

TITLE 10GBASE-T 30m SFP+ Copper	DOC No. RFD-20190113006-001	
	REVISION : 04	AUTHORIZED BY : Andy Yang
	DATE : 2024/11/08	CLASSIFICATION : Copper Transceiver

1. Purpose

The SFP+ Copper is a electrical Small Form Factor Pluggable Plus (SFP+) transceiver module for the high performance integrated full duplex data link at 10.3125Gbps over Category Cat 6a/7 UTP. Interoperability with legacy Ethernet equipment auto-negotiation is of particular significance as it enables data center expansions and expenditures to occur incrementally. The added benefit is that it uses standards based technology that uses the familiar RJ45 connector and provides backward compatibility with legacy networks.

2. General Description

The 10G BASE-T electrical SFP+ transceivers use an integrated RJ-45 connector with transformer and PHY IC. The link length is up to 30m over four pair Category Cat 6a/7 UTP

3. Feature

- Electrical interface specifications per SFF-8431
- Management interface specifications per SFF-8432 and SFF-8472
- Support 10GBASE-T Operation in Host Systems
- Compatible with 1G/2.5G/5G/10G
- Up to 30m over Cat6a/7 cable
- Single +3.3V power supply
- 3.3W maximum power consumption with established link
- Operating temperature Options: 0~70°C
- RoHS Compliant

4. Applications

- High speed storage area networks
- Switched Backplane Applications
- Switch to Switch Interface

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5. Revision History

Rev.	Comments	Date	Originator	Approval
01	Preliminary Draft	2019/01/13	Mike Sun	Ray Yang
02	Removed I Temp.	2021/05/03	Mike Sun	Ray Yang
03	Modify PN	2023/10/06	Albert Lin	Mike Sun
04	Modify power consumption	2024/11/08	Andy Yang	Mike Sun

6. Absolute Maximum Rating

Parameter	Min	Max	Unit	Notes
Storage Temperature	-40	85	°C	Ambient temperature
Operating Temperature	0	70	°C	Case temperature
Operating Relative Humidity	5	95	%	

7. +3.3V Electrical Power Interface

Parameter	Min	Typical	Max	Unit
Supply Current	-	600	750	mA
Input Voltage	3.13	3.3	3.47	V
Maximum Voltage	-	-	3.8	V
I2C	0	-	100,000	Hz

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8. Low-Speed Signals ,Electronic Characteristics

Parameter	Symbol	Min	Max	Units	Notes
SFP Output LOW	VOL	0	0.5	V	
SFP Output HIGH	VOH	Host_VCC-0.5	Host_VCC+0.3	V	4.7k to 10k pull-up to host_VCC
SFP Input LOW	VIL	0	0.8	V	measured at host side of connector
SFP Input HIGH	VIH	2	VCC+0.3	V	

9. Low-Speed Signals ,Electronic Characteristics

Parameter	Symbol	Min	Typ	Max	Units	Conditions / Notes
Line Frequency	fL	-	125	-	MHz	5-level encoding, per IEEE802.3
Tx Output Impedance	ZOUT,TX		100		Ohm	
Rx Input Impedance	ZIN,RX		100		Ohm	

10. High-Speed Electrical Interface, Host-SFP

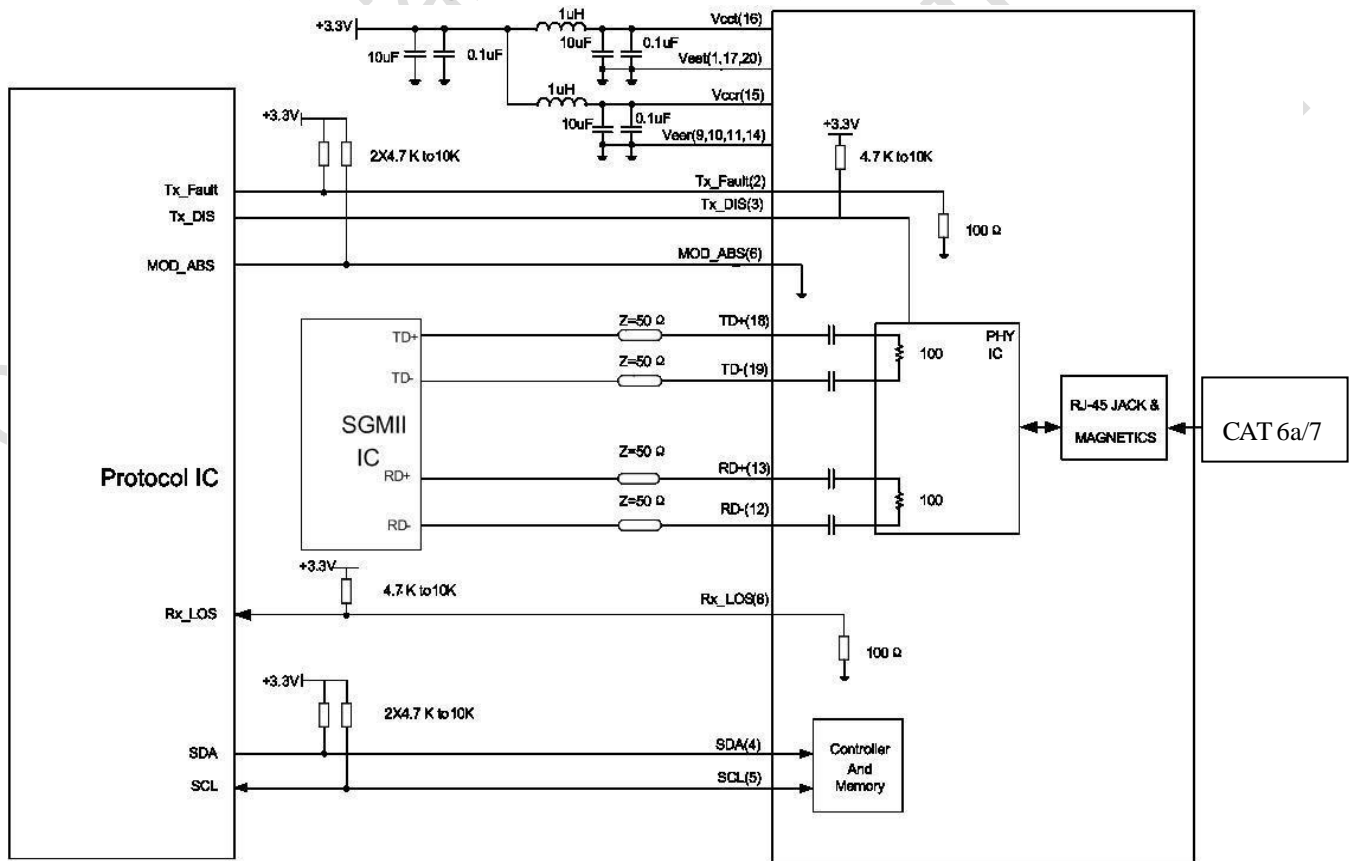
Parameter	Symbol	Min	Typ	Max	Units	Conditions / Notes
Transmitter Differential Input Voltage	VIN	180	-	700	mV	Differential voltage swings
Receiver Differential Output Voltage	VOUT	350	-	850	mV	Differential voltage swings
Rise and Fall Time	tr / tf	-	100	-	ps	20% - 80%
Tx Input Impedance	ZIN	-	50	-	Ohm	Single ended
Rx Output Impedance	ZOUT	-	50	-	Ohm	Single ended

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General

Parameter	Symbol	Min	Typ	Max	Units	Conditions / Notes
Data Rate	BR	10		10000	Mb/sec	IEEE802.3 compatible.
Cable Length	L	-	-	30	m	CAT6a/7. BER <10-12

11. Power supply and voltage detection circuitry



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Serial Communication Protocol

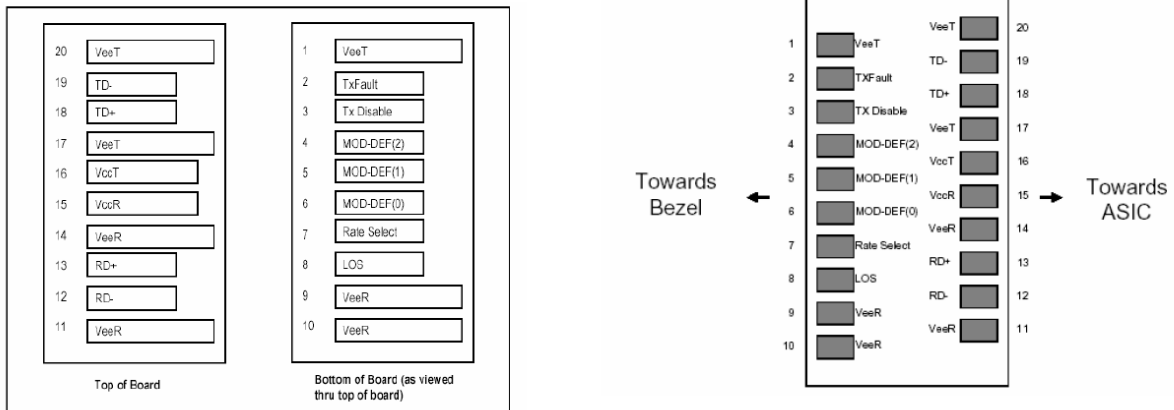
EEPROM Serial ID Memory Contents at address A0

All JPC SFP support the 2-wire serial communication protocol outlined in the SFP+ MSA. These SFP+ use an 128 byte E2PROM with an address of A0h.

Internal ASIC Registers

The 10GBASE-T physical layer IC can also be accessed via the 2-wire serial bus at address ACh.

12. Pin Description



13. Module Pin Definitions

Pin No.	Pin Name	Function	Notes
1	VeeT	Transmitter Ground	1
2	TX Fault	Transmitter Fault Indication	
3	TX Disable	Transmitter Disable	2

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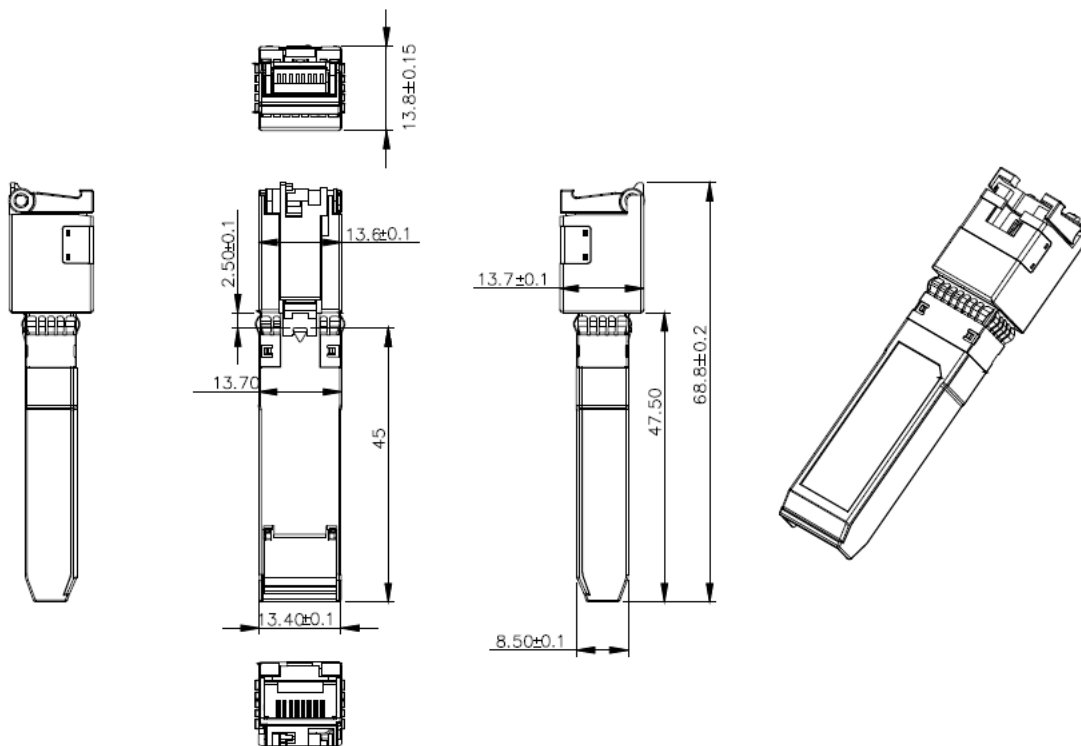
4	MOD_DEF 2	Module Definition 2	3
5	MOD_DEF 1	Module Definition 1	3
6	MOD_DEF 0	Module Definition 0	3
7	Rate Select	Not connected 3 4	
8	RX_LOS	Receiver Loss of Signal	4
9	VeeR	Receiver Ground	1
10	VeeR	Receiver Ground	1
11	VeeR	Receiver Ground	1
12	RD -	Inv. Received Data Out	
13	RD +	Received Data Out	
14	VeeR	Receiver Ground	1
15	VccR	Receiver Power	
16	VccT	Transmitter Power	
17	VeeT	Transmitter Ground	1
18	TD +	Transmit Data In	
19	TD -	Inv. Transmit Data In	
20	VeeT	Transmitter Ground	1

Notes:

1. Circuit ground is isolated from chassis ground
2. PHY disabled on TxDIS > 2.0V or open, enabled on TxDIS < 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. LVTTTL compatible with a maximum voltage of 2.5V.

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14. Mechanical Design Diagram



Units: mm

15. Product description &P/N List

10GBASE-T SFP+ Transceiver

Data Rate	Wavelength (nm)	Distance	Connector	Tem.
10G	RJ-45	30m	RJ-45	C