XFP Series

® **ETU-LINK**
Optical Communication System

XFP

EX31X-3LCD20

10Gbps 1310nm 20KM XFP Optical Transceiver

➢ Hot-pluggable XFP footprint
➢ Supports 9.95Gb/s to 11.3Gb/s bit rates
➢ XFI Loopback Mode
➢ RoHS-6 Compliant (lead-free)
➢ Power dissipation <1.5W
➢ Case temperature range: -5°C to 70°C
➢ Maximum link length of 20km
➢ Uncooled 1310nm DFB laser
➢ Full Duplex LC connector
➢ No Reference Clock required
➢ Built-in digital diagnostic functions
➢ Standard bail release mechanism

Applications

➢ 10GBASE-LR/LW 10G Ethernet
➢ 10G Fiber Channel
➢ SONET OC-192 SR-1 SDH STM I-64.1

Description

ETU-Link's EX31X-3LCD20 Small Form Factor 10 G (XFP) transceivers are compliant with the current XFP Multi-Source Agreement (MSA) Specification1.They comply with 10-Gigabit Ethernet 10GBASE-LR/LW per IEEE 802.3ae and 10G Fiber Channel. Digital diagnostics functions are available via a 2-wire serial interface, as specified in the XFP MSA. The transceiver is RoHS compliant and lead-free per Directive 2002/95/EC[3].

Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit
Maximum Supply Voltage	Vcc3	-0.5		4.0	V
Storage Temperature	T_S	-40		85	°C
Case Operating Temperature	T_{case}	-5		70	°C

Electrical Characteristics (T_{OP} = -5 to 70 °C, V_{CC3} = 3.13 to 3.45 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Supply Voltage #2	Vcc3	3.13		3.45	V	
Supply Current – Vcc3 supply	Icc3			450	mA	
Module total power	P			1.5	W	1
Transmitter						
Input differential impedance	Rin		100		Ω	2
Differential data input swing	Vin,pp	120		820	mV	
Transmit Disable Voltage	VD	2.0		Vcc	V	3
Transmit Enable Voltage	VEN	GND		GND+ 0.8	V	
Transmit Disable Assert Time				10	us	
Receiver						
Differential data output swing	Vout,pp	340	650	850	mV	4
Data output rise time	tr			38	ps	5
Data output fall time	tf			38	ps	5
LOS Fault	VLOS fault	Vcc – 0.5		VccHOST	V	6
LOS Normal	VLOS norm	GND		GND+0.5	V	6
Power Supply Rejection	PSR					7

Notes:

1) Maximum total power value is specified across the full temperature and voltage range.

2) After internal AC coupling.

3) Or open circuit.

4) Into 100 ohms differential termination.

5) These are unfiltered 20-80% values

6) Loss of Signal is open collector to be pulled up with a 4.7k – 10kohm resistor to 3.15 – 3.6V. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

7) Per Section 2.7.1. in the XFP MSA Specification[1].

Optical Characteristics $(T_{OP}$ = -5 to 70 °C, V_{CC3} = 3.13 to 3.45 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Average Optical Power	P_f	-2		3	dBm	
Optical Wavelength	λ	1290	1310	1330	nm	
Sidemode Suppression ratio	SSR_{min}	30			dB	
Optical Extinction Ratio	ER	3.2			dB	
Transmitter and Dispersion Penalty	TDP			2	dB	
Average Launch power of transmitter	P_{OFF}			-30	dBm	
Tx Jitter	Tx_j				Per 802.3ae requirements	
Relative Intensity Noise	RIN			-130	dB/Hz	
Receiver						
Receiver Sensitivity	R_{SENS}			-15	dBm	1
Input Saturation Power (Overload)	Psat	0.5			dBm	
Wavelength Range	$λ_C$	1270		1610	nm	
Receiver Reflectance	R_{rx}			-15	dB	
LOS De-Assert	LOS_D			-22	dBm	
LOS Assert	LOS_A	-30			dBm	
LOS Hysteresis		0.5		4	dB	

Notes: Measured with worst ER; BER<10^{-12} @ 10.3Gbps, 2^{31} – 1 PRBS.

Pin Assignment
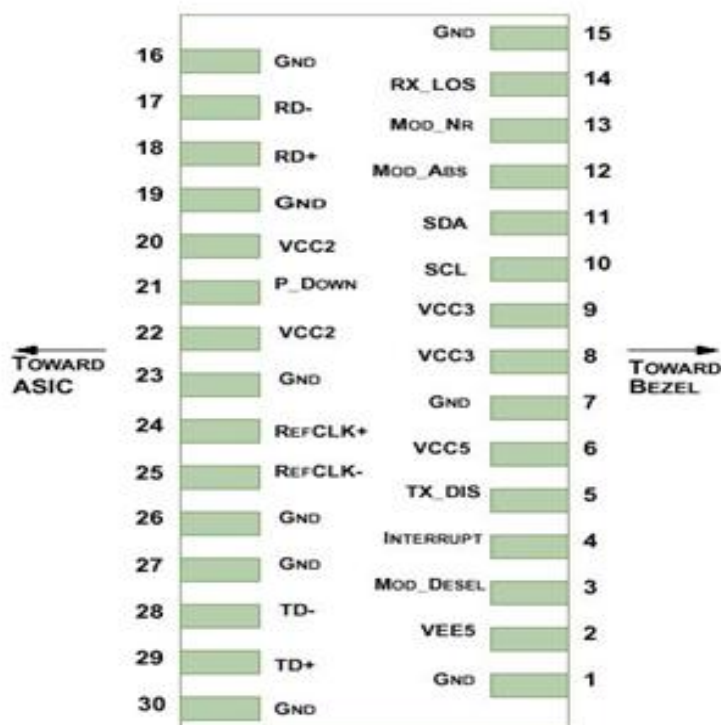
Diagram of Host Board Connector Block Pin Numbers and Name

Pin	Logic	Symbol	Name/Description	Ref.
1		GND	Module Ground	1
2		VEE5	Optional –5.2 Power Supply – Not required	
3	LVTTL-I	Mod-Desel	Module De-select; When held low allows the module to respond to 2-wire serial interface commands	
4	LVTTL-O	Interrupt	Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire interface	2
5	LVTTL-I	TX_DIS	Transmitter Disable; Transmitter laser source turned off	
6		VCC5	+5 Power Supply – Not required	
7		GND	Module Ground	1
8		VCC3	+3.3V Power Supply	
9		VCC3	+3.3V Power Supply	
10	LVTTL-I	SCL	Serial 2-wire interface clock	
11	LVTTL-I/O	SDA	Serial 2-wire interface data line	2
12	LVTTL-O	Mod_Abs	Module Absent; Indicates module is not present. Grounded in the module.	2
13	LVTTL-O	Mod_NR	Module Not Ready; ETU-LINK's defines it as a logical OR between RX_LOS and Loss of Lock in TX/RX.	2
14	LVTTL-O	RX_LOS	Receiver Loss of Signal indicator	2
15		GND	Module Ground	1
16		GND	Module Ground	1
17	CML-O	RD-	Receiver inverted data output	
18	CML-O	RD+	Receiver non-inverted data output	
19		GND	Module Ground	1
20		VCC2	+1.8V Power Supply – Not required	
21	LVTTL-I	P_Down/RST	Power Down; When high, places the module in the low power stand-by mode and on the falling edge of P_Down initiates a module reset. Reset; The falling edge initiates a complete reset of the module including the 2-wire serial interface, equivalent to a power cycle.	
22		VCC2	+1.8V Power Supply – Not required	
23		GND	Module Ground	1
24	PECL-I	RefCLK+	Reference Clock non-inverted input, AC coupled on the host board – Not required	3
25	PECL-I	RefCLK-	Reference Clock inverted input, AC coupled on the host board – Not required	3
26		GND	Module Ground	1
27		GND	Module Ground	1
28	CML-I	TD-	Transmitter inverted data input	
29	CML-I	TD+	Transmitter non-inverted data input	
30		GND	Module Ground	1

Notes:

1) Module circuit ground is isolated from module chassis ground within the module.

2) Open collector; should be pulled up with 4.7kΩ – 10kΩ on host board to a voltage between 3.15V and 3.6V.

3) A Reference Clock input is not required by the EX31X-3LCD20. If present, it will be ignored.

General Specifications

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Bit Rate	BR	9.95		11.3	Gb/s	1
Bit Error Ratio	BER			10^{-12}		2
Max. Supported Link Length	LMAX		20		km	1

Notes:

1) 10GBASE-LR/LW.

2) Tested with 10.3Gbps, 2^31 – 1 PRBS.

Digital Diagnostic Functions

As defined by the XFP MSA[1], ETU-LINK XFP transceivers provide digital diagnostic functions via a 2-wire serial interface, which allows real-time access to the following operating parameters:

1. Transceiver temperature

2. Laser bias current

3. Transmitted optical power

4. Received optical power

5. Transceiver supply voltage

It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range.

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through the 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL pin) is generated by the host. The positive edge clocks data into the XFP transceiver into those segments of its memory map that are not write-protected. The negative edge clocks data from the XFP transceiver. The serial data signal (SDA pin) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially. The 2-wire serial interface provides sequential or random access to the 8 bit parameters, addressed from 000h to the maximum address of the memory.
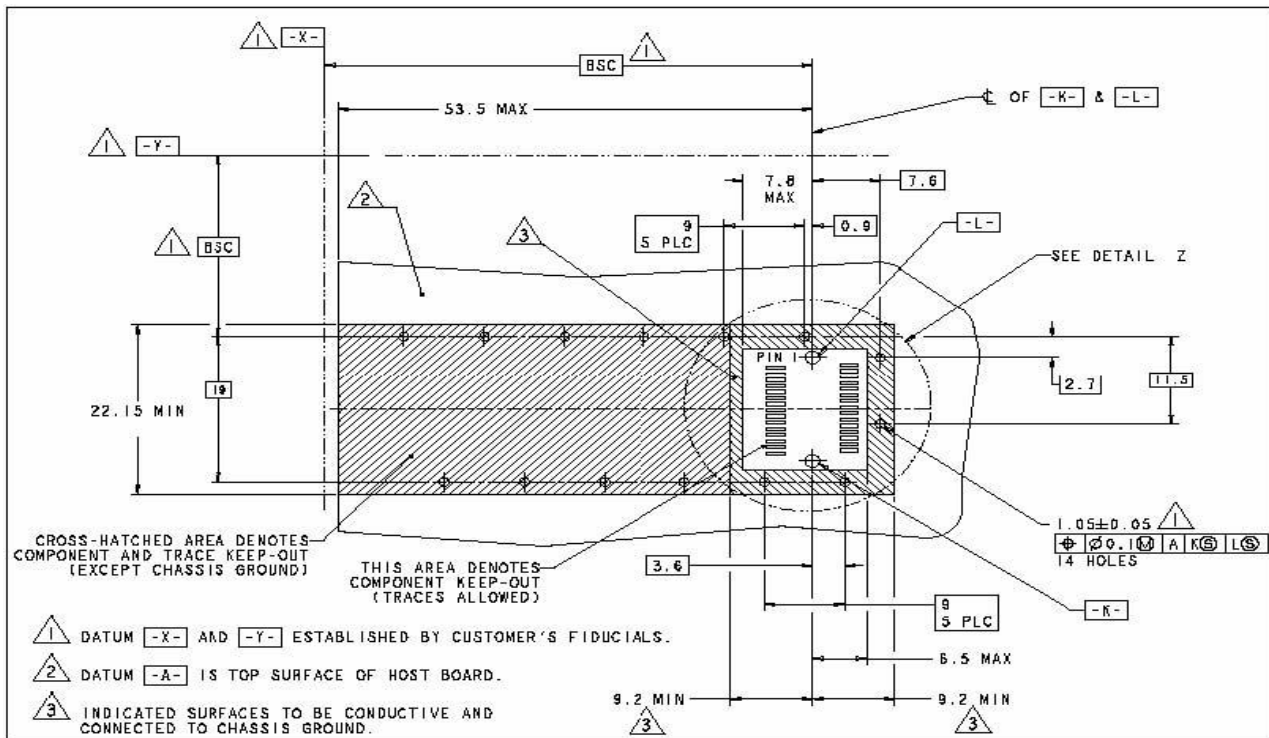
Mechanical Specifications

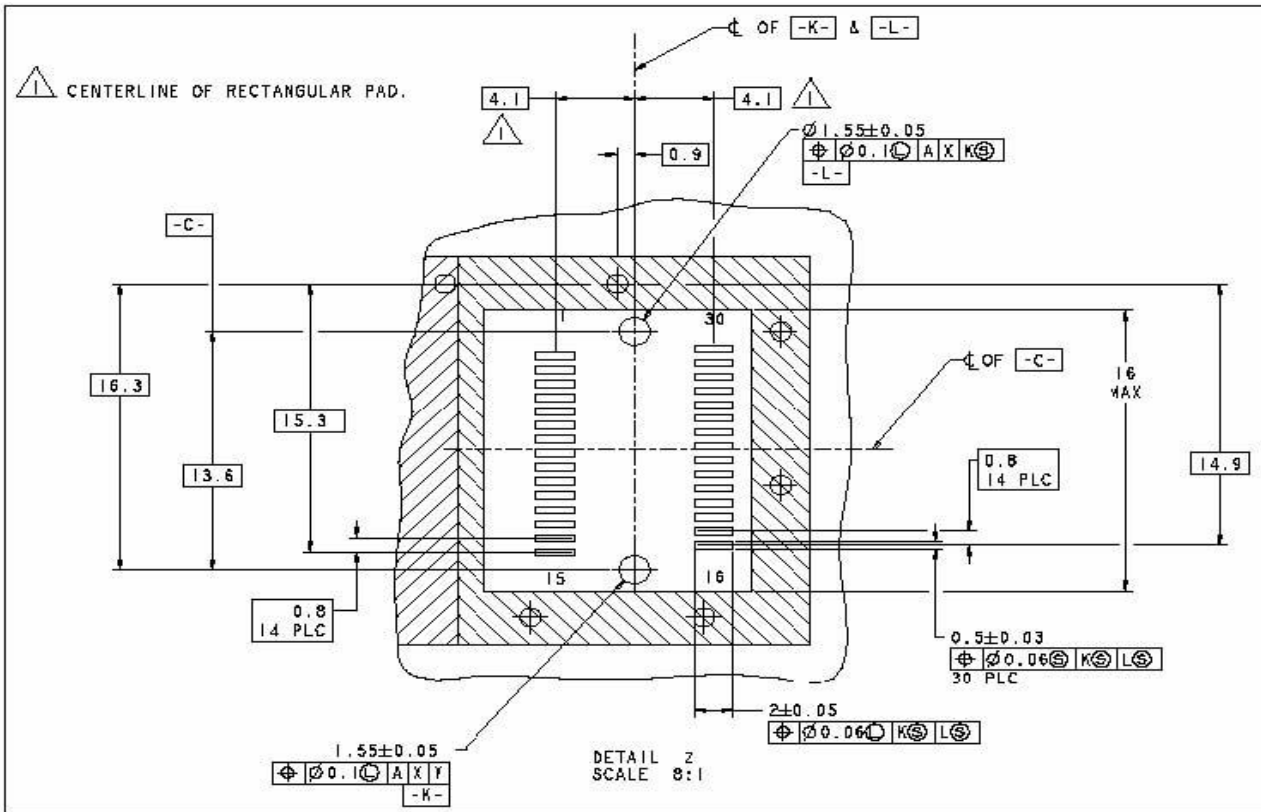ETU-LINK's XFP transceivers are compliant with the dimensions defined by the XFP Multi-Sourcing Agreement (MSA).
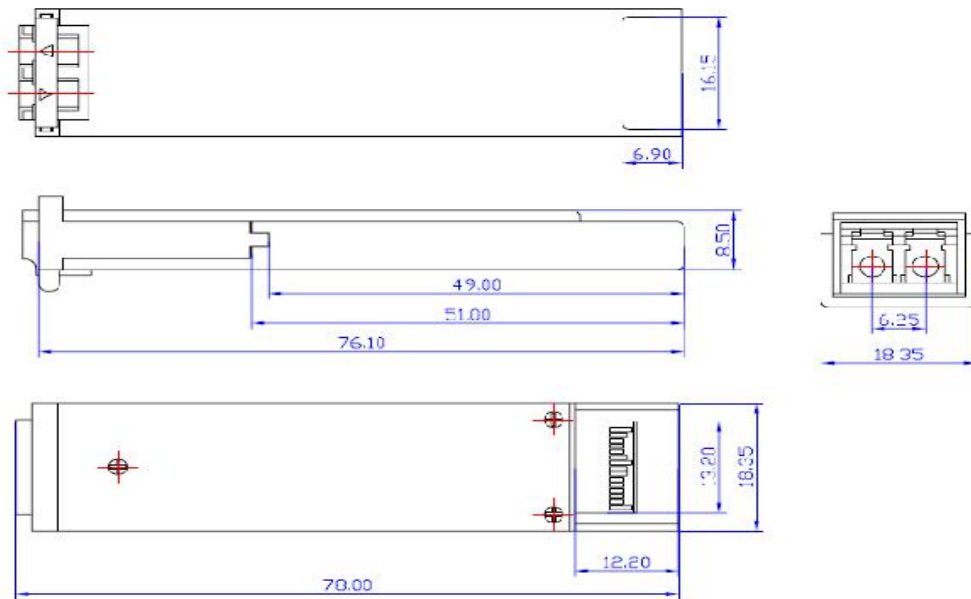
XFP Transceiver (dimensions are in mm)

PCB Layout and Bezel Recommendations

PCB Layout and Bezel Recommendations

CROSS-HATCHED AREA DENOTES COMPONENT AND TRACE KEEP-OUT (EXCEPT CHASSIS GROUND)

THIS AREA DENOTES COMPONENT KEEP-OUT (TRACES ALLOWED)

1. DATUM -X- AND -Y- ESTABLISHED BY CUSTOMER'S FIDUCIALS.
2. DATUM -A- IS TOP SURFACE OF HOST BOARD.
3. INDICATED SURFACES TO BE CONDUCTIVE AND CONNECTED TO CHASSIS GROUND.

XFP Host Board Mechanical Layout (dimensions are in mm)

XFP Detail Host Board Mechanical Layout (dimensions are in mm)
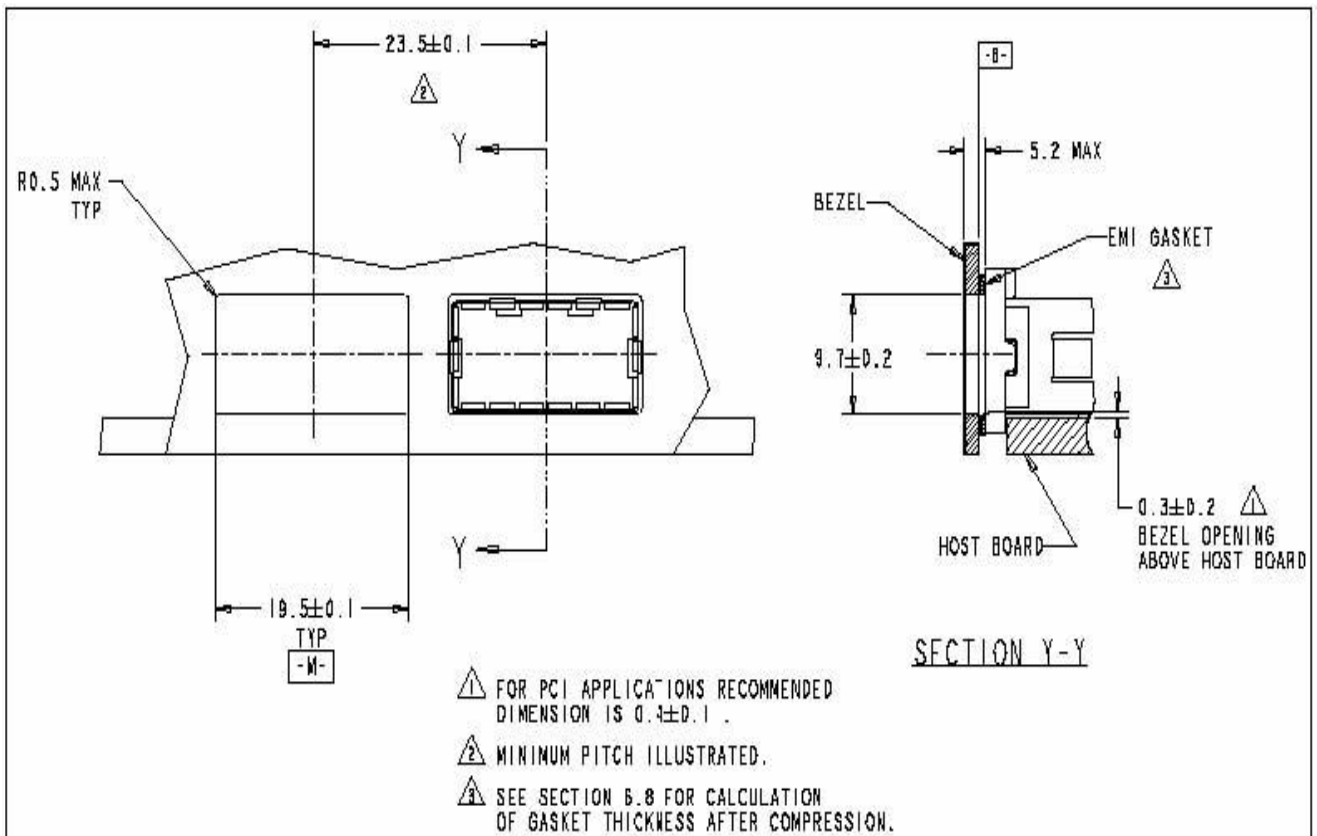
Regulatory Compliance

Feature	Reference	Performance
Electrostatic discharge（ESD）	IEC/EN 61000-4-2	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN 55022 Class B (CISPR 22A)	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10, 1040.11 IEC/EN 60825-1, 2	Class 1 laser product
Component Recognition	IEC/EN 60950, UL	Compatible with standards
ROHS	2002/95/EC	Compatible with standards
EMC	EN61000-3	Compatible with standards

Compatibility Test

In order to ensure the product compatibility, our products will be tested on the switch before shipment. Our modules can 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

Alcatal 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.
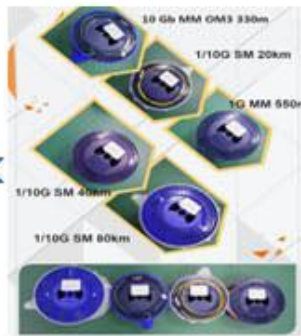

Standardized Production Line

Professional Welding

Assembling

Aging Testing

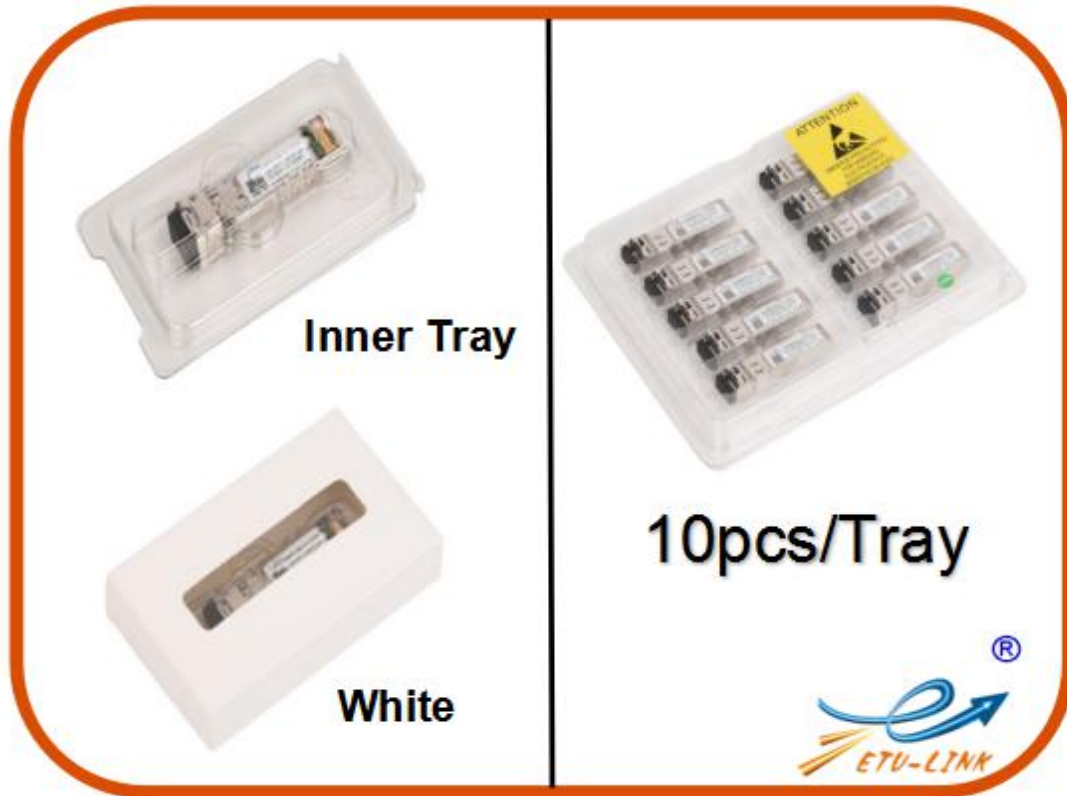Distance Testing

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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