10M/100M/1G/2.5G/5G/10Gbps NBASE-T SFP Copper RJ-45 30m Transceiver

SFP-10GM-T-30

Application

- 10 Gigabit Ethernet over Category 6a/7 Cable
- Switch/Route to Switch/Route Link
- High Speed I/O for File Servers

Features

- Supports XFI or USXGMII to Copper Auto-Negotiation
- 10G BASE-T Operation in Host Systems with XFI Interface.
- 10G BASE-T Supports Links up to 30m Using Cat 6a/7 Cable. Power Consumption 2.5W MAX @ 30m
- 10/100/1000 BASE-T Operation in Host Systems with USXGMII Interface.
- 10/100/1000 BASE-T Supports Links up to 100m Using Cat 5 Cable or Better
- Unshielded and Shielded Cable Support
- Hot-pluggable SFP Footprint. Fully Metallic Enclosure for Low EMI.
- Access to I2C -Wire Serial Bus Interface for Serial ID and PHY Register Access
- Compliant with FCC 47 CFR Part 15 Class B / EN55022 Class B
- Compact RJ-45 Connector Assembly
- Detailed Product Information in EEPROM
- Compliant with SFF-8431 SFF-8432 and SFF-8472
- Compliant with SFP MSA
- Compliant with IEEE 802.3-2012, IEEE 802.3az
- 3.3V Single Power Supply.
- Compliant with RoHs-6.
- MDI/MDIX Crossover.
- Operation Temperature Range 0℃to 70℃

Description

The FS 10G-T 30M 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 7 cable at XFI to Copper Auto-negotiation mode.

10G-T 30M supports USXGMII to Copper Auto-negotiation mode . compliant with the Gigabit Ethernet and 1000BASE-T standards as specified in IEEE 802. 3-2012 and IEEE 802.3ab, which supports 10/100/1000Base-T Copper data-rate up to 100 meters reach over twisted-pair category 5 cable.

The 10G-T 30M 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.

The SFP-10GM-T-30 is a 10GBase-T auto-negotiation optical transceiver designed for operation in 10G SFP+ switch ports. This module does not support backward compatibility with 1G SFP ports - while physically insertable into 1G ports, link establishment will fail due to incompatible electrical signaling specifications. The device features multi-rate auto-negotiation capability, supporting speed adaptation across 10M/100M/1G/2.5G/5G/10G operational modes, with the final link speed determined by the peer device's capability. For 1G-T connectivity requirements, the SFP-GE-T (1GBase-T) module is recommended as the compatible alternative.

Product Specifications

I. SFP+ to Host Connector Pin Out

Pin	Signal Name	Description	MSA Notes
1	VeeT	Transmitter ground (common with receiver ground)	
2	TFAULT	Transmitter Disable - Module disables on high or open	Note 1
3	TDIS	Module Definition 2. Data line for Serial ID.	Note 2
4	MOD_DEF(2)	Module Definition 1. Clock line for Serial ID.	Note 3
5	MOD_DEF(1)	Module Definition 0. Grounded in module.	Note 3
6	MOD_DEF(0)	No connection	Note 3
7	Rate Select	Loss of Signal - High Indicates Loss of Signal	

8	LOS	Receiver Ground (common with transmitter ground)	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:
1. TX Fault is not used and is always tied to ground.
2. TX Disable as described in the MSA is not applicable to the 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
3. 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.
4. 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)
5. 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.

6. VCCR and VCCT are the receiver and transmitter power supplies. They are defined as 3.3 V ± 5% at the SFP connector pin. The 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.

Ⅱ. SFP+ to Host Connector Pin Out and RJ45 Connector Diagram

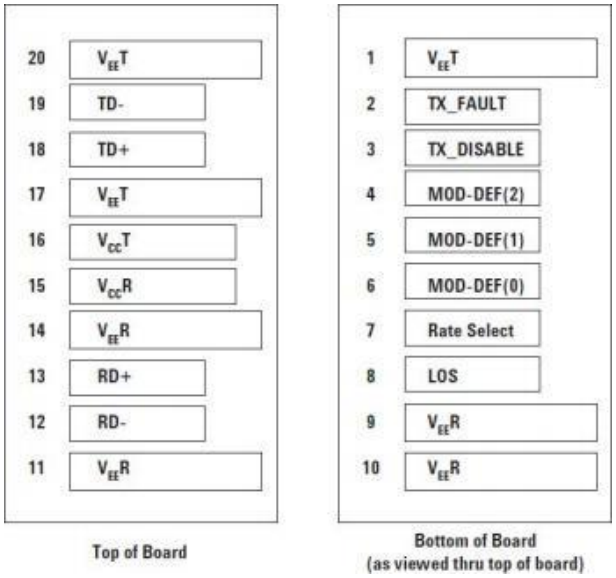


Figure 1a. Diagram of Host Board Connector Block Pin Numbers and Names

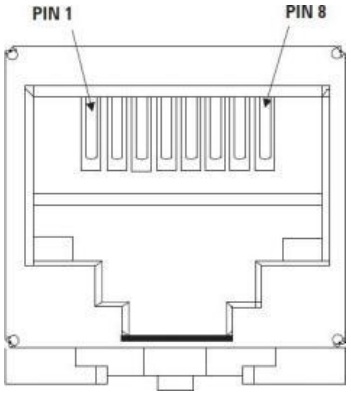
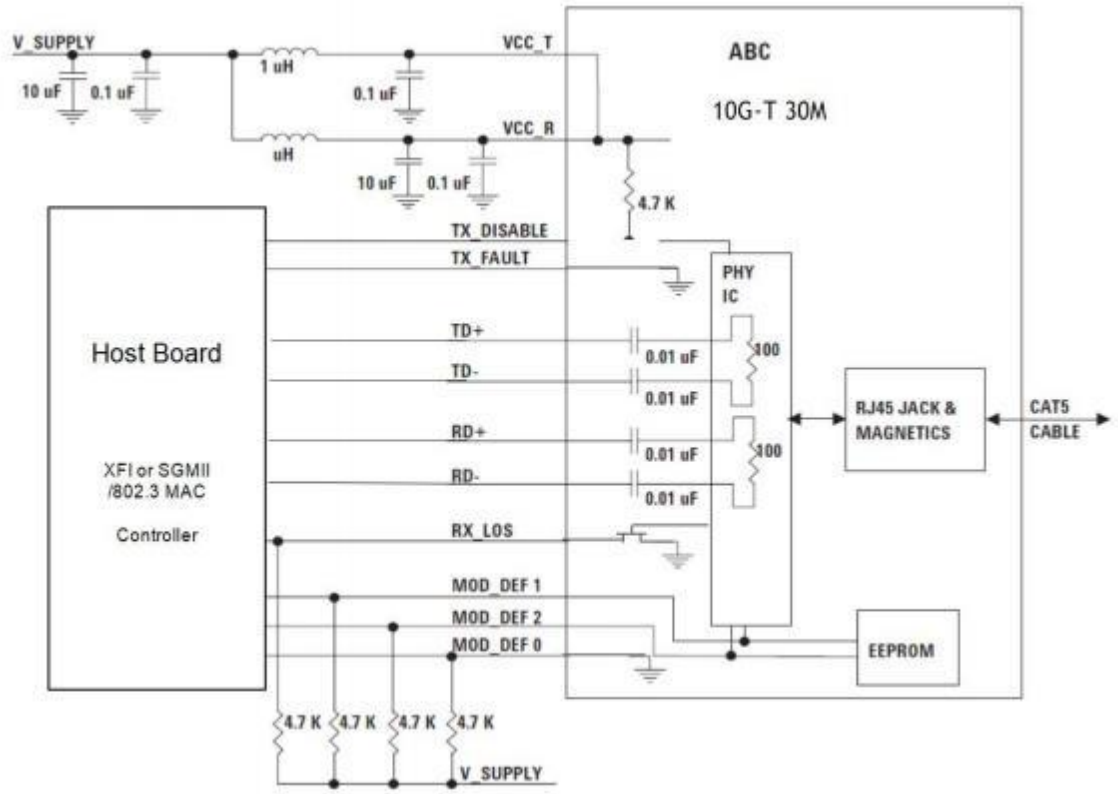
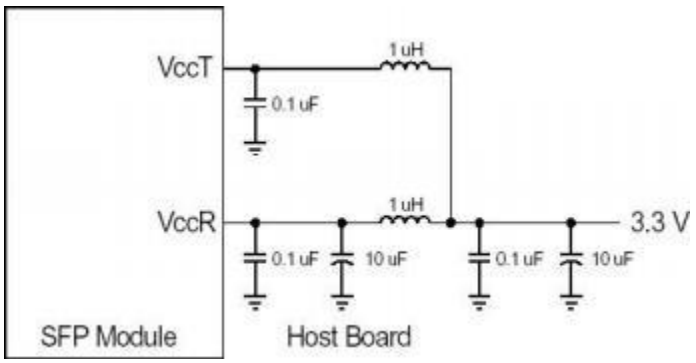


Figure1b. MDI (RJ 45 Jack) Pin Assignment

Ⅲ. Recommended Interface Circuit



Ⅳ. Recommended Host Board Power Supply Circuit



Ⅴ. Power Supply Interface Electronic Characteristics

Parameter	Symbol	Unit	Min.	Typ.	Max.	Notes/Conditions
Input Voltage	V_{CC}	V	3.135	3.3	3.465	Referenced to GND
Supply Current	I_{CC}	mA		650	700	At 10GBase-t Cat 6a/7 30m 2.5W max power over full range of voltage and temperature. See caution note below
				290	320	At 100Base-t Cat 5 100m over full range of voltage and temperature
				330	360	At 10Base-t Cat 5 100m over full range of voltage and temperature
				430	470	At 1000Base-t Cat 5 100m over full range of voltage and temperature

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

Ⅵ. Low-Speed Signals, Electronic Characteristics

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

Ⅶ. High-Speed Electrical Interface, Transmission Line-SFP+

Parameter	Symbol	Unit	Min.	Typ.	Max.	Notes/Conditions
Line Frequency	f_L	GHz		10.3125		XFI to Copper
				1.25		USXGMII to Copper
Tx Output Impedance	Zout,TX	Ohm		100		Differential
Rx Input Impedance	Zin,RX	Ohm		100		Differential

Ⅷ. High-Speed Electrical Interface, Host-SFP+

Parameter	Symbol	Unit	Min.	Typ.	Max.	Notes/Conditions
Data Input: Transmitter Differential Input Voltage (TD +/-)	Vinsing	mV	500	800	1100	
Data Output: Receiver Differential Output Voltage (RD +/-)	Voutsing	mV	500	800	1100	
Rise/Fall Time	Tr,Tf	psec	25		47	20%-80%
Tx Input Impedance	Zin	Ohm		50		Single ended
Rx Output Impedance	Zout	Ohm		50		Single ended

IX. High-Speed Electrical Interface, Transmission Line-SFP+

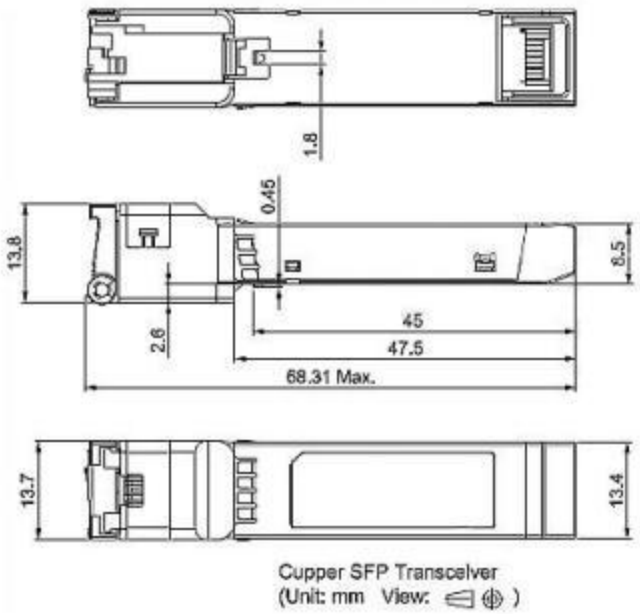
Parameter	Symbol	Unit	Min.	Typ.	Max.	Notes/Conditions
Cable Length	L	m			30	@10GBase-T .Category 6a/7 BER < 10^{-12}
					100	@10/100/1000Base-T .Category 5 UTP. BER < 10^{-12}
Data Rate	BR	Gb/s		10.3125 or 1.25		IEEE 802.3 compatible.

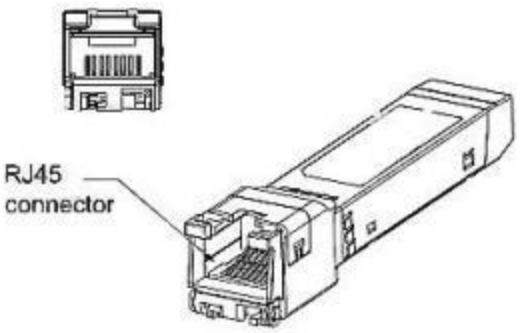
Notes:
1. Automatic crossover detection is enabled. External crossover cable is not required.
2. 10GBASE-T operation requires the host system to have an XFI interface with no clocks.
3. 10/100/1000 BASE-T operation requires the host system to have an USXGMII interface with no clocks.

X. Environmental Specifications

Parameter	Symbol	Unit	Min.	Typ.	Max.	Notes/Conditions
Operating Temperature	Top	℃	0		70	Case temperature
Storage Temperature	Tsto	℃	-40		85	Ambient temperature

XI. Mechanical Drawing of Copper SFP+





Test Center

I. Compatibility Testing

Each fiber optical transceiver has been tested in host device on site in FS Assured Program to ensure full compatibility with over 200 vendors.

Cisco Catalyst C9500-24Y4C

Cisco MS425-16

Brocade VDX 6940-144S

Dell EMC Networking Z9100-ON

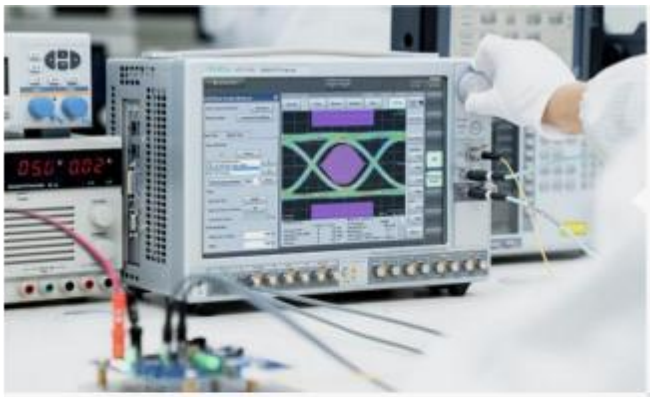
Force⑩tm S60-44T

HUAWEI S6720-30L-HI-24S

Above is part of our test bed network equipment. For more information, please click the Test Bed PDF. It will be updated in real time as we expand our portfolio.

II. Performance Testing

Each fiber optical transceiver has been fully tested in FS Assured Program equipped with world's most advanced analytical equipment to ensure that our transceivers work perfectly on your device.



1. TX/RX Signal Quality Testing

Equipped with the all-in-one tester integrated 4ch BERT & sampling oscilloscope, and variable optical attenuator to ensure the input and output signal quality.

- Eye Pattern Measurements: Jitter, Mask Margin, etc
- Average Output Power
- OMA
- Extinction Ratio
- Receiver Sensitivity
- BER Curve

2. Reliability and Stability Testing

Subject the transceivers to dramatic changes in temperature on the thermal shock chamber to ensure reliability and stability of the transceivers.

- Commercial: 0 °C to 70 °C
- Extended: -5 °C to 85 °C
- Industrial: -40 °C to 85 °C

3. Transfer Rate and Protocol Testing

Test the actual transfer data rate and the transmission ability under different protocols with Network Master Pro.

- Ethernet
- Fibre Channel
- SDH/SONET
- CPRI

4. Optical Spectrum Evaluation

Evaluate various important parameters with the Optical Spectrum Analyzer to meet the industry standards.

- Center Wavelength, Level
- OSNR
- SMSR
- Spectrum Width

Order Information

Part Number	Description
SFP-10GM-T-30	10M/100M/1G/2.5G/5G/10Gbps SFP Copper RJ-45 30m Transceiver
SFP-10GSR-85	10GBASE-SR SFP+ 850nm 300m DOM Transceiver
SFP-10GLRM-31	10GBASE-LRM SFP+ 1310nm 220m DOM Transceiver
SFP-10GLR-31	10GBASE-LR SFP+ 1310nm 10km DOM Transceiver
SFP-10GER-55	10GBASE-ER SFP+ 1550nm 40km DOM Transceiver
SFP-10GZR-55	10GBASE-ZR SFP+ 1550nm 80km DOM Transceiver
SFP-10GZR100-55	10GBASE-ZR SFP+ 1550nm 100km DOM Transceiver
SFP-10GMSR-85	Dual-Rate 1000BASE-SX and 10GBASE-SR SFP+ 850nm 300m DOM Transceiver
SFP-10GMLR-31	Dual-Rate 1000BASE-LX and 10GBASE-LR SFP+ 1310nm 10km DOM Transceiver

Note:

10G SFP+ transceiver module is individually tested on corresponding equipment such as Cisco, Arista, Juniper, Dell, Brocade and other brands, and passes the monitoring of FS.COM intelligent quality control system.