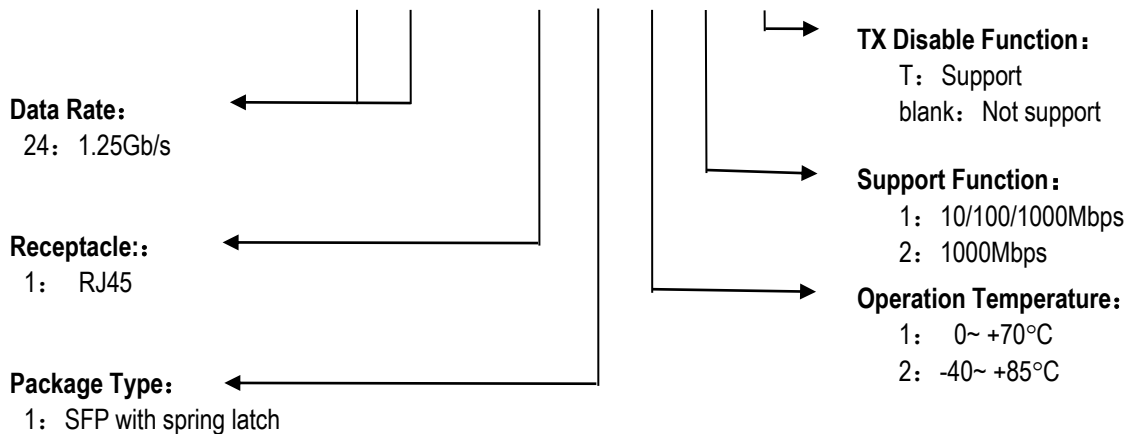
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1. Ordering Information:

| Part No. | DESCRIPTION | LABEL MARKING |
|-----------------|---|--|
| HTSFP-24-1111F | 10/100/1000Base-T, with SGMII interface, enable the auto-negotiation default,without Tx_disable function, support Rx_LOS as link indication function,unshielded twisted-pair (UTP) Category 5 Cable,Transmission Distance 0.1Km,Temperature 0 ~ 70°C | HTSFP-24-1111F Copper SFP 10/100/1000Mb/s ,SGMII, 100m +3.3V 0~70 °C XXXXXXXXXX CEFC |
| HTSFP-24-1112F | 1000Base-T, with 1.25Gbps SerDes interface, enable the auto-negotiation default,without Tx_disable function, support Rx_LOS as link indication function,unshielded twisted-pair (UTP) Category 5 Cable,Transmission Distance 0.1Km,Temperature 0 ~ 70°C | HTSFP-24-1112F Copper SFP 1000Base-T, 1G SerDes, 100m +3.3V 0~70 °C XXXXXXXXXX CEFC |
| HTSFP-24-1111TF | 10/100/1000Base-T, with SGMII interface, enable the auto-negotiation default,with Tx_disable function, support Rx_LOS as link indication function,unshielded twisted-pair (UTP) Category 5 Cable,Transmission Distance 0.1Km,Temperature 0 ~ 70°C | HTSFP-24-1111TF Copper SFP 10/100/1000Mb/s ,SGMII, 100m +3.3V 0~70 °C XXXXXXXXXX CEFC |
| HTSFP-24-1112TF | 1000Base-T, with 1.25Gbps SerDes interface, enable the auto-negotiation default, with Tx_disable function,usupport Rx_LOS as link indication function,nshielded twisted-pair (UTP) Category 5 Cable,Transmission Distance 0.1Km,Temperature 0 ~ 70°C | HTSFP-24-1112TF Copper SFP 1000Base-T, 1G SerDes, 100m +3.3V 0~70 °C XXXXXXXXXX CEFC |
| HTSFP-24-1121F | 10/100/1000Base-T, with SGMII interface, enable the auto-negotiation default, without Tx_disable function,support Rx_LOS as link indication function,unshielded twisted-pair (UTP) Category 5 Cable,Transmission Distance 0.1Km,Temperature -40 ~ 85°C | HTSFP-24-1121F Copper SFP 10/100/1000Mb/s ,SGMII, 100m +3.3V -40~85°C XXXXXXXXXX CEFC |
| HTSFP-24-1122F | 1000Base-T, with 1.25Gbps SerDes interface, enable the auto-negotiation default, without Tx_disable function,support Rx_LOS as link indication function,unshielded twisted-pair (UTP) Category 5 Cable,Transmission Distance 0.1Km,Temperature -40 ~ 85°C | HTSFP-24-1122F Copper SFP 1000Base-T, 1G SerDes, 100m +3.3V -40~85 °C XXXXXXXXXX CEFC |
| HTSFP-24-1121TF | 10/100/1000Base-T, with SGMII interface, enable the auto-negotiation default,with Tx_disable function, support Rx_LOS as link indication function,unshielded twisted-pair (UTP) Category 5 Cable,Transmission Distance 0.1Km,Temperature -40 ~ 85°C | HTSFP-24-1121TF Copper SFP 10/100/1000Mb/s ,SGMII, 100m +3.3V -40~85°C XXXXXXXXXX CEFC |
| HTSFP-24-1122TF | 1000Base-T, with 1.25Gbps SerDes interface, enable the auto-negotiation default, with Tx_disable function,support Rx_LOS as link indication function,unshielded twisted-pair (UTP) Category 5 Cable,Transmission Distance 0.1Km,Temperature -40 ~ 85°C | HTSFP-24-1122TF Copper SFP 1000Base-T, 1G SerDes, 100m +3.3V -40~85 °C XXXXXXXXXX CEFC |

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Notes:

- 1 Adding the Capital "F" at the end of the PN for RoHs compliant product.
- 2 HTSFP-24-11x1xF's auto-negotiation capabilities is SGMII without Clock With SGMII auto-negotiation advertise all capabilities and prefer master to 10/100/1000Base-T copper, 10/100/1000 BASE-T operation requires the host system to have an SGMII interface without clocks. and auto-negotiation advertise all capabilities 10/100/1000Base-T
- 3 HTSFP-24-11x2xF's auto-negotiation capabilities is SERDES without Clock With SERDES auto-negotiation , advertise only 1000BASE-T full duplex preferred master and 1000BASE-X auto-neg to 1000Base-T copper(GBIC). Only,. With a SERDES that does not support SGMII, the module will operate at 1000BASE-T only.

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2.Recommended Software configuration

2.1 How to be manually forced the copper speed work at 10 100 or 1000Base-T full duplex SGMII on HTSFP-24-11xxF

HTSFP-24-11xxF work at mode of “Auto-negotiation enable” default. But it also can operate with “Auto-negotiation disable and manually forced the copper speed work at 10 100 or 1000Base-T full duplex”. Please refer the following steps to configure:

Step 1: Access the PHY at 0xACh via two-wire serial interface.

Step 2: Configure 0xACh as below table

| PHY Address: 0xACh | | |
|--|------------|--|
| Register Address | Write data | Description |
| Setup the Copper SFP work as 10/100/1000Base-T full duplex Auto-negotiation to SGMII interface , | | |
| 0x16h | 0x0000h | Select page 0 (0x0000h=Copper side) |
| 0x1Bh | 0x9084h | Enable SGMII interface |
| 0x09h | 0x0F00h | Advertise 1000BASE-T Full Duplex/Half Duplex |
| 0x00h | 0x9140h | Software reset to allow changes to take effect |
| 0x04h | 0x0DE1h | Advertise 100BASE-T Full Duplex/Half Duplex |
| 0x00h | 0x9140h | Software reset to allow changes to take effect |
| Setup the Copper SFP work as 1000Base-T full duplex to SGMII interface , | | |
| 0x16h | 0x0000h | Select page 0 (0x0000h=Copper side) |
| 0x00h | 0x8140h | Software reset to allow changes to take effect |
| Setup the Copper SFP work as 100 Base-T full duplex to SGMII interface , | | |
| 0x16h | 0x0000h | Select page 0 (0x0000h=Copper side) |
| 0x00h | 0xA100h | Software reset to allow changes to take effect |
| Setup the Copper SFP work as 10Base-T full duplex to SGMII interface , | | |
| 0x16h | 0x0000h | Select page 0 (0x0000h=Copper side) |
| 0x00h | 0x8100h | Software reset to allow changes to take effect |

2.2 How to disable or enable Auto-negotiation on HTSFP-24-11xxF

HTSFP-24-11xxF work at mode of “Auto-negotiation enable” default. But it also can operate with “Auto-negotiation disable”. Please refer the following steps to configure:

Step 1: Access the PHY at 0xACh via two-wire serial interface.

Step 2: Configure 0xACh as below table

| PHY Address: 0xACh | | |
|--------------------|--------------------|---|
| Register Address | Write data | Description |
| 0x16h | 0x0000h | Select page 0 (0x0000h=Copper side, 0x0001h=MAC side) |
| 0x00h | 0x8140h 0x9140h | or 0x8140h to Disable Auto-negotiation ; 0x9140h to Enable Auto-negotiation |
| 0x16h | 0x0000h | Select page 0 |

2.3How to enable HTSFP-24-11x1xF work at 1000BASE-T, same as HTSFP-24-11x2xF

HTSFP-24-11x1xF supports 10/100/1000Base-T full duplex SGMII interface default. But it also can operate with 1000Base-T of SERDES operation.

Please refer the following steps to configure:

Step 1: Access the PHY at 0xACh via two-wire serial interface.

Step 2: Configure 0xACh as below table

| PHY Address: 0xACh | | |
|--------------------|------------|--|
| Register Address | Write data | Description |
| 0x16h | 0x0000h | Select page 0 (0x0000h=Copper side) |
| 0x1Bh | 0x9088h | Enable SerDes mode |
| 0x00h | 0x9140h | Software reset to allow changes to take effect |

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**2.4 How to enable HTSFP-24-11x2xF work at 10/100/1000Base-T full duplex SGMII, same as HTSFP-24-11x1xF**

HTSFP-24-11x2xF supports 1000Base-T of SERDES interface default. But it also can operate with 10/100/1000Base-T full duplex SGMII operation.

Please refer the following steps to configure:

Step 1: Access the PHY at 0xACh via two-wire serial interface.

Step 2: Configure 0xACh as below table

| PHY Address: 0xACh | | |
|--------------------|------------|--|
| Register Address | Write data | Description |
| 0x16h | 0x0000h | Select page 0 (0x0000h=Copper side) |
| 0x1Bh | 0x9084h | Enable SGMII interface |
| 0x09h | 0x0F00h | Advertise 1000BASE-T Full Duplex/Half Duplex |
| 0x00h | 0x9140h | Software reset to allow changes to take effect |
| 0x04h | 0x0DE1h | Advertise 100BASE-T Full Duplex/Half Duplex |

2.5 Copper SFP's PHY Register Default Values (Hex)

| Register | | | HTSFP-24-11x1xF SGMII to Copper | | HTSFP-24-11x2xF GBIC to Copper | |
|---------------------|------|---|------------------------------------|-------------------|-----------------------------------|-------------------|
| Register No. Dec | Hex | Register Name | Copper side Page0 | MAC side Page1 | Copper side Page0 | MAC side Page1 |
| 0 | 0000 | Control Register | 1140 | 1140 | 0140 | 1140 |
| 1 | 0001 | Status Register | 7949 | 0149 | 0149 | 0149 |
| 2 | 0002 | Phy ID(Identifier) 1 | 0141 | 0141 | 0141 | 0141 |
| 3 | 0003 | Phy ID(Identifier) 2 | 0CC2 | 0CC2 | 0CC2 | 0CC2 |
| 4 | 0004 | Auto-Negotiation Advertisement Register | 0DE1 | 0801 | 0C01 | 0000 |
| 5 | 0005 | Link Partner Ability Register | 0000 | 0000 | 0000 | 0000 |
| 6 | 0006 | Auto-Negotiation Expansion Register | 0004 | 0004 | 0004 | 0004 |
| 7 | 0007 | Next Page Transmit Register | 2801 | 2001 | 2001 | 2001 |
| 8 | 0008 | Link Partner Next page Register | 0000 | 0000 | 0000 | 0000 |
| 9 | 0009 | 1000BASE-T Control Register | 0F00 | 0F00 | 0E00 | 0E00 |
| 10 | 000A | 1000BASE-T Status Register | 4000 | 4000 | 4000 | 4000 |
| 11 | 000B | Reserved | 0000 | 0000 | 0000 | 0000 |
| 12 | 000C | Reserved | 0000 | 0000 | 0000 | 0000 |
| 13 | 000D | Reserved | 0000 | 0000 | 0000 | 0000 |
| 14 | 000E | Reserved | 0000 | 0000 | 0000 | 0000 |
| 15 | 000F | Extended Status Register | F000 | F000 | F000 | F000 |
| 16 | 0010 | PHY Specific Control Register | 0078 | 0078 | 0078 | 0078 |
| 17 | 0011 | PHY Specific Status Register | 8140 | 8010 | 8140 | 8010 |
| 18 | 0012 | Interrupt Enable Register | 0000 | 0000 | 0000 | 0000 |
| 19 | 0013 | Interrupt Status Register | 0040 | 0000 | 0040 | 0000 |
| 20 | 0014 | Extended PHY Specific Control Register | 0C68 | 0C68 | 0C68 | 0C68 |
| 21 | 0015 | Receive Error Counter Register | 0000 | 0000 | 0000 | 0000 |
| 22 | 0016 | Extended Address Register | 0000 | 0001 | 0000 | 0001 |
| 23 | 0017 | Global Status Register | 0000 | 0000 | 0000 | 0000 |
| 24 | 0018 | LED Control Register | 4100 | 4100 | 4100 | 4100 |
| 25 | 0019 | Manual LED Override Register | 0000 | 0000 | 0000 | 0000 |
| 26 | 001A | Extended PHY Specific Control 2 Register | 0002 | 0002 | 000A | 000A |
| 27 | 001B | Extended PHY Specific Status Register | 8084 | 8084 | 9088 | 9088 |
| 28 | 001C | MDI[0:3] Virtual Cable TesterTM Status (Pages 0-3); 1000BASE-T Pair Skew (Page 4); 100BASE-T Pair, 1000BASE-T Pair Swap and Polarity (Page 5) | 0000 | 0000 | 0000 | 0000 |

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| | | | | | | |
|----|------|--|------|------|------|------|
| 29 | 001D | Extended Address | 0000 | 0000 | 0000 | 0000 |
| 30 | 001E | Calibration Override (Page 3); Force Gigabit (Page 7); Class A (Page 11); CRC Checker result (Page 12); Test Enable Control (Page 16); Miscellaneous Control (Page 18) | 0000 | 0000 | 0000 | 0000 |
| 31 | 001F | Reserved Register | 0000 | 0000 | 0000 | 0000 |

3.Specification:**3.1 SFP to Host Connector Pin Out**

| Pin | Signal Name | Description | MSA Note |
|-----|-------------|---|----------|
| 1 | VEET | Transmitter ground (common with receiver ground) | |
| 2 | TFAULT | Transmitter Fault. Not supported, Grounded in module | Note 1 |
| 3 | TDIS | Transmitter Disable - Module disables on high or open | Note 2 |
| 4 | MOD_DEF(2) | Module Definition 2. Data line for Serial ID. | Note 3 |
| 5 | MOD_DEF(1) | Module Definition 1. Clock line for Serial ID. | Note 3 |
| 6 | MOD_DEF(0) | Module Definition 0. Grounded in module. | Note 3 |
| 7 | Rate Select | No connection | |
| 8 | LOS | Loss of Signal - High Indicates Loss of Signal | Note 4 |
| 9 | VEER | Receiver Ground (common with transmitter ground) | |
| 10 | VEER | Receiver Ground (common with transmitter ground) | |
| 11 | VEER | Receiver Ground (common with transmitter ground) | |
| 12 | RD- | Receiver Inverted DATA out. AC Coupled | Note 5 |
| 13 | RD+ | Receiver Non-inverted DATA out. AC Coupled | Note 5 |
| 14 | VEER | Receiver Ground (common with transmitter ground) | |
| 15 | VCCR | Receiver Power Supply | Note 6 |
| 16 | VCCT | Transmitter Power Supply | Note 6 |
| 17 | VEET | Transmitter Ground (Common with Receiver Ground) | |
| 18 | TD+ | Transmitter Non-Inverted DATA in. AC Coupled. | Note 7 |
| 19 | TD- | Transmitter Inverted DATA in. AC Coupled. | Note 7 |
| 20 | VEET | Transmitter Ground (common with receiver ground) | |

Notes:

- TX Fault is not used and is always tied to ground.
- TX Disable as described in the MSA is not applicable to the 1000BASE-T module, but is used for convenience as an input to reset the internal ASIC. This pin is pulled up within the module with a 4.7 Kohm resistor.
 Low (0–0.8 V): Transceiver on
 Between (0.8 V and 2.0 V): Undefined
 High (2.0–3.465 V): Transceiver in reset disable state
 Open: Transceiver in reset disable state
- Mod-Def 0, 1, 2. These are the module definition pins. They should be pulled up with a 4.7-10 Kohm resistor on the host board to a supply less than VCCT + 0.3 V or VCCR + 0.3 V.
 Mod Def 0 is tied to ground to indicate that the module is present.
 Mod-Def 1 is clock line of two wire serial interface for optional serial ID
 Mod-Def 2 is data line of two wire serial interface for optional serial ID
- This pin is open drain CMOS output signals, They should be pulled up with a 4.7-10 Kohm resistor on the host board to a supply less than VCCT + 0.3 V or VCCR + 0.3 V. (see Table 3. Low-Speed Signals, Electronic Characteristics)
- RD-/+ : These are the differential receiver outputs. They are ac coupled 100 ohm differential lines which should be terminated with 100 ohm differential at the user SerDes. The ac coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 370 and 2000 mV differential (185 – 1000 mV single ended) when properly terminated. These levels are compatible with CML and LVPECL voltage swings.
- VCCR and VCCT are the receiver and transmitter power supplies. They are defined as 3.3 V ± 5% at the SFP connector pin. The

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maximum supply current is about 300mA and the associated in-rush current will typically be no more than 30 mA above steady state after 500 nanoseconds.

7. TD-/+: These are the differential transmitter inputs. They are ac coupled differential lines with 100 ohm differential termination inside the module. The ac coupling is done inside the module and is thus not required on the host board. The inputs will accept differential swings of 500 – 2400 mV (250 – 1200 mV single ended), though it is recommended that values between 500 and 1200 mV differential (250 – 600 mV single ended) be used for best EMI performance. These levels are compatible with CML and LVPECL voltage swings.

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3.2 SFP to Host Connector Pin Out and RJ45 Connector Diagram

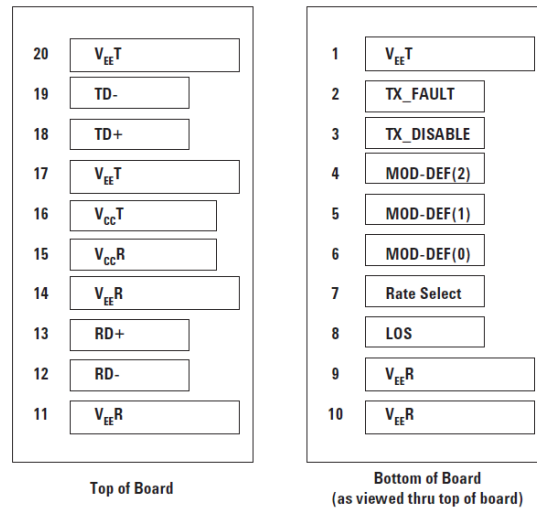


Figure 1a. Diagram of Host Board Connector Block Pin Numbers and Names

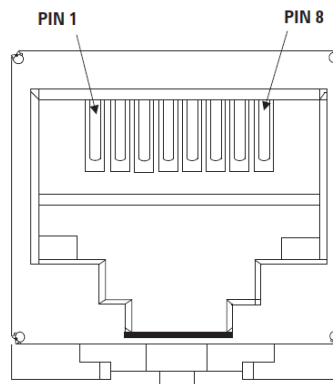


Figure1b. MDI (RJ 45 Jack) Pin Assignment

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3.3 Recommended Interface Circuit

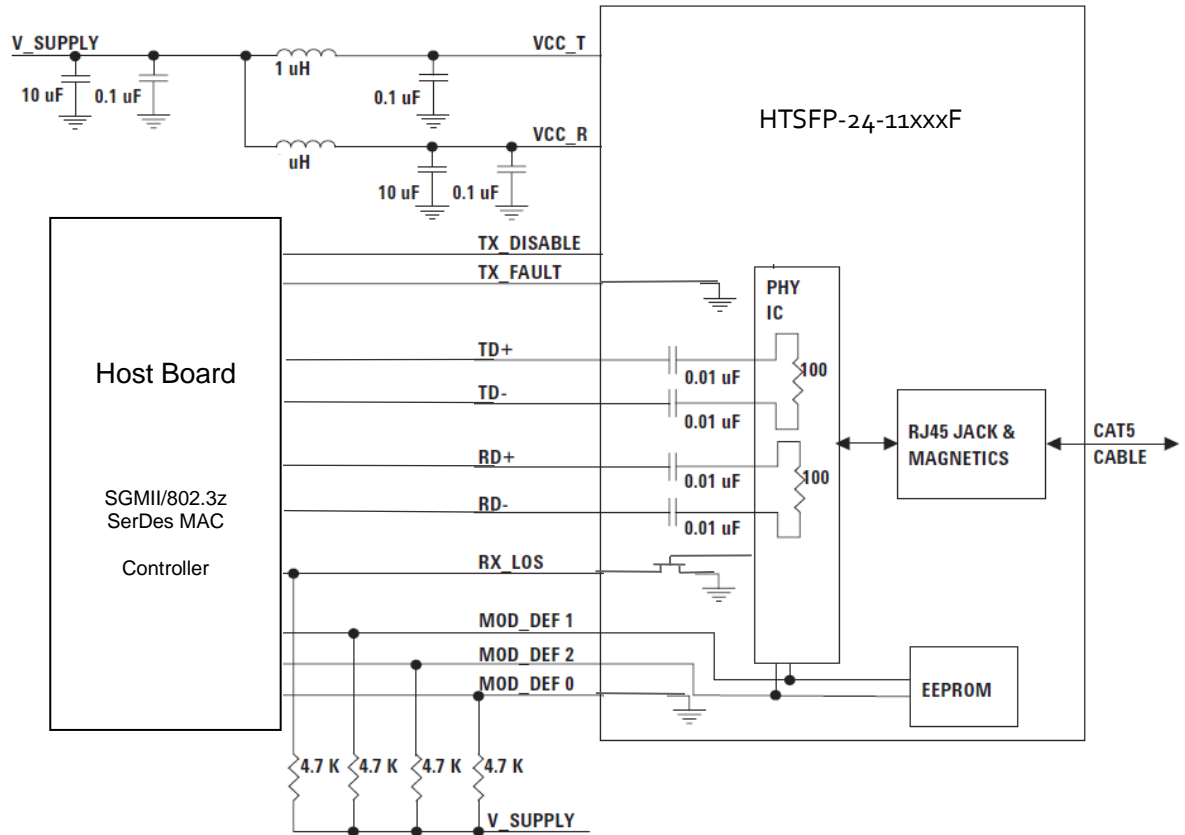


Figure 2 Recommended Interface Circuit

3.4 Recommended Host Board Power Supply Circuit

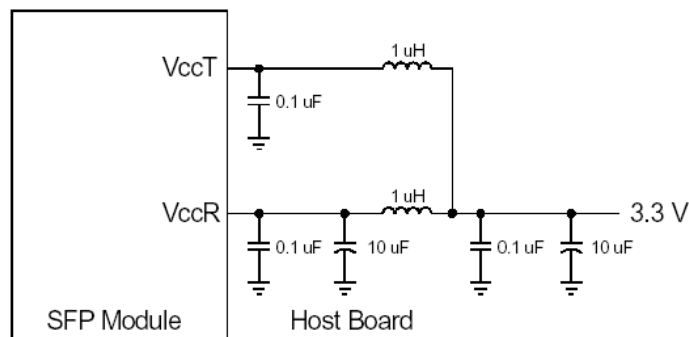


Figure 3, Recommended Host Board Power Supply Circuit

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3.5 Power Supply Interface Electronic Characteristics

The SFP Copper Transceiver has an input voltage range of 3.3 V \pm 5%. The 4 V maximum voltage is not allowed for continuous operation.

Power Supply Interface Electronic Characteristics

| Parameter | Symbol | Min. | Typical | Max. | Unit | Note/Conditions |
|----------------|--------|-------|---------|-------|------|---|
| Supply Current | Is | | 300 | 350 | mA | 1.2W max power over full range of voltage and temperature. See caution note below |
| Input Voltage | Vcc | 3.135 | 3.3 | 3.465 | V | Referenced to GND |

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

Table 2. Power Supply Interface Electronic Characteristics

3.6 Low-Speed Signals

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_Vcc.

Low-Speed Signals, Electronic Characteristics

| Parameter | Symbol | Min. | Max. | Unit | Note/Conditions |
|-----------------|-----------------|----------------|----------------|------|----------------------------------|
| SFP Output LOW | V _{OL} | 0 | 0.5 | V | 4.7k to 10k pull-up to host_Vcc. |
| SFP Output HIGH | V _{OH} | host_Vcc - 0.5 | host_Vcc + 0.3 | V | 4.7k to 10k pull-up to host_Vcc. |
| SFP Input LOW | V _{IL} | 0 | 0.8 | V | 4.7k to 10k pull-up to Vcc. |
| SFP Input HIGH | V _{IH} | 2 | Vcc + 0.3 V | V | 4.7k to 10k pull-up to Vcc. |

Table 3. Low-Speed Signals, Electronic Characteristics

3.7 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 | Note/Conditions |
|---------------------|---------------------|------|---------|------|------|----------------------------------|
| Line Frequency | f _L | | 1.25 | | GHz | 5-level encoding, per IEEE 802.3 |
| Tx Output Impedance | Z _{out,TX} | | 100 | | Ohm | Differential |
| Rx Input Impedance | Z _{in,RX} | | 100 | | Ohm | Differential |

Table 4. High-Speed Electrical Interface, Transmission Line-SFP

High-Speed Electrical Interface, Host-SFP

| Parameter | Symbol | Min. | Typical | Max. | Unit | Note/Conditions |
|---|----------------------|------|---------|------|------|-----------------|
| Data Input: Transmitter Differential Input Voltage (TD +/-) | V _{insing} | 500 | | 2400 | mV | |
| Data Output: Receiver Differential Output Voltage (RD +/-) | V _{outsing} | 370 | 735 | 2000 | mV | |
| Rise/Fall Time | Tr,Tf | | 100 | 250 | psec | 20%-80% |

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

Table 5. High-Speed Electrical Interface, Host-SFP

General Specifications

| Parameter | Symbol | Min. | Typical | Max. | Unit | Note/Conditions |
|--------------|--------|------|---------|------|------|--|
| Data Rate | BR | | 1.25 | | Gb/s | IEEE 802.3 compatible. |
| Cable Length | L | | | 100 | m | Category 5 UTP. BER <10 ⁻¹² |

Table 6. General Specifications

Notes:

1. Clock tolerance is +/- 50 ppm
2. By default, the HTSFP-24-11x1xF/HTSFP-24-11x2xF is a full duplex device in preferred master mode
3. Automatic crossover detection is enabled. External crossover cable is not required
4. 10/100/1000 BASE-T operation requires the host system to have an SGMII interface with no clocks. With a SERDES that does not support SGMII, the module will operate at 1000BASE-T only.

3.8 Environmental Specifications

The HTSFP-24-111xxF has an range from 0°C to +70°C case temperature as specified in Table 7a.

| Parameter | Symbol | Min. | Typical | Max. | Unit | Notes/Conditions |
|-----------------------|--------|------|---------|------|------|---------------------|
| Operating Temperature | Top | 0 | | 70 | °C | Case temperature |
| Storage Temperature | Tsto | -40 | | 85 | °C | Ambient temperature |

Table 7a. Environmental Specifications

The HTSFP-24-112xxF has an range from -40°C to +85°C case temperature as specified in Table 7b.

| Parameter | Symbol | Min. | Typical | Max. | Unit | Notes/Conditions |
|-----------------------|--------|------|---------|------|------|---------------------|
| Operating Temperature | Top | -40 | | 85 | °C | Case temperature |
| Storage Temperature | Tsto | -40 | | 125 | °C | Ambient temperature |

Table 7b. Environmental Specifications

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 Hot Pluggable, With Small Form Pluggable Low Voltage 3.3 V
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 Temperature applications as 0°C to +70°C 0r-40°C to +85°C

**3.9 Serial ID Memory Contents:**

The HTSFP- 24 - 11xxF provides standard serial ID information compliant with SFP MSA, which can be accessed with address of A0h via the 2-wire serial CMOS EEPROM protocol.

| Address | Field Size (Byte) | Name of Field | Description and Contents | | Hex |
|---------------------------|-------------------|-----------------|--|--|---|
| Base ID Fields | | | | | |
| 0 | 1 | Identifier | Type of Serial transceiver (SFP) | | 03 |
| 1 | 1 | Reserved | Extended identifier of type serial transceiver (MOD4) | | 04 |
| 2 | 1 | Connector | Code of optical connector type (Copper RJ45) | | 22 |
| 3-10 | 8 | Transceiver | Gigabit Ethernet 1000Base-T Copper | | 00 00 00 08 00 00 00 00 |
| 11 | 1 | Encoding | 8B10B | | 01 |
| 12 | 1 | BR,Nominal | Nominal baud rate, unit of 100Mbps | 1000Base-T to 1.25G/s Serdes (HTSFP-24-11x2xF) | 0d |
| | | | | 10/100/1000Base-T to SGMII (HTSFP-24-11x1xF) | 00 |
| 13 | 1 | Reserved | | | 00 |
| 14 | 1 | Length (9um)-km | | | 00 |
| 15 | 1 | Length (9um) | Link length supported for 9/125um fiber, units of 100m | | 00 |
| 16 | 1 | Length (50um) | Link length supported for 50/125um fiber, units of 10m | | 00 |
| 17 | 1 | Length (62.5um) | Link length supported for 62.5/125um fiber, units of 10m | | 00 |
| 18 | 1 | Length (Copper) | Link length supported for copper, units of meters。 | | 64 |
| 19 | 1 | Reserved | | | 00 |
| 20-35 | 16 | Vendor Name | " HI-OPTEL | "(ASCII) | 48 49 2D 4F 50 54 45 4C 20 20 20 20 20 20 20 20 |
| 36 | 1 | Reserved | | | 00 |
| 37-39 | 3 | Vendor OUI | SFP transceiver vendor OUI ID | | 00 00 00 |
| 40-55 | 16 | Vendor PN | Part Number: “HTSFP-24-11xxxF” (ASCII) | | 48 54 53 46 50 2D 32 34 2D 31 31 xx xx xx xx 20 |
| 56-59 | 4 | Vendor rev | Revision level for part number (means B revision) | | 42 20 20 20 |
| 60-61 | 2 | Wavelength | | | 00 00 |
| 62 | 1 | Reserved | | | 00 |
| 63 | 1 | CCID | Least significant byte of Check sum of data in address 0-62 | | xx |
| Extended ID Fields | | | | | |
| 64-65 | 2 | Option | Indicates which optical SFP signals are implemented,If address 65 is 12h ,TX_DISABLE and RX_LOS are implemented ,TX_FAULT is not implemented | | 00 xx (00 02 10 or 12) |
| 66 | 1 | BR, max | Upper bit rate margin, units of % | | 00 |
| 67 | 1 | BR, min | Lower bit rate margin, units of % | | 00 |
| 68-83 | 16 | Vendor SN | Serial number (ASCII) | | xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx |
| 84-91 | 8 | Date code | Manufacturing date ASCII code Year (2 bytes), Month (2 bytes), Day (2 bytes), vendor specific lot code, may be blank (2 bytes) | | xx xx xx xx xx xx xx xx |
| 92-94 | 3 | Reserved | | | 00 00 00 |
| 95 | 1 | CC_EX | Check code for the extended ID Fields (addresses 64 to 94) | | xx |
| Vendor Specific ID Fields | | | | | |

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| | | | |
|--------|----|-----------------|-----------------------------------|
| 96-127 | 32 | Vendor specific | Hi-Optel specific date, read only |
|--------|----|-----------------|-----------------------------------|

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3.10 Mechanical Drawing:

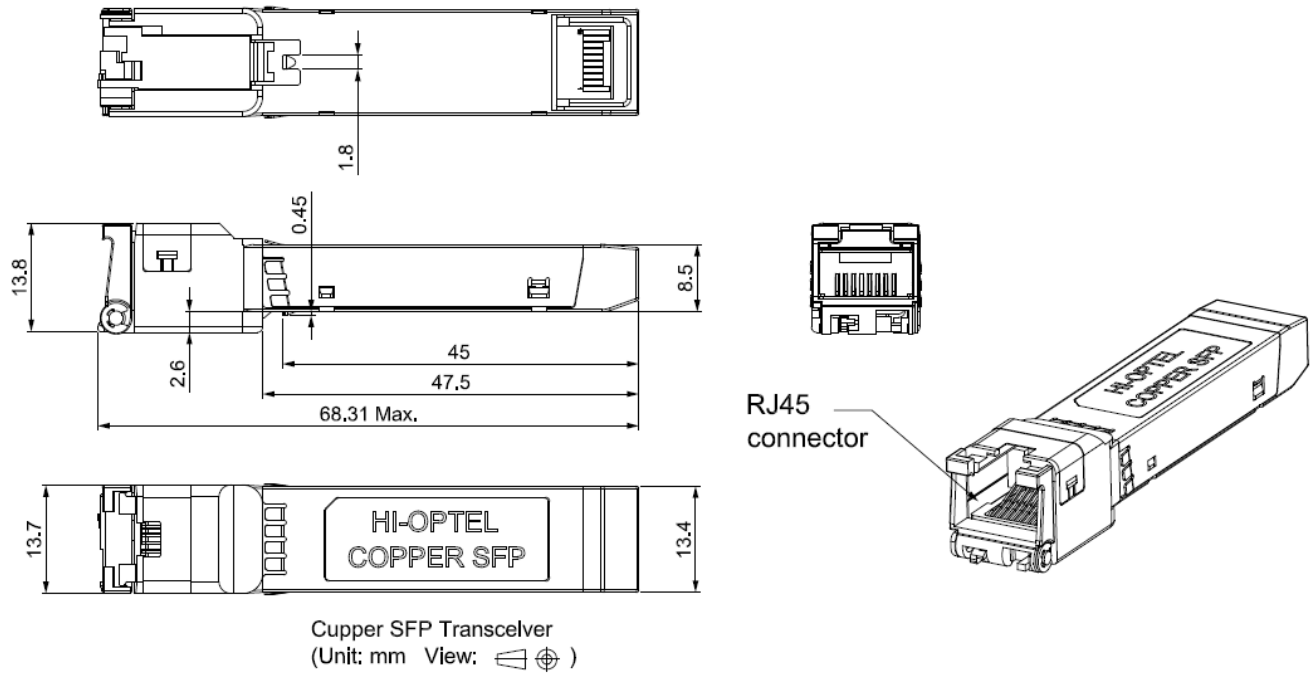


Figure 4, Mechanical Diagram of Copper SFP

References

1. Small Form Factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA), September 2000.
2. IEEE Std 802.3, 2002 Edition. IEEE Standards Department, 2002.
4. "AT24C01A/02/04/08/16 2-Wire Serial CMOS E²PROM", Atmel Corporation. www.Atmel.com
5. "Alaska Ultra 88E1111 Integrated 10/100/1000 Gigabit Ethernet Transceiver", Marvell Corporation. www.marvell.com