



## SFP+

### ES-T5-R-1

#### 10GBASE-T SFP+ Copper Transceiver

- Support 10GBASE-T operation in host system and auto-negotiation to lower speed
- Support RX\_LOS as link indication
- Hot-pluggable SFP footprint
- RJ45 connector
- Compliant with SFP MSA
- Single +3.3V power supply
- RoHS compliant and lead-free
- Operating case temperature:  
Commercial: 0°C to +70°C  
Industrial: -40°C to +85°C



## Applications

- 10GBASE-T
- 5GBASE-T
- 2.5GBASE-T
- 1000BASE-T

## Description

ES-T5-R-1 10GBASE-T Copper Small Form Pluggable (SFP) transceivers are based on the SFP Multi Source Agreement (MSA). They are compliant with the 10GBASE-T, 5GBASE-T, 2.5GBASE-T and 1000BASE-T.

## Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit
Maximum Supply Voltage	V <sub>cc</sub>	-0.5		4.0	V
Storage Temperature	TS	-40		+85	°C

## Recommended Operation Conditions

Parameter	Symbol	Min	Typ.	Max	Unit
Supply Voltage	V <sub>cc</sub>	3.14	3.3	3.46	V
Storage Temperature	TS	-40		+85	°C
Case Operating Temperature	Commercial	0		+70	°C
	Industrial	-40		+85	°C

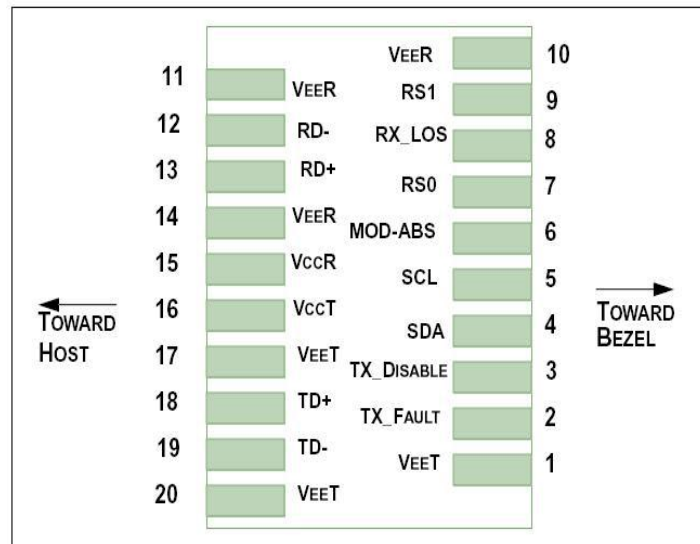
## Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
<b>+3.3V Electrical Power Interface</b>						
Supply Voltage	V <sub>cc</sub>	3.14	3.3	3.46	V	
Supply Current	I <sub>cc</sub>			900	mA	1
<b>Low-Speed Signals, Electronic Characteristics</b>						
SFP Output LOW	V <sub>ol</sub>	0		0.5	V	2
SFP Output HIGH	V <sub>oh</sub>	V <sub>cc</sub> -0.5		V <sub>cc</sub> +0.3	V	2
SFP Input LOW	V <sub>il</sub>	0		0.4	V	3
SFP Input HIGH	V <sub>ih</sub>	2.8		V <sub>cc</sub> +0.3	V	3
<b>High-Speed Electrical Interface, Transmission Line-SFP</b>						
Tx Output Impedance	Z <sub>out, TX</sub>		100		Ohm	4
Rx Input Impedance	Z <sub>in, RX</sub>		100		Ohm	4
<b>High-Speed Electrical Interface, Host-SFP</b>						
Differential CML Inputs	V <sub>in</sub>	250		1200	mV	5
Differential CML Outputs	V <sub>out</sub>	350	100	800	mV	5
Rise/Fall Time	Tr/Tf		175		psec	6
Tx Input Impedance	Z <sub>in</sub>		100		Ohm	7
Rx Output Impedance	Z <sub>out</sub>		100		Ohm	7

**Notes:**

- 1) 3.0W maximum power consumption over full range of voltage and temperature. Power consumption and surge current are higher than the specified values in the SFP MSA.
- 2) 4.7k to 10k pull-up to host\_Vcc, measured at host side of connector.
- 3) 4.7k to 10k pull-up to Vcc, measured at SFP side of connector.
- 4) Differential.
- 5) AC coupled.
- 6) 20%-80%.
- 7) Differential ended.

## Pin Assignment



**Pin out of Connector Block on Host Board**

Pin	Symbol	Name/Description	Ref.
1	Veet	Transmitter Ground (Common with Receiver Ground)	1
2	TX_Fault	Transmitter Fault. Not supported.	
3	TX_Disable	Transmitter Disable.	2
4	SDA	2-wire Serial Interface Data Line	3
5	SCL	2-wire Serial Interface Clock Line	3
6	MOD_ABS	Module Absent. Grounded within the module	3
7	RS0	No connection required	
8	RX_LOS	Loss of Signal indication.	4
9	RS1	No connection required	
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	Veer	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	Veer	Transmitter Ground (Common with Receiver Ground)	1

**Notes:**

- 1) Circuit ground is internally isolated from chassis ground.
- 2) PHY disabled on TX\_Disable > 2.0V or open, enabled on TX\_Disable < 0.8V.
- 3) Should be pulled up with a 4.7k to 10k resistor to host\_Vcc on the host board. MOD\_ABS pulls line low to indicate module is plugged in.
- 4) LVTTTL output, should be pulled up with a 4.7k to 10k resistor to host\_Vcc on the host board. Low indicates linked.

## Cable Length

Standard	Cable	Reach
10Gbase-T	CAT6A/CAT7	30m
5Gbase-T	CAT6 or better	50m
2.5Gbase-T	CAT5E or better	100m
1000base-T	CAT5E or better	100m

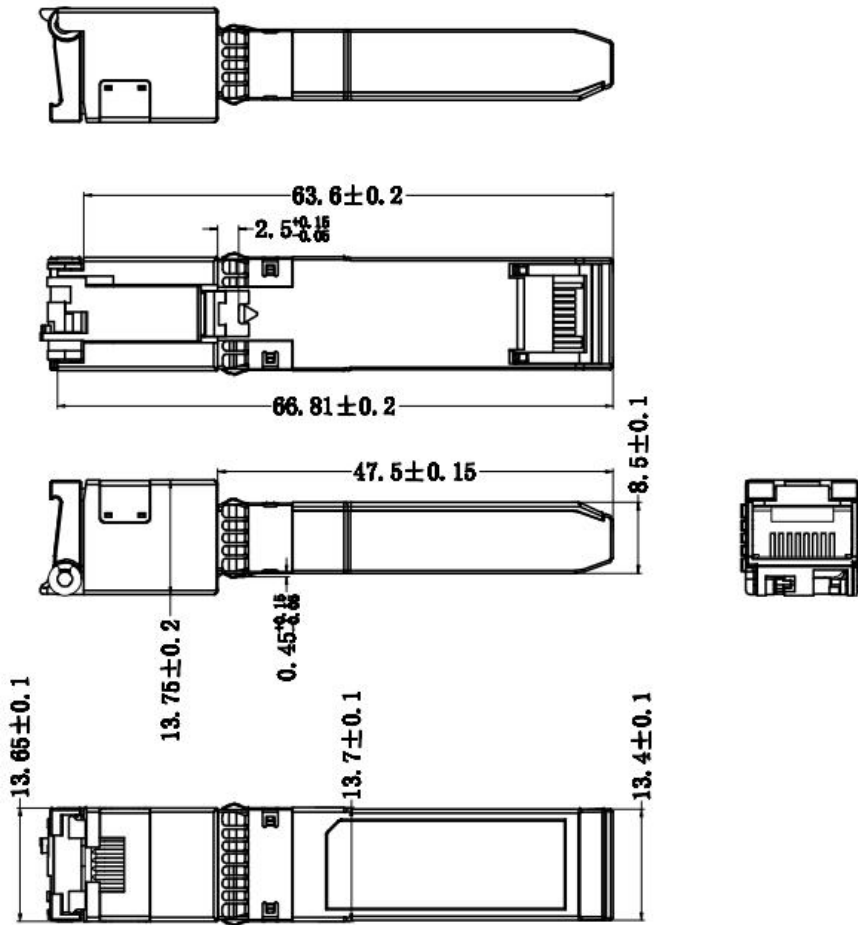
## Serial Communication Protocol

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

Serial Bus Timing Requirements					
Parameter	Symbol	Min	Typ	Max	Unit
I2C Clock Rate		0		200,000	Hz

## Outline Dimensions

Unit: mm



## Ordering Information

PN	Host interface	Port type	Line rate	Temperature
ES-T5-R-1	XFI	10G	10G(5G/2.5G/1000M/100M/10M with flow control)	Commercial
ES-T5-R-2	XFI	10G	10G(5G/2.5G/1000M/100M/10M with flow control)	Industrial
ES-T5-R-3	XFI or SGMII	10G or 1G	10G/2.5G(in10G port), 1000M/100M/10M(in 1G port)	Commercial
ES-T5-R-4	XFI or SGMII	10G or 1G	10G/2.5G(in10G port), 1000M/100M/10M(in 1G port)	Industrial
ES-T5-R-5	USXGMII	10G with USXGMII	10G/5G/2.5G/1000M/100M/10M	Commercial
ES-T5-R-6	USXGMII	10G with USXGMII	10G/5G/2.5G/1000M/100M/10M	Industrial

## Compatibility Test

In order to ensure the product compatibility, our products will be tested on the switch before shipment. Our modules can be compatible with many mainstream brand switches, such as Cisco, Juniper, Extreme, Brocade, IBM, H3C, HP, Huawei, D-Link, Mikrotik, ZTE, TP-Link...

Our test equipment: VOLKTEK MEN-4110, HP 2530-8G, CRS226-24G-25+RM, Catalyst 2960G Series, Catalyst 3850 XS 10G SFP+, Catalyst 3750-E Series, HUAWEI S5700Series, H3C S3100V2 Series, Juniper-EX4200, etc.



**Cisco Catalyst 3850**



**HUAWEI S5700**



**H3C S3100V2**



**HP J9264AR**



**Juniper EX 4200**



**Alcatel 6850E-U24X**



**Mikrotik CR5226-24G-25+RM**



**Cisco Catalyst 2960G**



**Volktek MEN-4110**

## Product Production Process

# Quality Assurance

Continuous introduction of new equipment, produced by strict standards, strict quality inspection, to guarantee the high quality standard of each product.



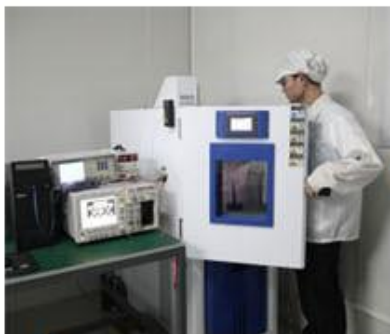
**Standardized  
Production Line**



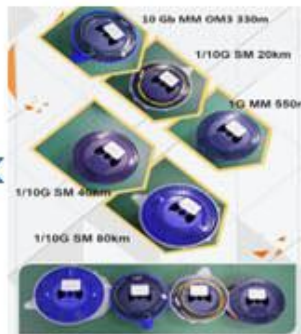
**Professional  
Welding**



**Assembling**



**Aging Testing**



**Distance Testing**



**Cleaning end face**



**Product Initial Test**



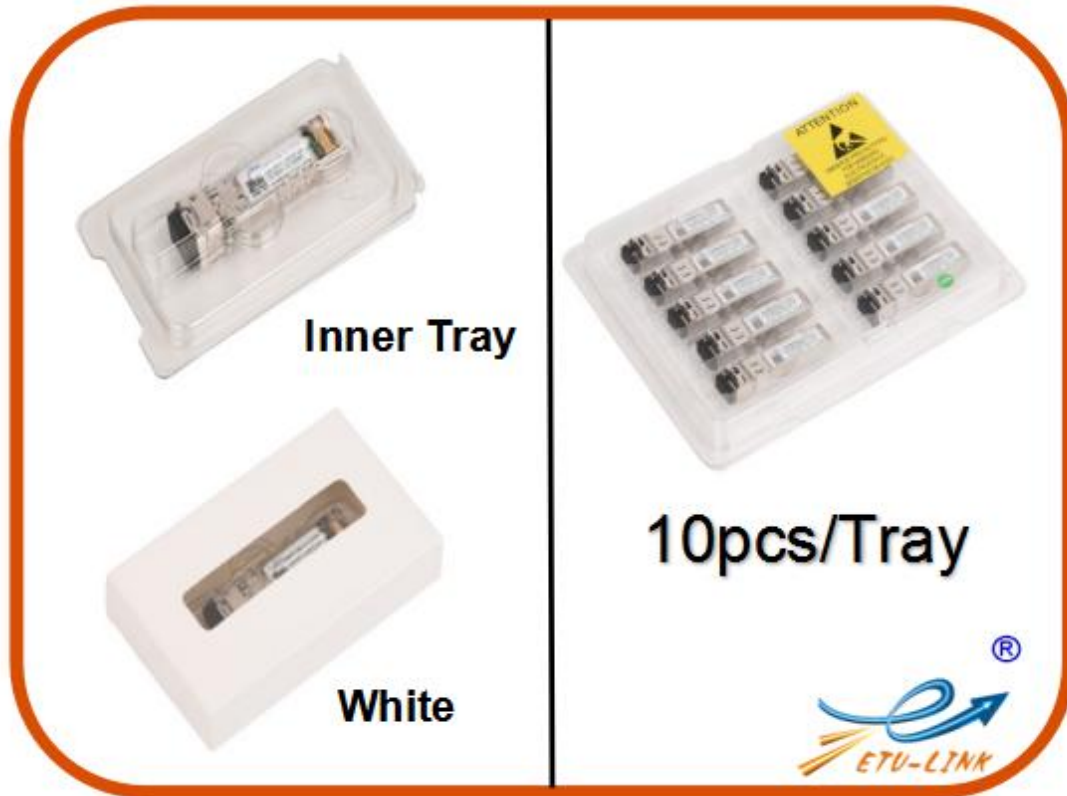
**Switch Testing**



**Product Final Test**

## Packaging

ETU-Link provides two kinds of packaging, 10pcs/Tray and individual package.



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