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# Product Datasheet

## SFP-10G-T-HP-C

### H3C® Compatible 10GBase-T SFP+ Transceiver

Hot Pluggable, +3.3V, Cat 6a/7 Cable, up to 30m

### FEATURES

- Supports 10GBase-T / 5GBase-T / 2.5GBase-T / 1000base-T
- Hot-pluggable SFP footprint
- Supports Links up to 30m using Cat 6a/7 Cable
- SFF-8431 and SFF-8432 MSA Compliant
- IEEE 802.3az Compliant
- Low Power Consumption (2.5W MAX @ 30m)
- Fast Retrain EMI Cancellation Algorithm
- Low EMI Emissions
- I2C 2-Wire Interface for Serial ID and PHY Register Access
- Auto-negotiates with other 10GBase-T PHYs
- Supports 100/1000Base-T using Cat 5e cable or better
- MDI/MDIX Crossover
- Multiple Loopback Modes for Testing and Troubleshooting
- Built-in Cable Monitoring and Link
- Cable Length Measurements
- Robust Die Cast Housing
- Bail Latch Style ejector mechanism
- Unshielded and Shielded cable support

### DESCRIPTION

ATGBICS® Compatible SFP-10G-T-HP-C copper transceiver module is a high-performance integrated duplex data link for bi-directional communication over copper cable. It is specifically designed for high-speed communication links that require 10 Gigabit Ethernet over Cat 6a/7.

SFP+-10GBASE-T Copper Small Form Pluggable (SFP) transceivers are based on the SFP Multi Source Agreement (MSA). They are compatible with the 10GBase-T / 5GBase-T / 2.5GBase-T / 1000base-T standards as specified in IEEE Std 802.3. SFP+-10GBASE-T uses the SFP's RX_LOS pin for link indication. If pull up SFP's TX_DISABLE pin, PHY IC be reset.

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## CABLE LENGTH

| Standard | Cable | Reach | Host Port |
|---|---|---|---|
| **10GBase-T** | CAT6A | 30m | XFI |
| **5GBase-T/2.5GBase-T** | CAT5E | 50m | 5GBase-R/2.5GBase-X |
| **1000base-T** | CAT5E | 100m | 1000base-FX |

## SFP TO HOST CONNECTOR PIN OUT

| Pin | Symbol | Name/Description | Ref. |
|---|---|---|---|
| **1** | VEET | Transmitter Ground (Common with Receiver Ground) | 1 |
| **2** | TFAULT | Transmitter Fault. Not supported. | |
| **3** | TDIS | Transmitter Disable. Laser output disabled on high or open. | 2 |
| **4** | MOD_DEF(2) | Module Definition 2. Data line for Serial ID. | 3 |
| **5** | MOD_DEF(1) | Module Definition 1. Clock line for Serial ID. | 3 |
| **6** | MOD_DEF(0) | Module Definition 0. Grounded within the module. | 3 |
| **7** | Rate Select | No connection required | |
| **8** | LOS | High indicates no linked. low indicates linked. | 4 |
| **9** | VEER | Receiver Ground (Common with Transmitter Ground) | 1 |
| **10** | VEER | Receiver Ground (Common with Transmitter Ground) | 1 |
| **11** | VEER | Receiver Ground (Common with Transmitter Ground) | 1 |
| **12** | RD- | Receiver Inverted DATA out. AC Coupled | |
| **13** | RD+ | Receiver Non-inverted DATA out. AC Coupled | |
| **14** | VEER | Receiver Ground (Common with Transmitter Ground) | 1 |
| **15** | VCCR | Receiver Power Supply | |
| **16** | VCCT | Transmitter Power Supply | |
| **17** | VEET | Transmitter Ground (Common with Receiver Ground) | 1 |
| **18** | TD+ | Transmitter Non-Inverted DATA in. AC Coupled. | |
| **19** | TD- | Transmitter Inverted DATA in. AC Coupled. | |
| **20** | VEET | Transmitter Ground (Common with Receiver Ground) | 1 |

Notes:
1. Circuit ground is connected to chassis ground
2. PHY disabled on $T_{DIS}$ > 2.0V or open, enabled on $T_{DIS}$ < 0.8V
3. Should be pulled up with 4.7k - 10k Ohms on host board to a voltage between 2.0 V and 3.6 V. MOD_DEF(0) pulls line low to indicate module is plugged in.
4. LVTTL compatible with a maximum voltage of 2.5V.

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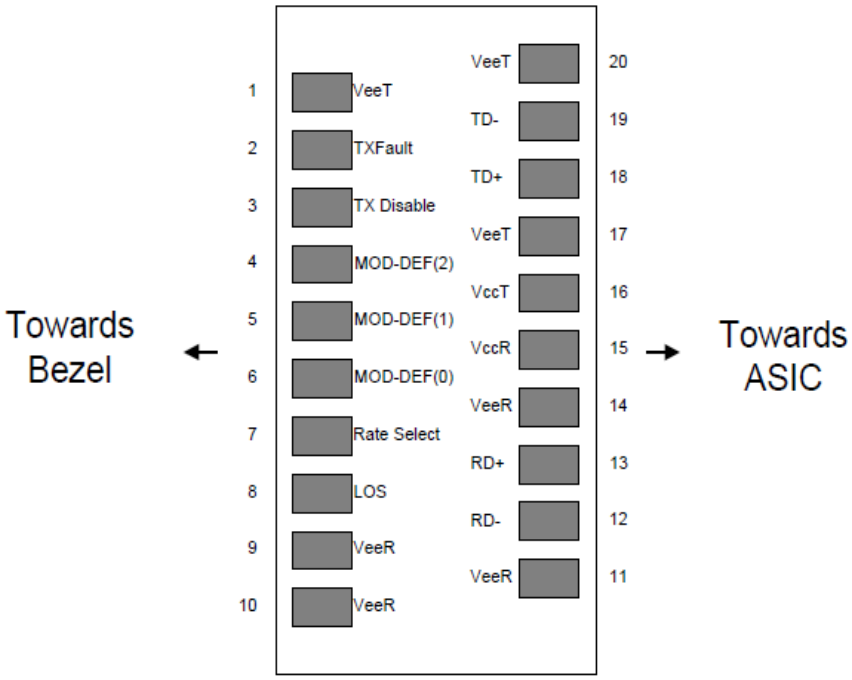



Figure 1. Diagram of host board connector block pin numbers and names

## +3.3V VOLT ELECTRICAL POWER INTERFACE

The SFP+-10GBASE-T has an input voltage range of 3.3 V +/- 5%. The 4V maximum voltage is not allowed for continuous operation.

| +3.3 Volt Electrical Power Interface | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | Symbol | Min | Typ | Max | unit | Notes/Conditions |
| **Supply Current** | Is | | 700 | 900 | mA | 3.0W 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 | | TBD | | 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

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## 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 |

## 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 |

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| 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 |

## GENERAL SPECIFICATIONS

| General | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | Symbol | Min | Typ | Max | unit | Notes/Conditions |
| **Data Rate** | BR | 1 | | 10 | Gb/sec | IEEE 802.3 compatible. See Notes 1,2 below |

Notes:
1. Clock tolerance is +/- 50 ppm

## ENVIRONMENTAL SPECIFICATIONS

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

| Parameter | Symbol | Min | Typ | Max | unit | Notes/Conditions |
|---|---|---|---|---|---|---|
| **Operating Temperature** | Top | 0 | | 65 | °C | Case temperature |
| **Storage Temperature** | Tsto | -40 | | 85 | °C | Ambient temperature |

## SERIAL COMMUNICATION PROTOCOL

All SFPs support the 2-wire serial communication protocol outlined in the SFP MSA. These SFPs use an MCU, can be accessed with address of A0h.

| Parameter | Symbol | Min | Typ | Max | unit | Notes/Conditions |
|---|---|---|---|---|---|---|
| **I $^2$C Clock Rate** | | 0 | | 200,000 | Hz | |

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## MECHANICAL SPECIFICATIONS (UNIT:MM)

