Rev	Date	Modified by	Description
A0	2023		

Product Specifications

100GBASE-LR4 10km QSFP28 Optical Transceiver with DDM

PN: EQ23110X-3LCD10

Features

- QSFP28 MSA compliant
- 4x25Gb/s or 4x28Gb/s electrical interface
- Supports 103. 125Gb/s and 111.81Gb/s aggregate bit rate
- Up to 10km transmission on single mode fiber
- LC duplex connector
- 4-lane DFB and 4-lane Pin
- Commercial case temperature: 0 ℃ to 70 ℃
- Single 3.3V power supply
- Maximum power consumption 4 Watts

Applications

- 100GBASE-LR4 Ethernet
- OTN OTU4 4I1-9D1F
- Telecom networking
- Data Center Interconnect

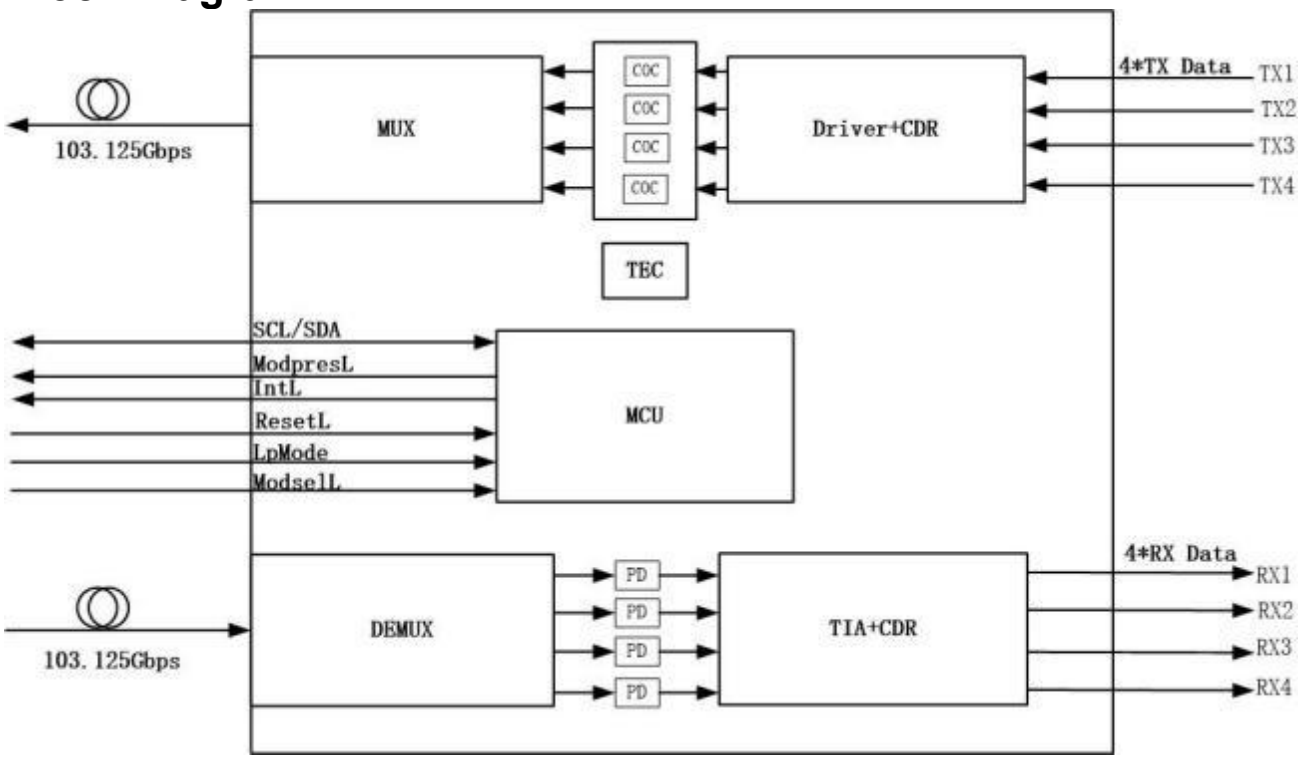
COMPLIANCE

- QSFP28 MSA
- SFF-8665
- IEEE802.3ba
- RoHS 2.0

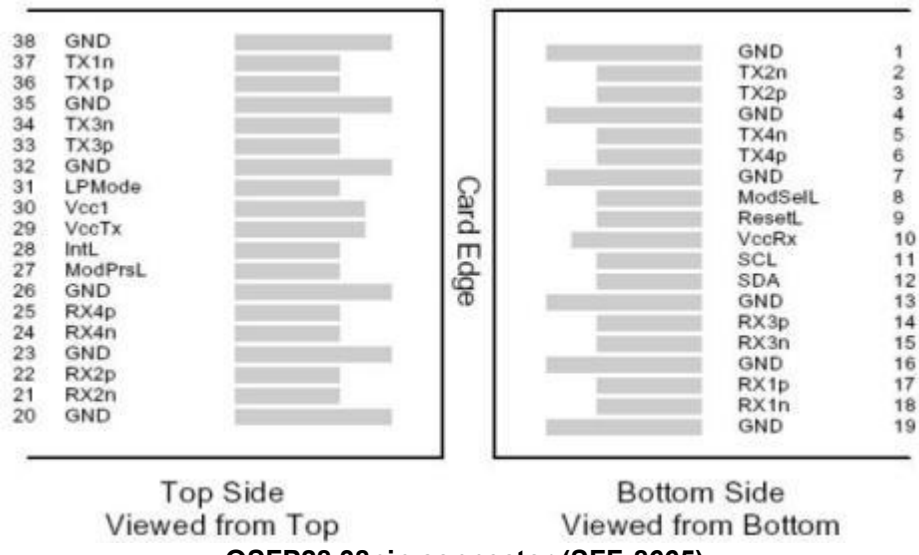
Description

The ETU EQ23110X-3LCD10 is designed for 10km optical communication applications. This module contains 4-lane DFB optical transmitter, 4-lane optical receiver and module management block including 2 wire serial interfaces. The optical signals are multiplexed to a single-mode fiber through an industry standard LC connector.

Block Diagram



Pin Diagram



QSFP28 38pin connector (SFF 8665)

Pin Descriptions

Pin	Symbol	Name/Description	Notes
1	GND	Ground	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data Input	
4	GND	Ground	1

5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data Input	
7	GND	Ground	1
8	ModSelL	Module Select	
9	ResetL	Module Reset	
10	Vcc Rx	+3.3V Power supply receiver	
11	SCL	2-wire serial interface clock	
12	SDA	2-wire serial interface data	
13	GND	Ground	1
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Ground	1
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Ground	1
20	GND	Ground	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Ground	1
24	Rx4n	Receiver Inverted Data Output	
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Ground	1
27	ModPrSL	Module Present	
28	IntL	Interrupt	
29	Vcc Tx	+3.3V Power supply transmitter	
30	Vcc1	+3.3V Power supply	
31	LPMode	Low Power Mode	
32	GND	Ground	1
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Input	
35	GND	Ground	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Groun	1

Note:

1. Circuit ground is internally isolated from chassis ground.

Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min	Typical	Max	Unit	Note
Maximum Supply Voltage	V_{cc}	0		3.6	V	
Storage Temperature	T_s	-40		85	℃	
Relative Humidity	RH	0		85	%	

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit	Note
Operating Case Temperature	T_{case}	0		70	℃	
Supply Voltage	V_{cc}	3.135	3.3	3.465	V	
Relative Humidity	RH	5		85	%	
Data Rate (Optical)	DRO		4*25.78125		Gbps	
Data Rate (Electrical)	DRE		4*25.78125		Gbps	
Link Distance				10	km	

Electrical Characteristics

100GBASE-LR4 Operation (EOL, TOP = 0 ~ 70℃, VCC = 3.135 to 3.465 V)

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Power Dissipation				4	W	
Supply Current	I_{cc}			1.15	A	
Transmitter						
Data Rate, each lane			25.78125		Gbps	
			27.95250		Gbps	
Differential Voltage pk-pk	V_{pp}	350			mV	
Input differential impedance	R_{in}		100		Ohm	
Differential Termination Resistance Mismatch				10	%	
Receiver						
Data Rate, each lane			25.78125		Gbps	
			27.95250		Gbps	
Output differential impedance	R_{out}		100		Ohm	
Differential Termination Resistance Mismatch				10	%	
Differential output voltage	$V_{out,\ pp}$		400		mV	

Optical Characteristics

100GBASE-LR4 Operation (EOL, TOP = 0 ~ 70℃, VCC = 3.135 to 3.465 V)

Parameters	Symbol	Min	Typical	Max	Unit	Notes
Transmitter						
Signal Speed per Lane	BR	25.78125 ± 100 ppm			Gb/s	
Transmit wavelength	λ_0	1294.53		1296.59	nm	
	λ_1	1299.02		1301.09	nm	
	λ_2	1303.54		1305.63	nm	
	λ_3	1308.09		1310.19	nm	
Side-Mode Suppression Ratio	SMSR	30			dB	
Total Average Launch Power	P_{total}			10.5	dBm	
Average launch power, each lane	P_{out}	-4.3		4.5	dBm	

Optical Modulation Amplitude (OMA), each lane	P_{OMA}	-1.3		4.5	dBm	
Launch power OFF per lane				-30	dBm	
Transmitter and Dispersion Penalty (TDP), each lane	TDP			2.2	dB	
Extinction Ratio (ER)	ER	4			dB	
Transmitter eye mask definition {X1,X2, X3, Y1, Y2, Y3}	{0.25, 0.4, 0.45, 0.25, 0.28, 0.4}					1
Mask margin		15			%	1
Receiver						
Signaling Speed per Lane	BR	25.78125 ± 100 ppm			Gb/s	
Receive wavelength	λ_0	1294.53		1296.59	nm	
	λ_1	1299.02		1301.09	nm	
	λ_2	1303.54		1305.63	nm	
	λ_3	1308.09		1310.19	nm	
Damage threshold, each lane		5.5			dBm	
Average receive power, each lane		-10.6		4.5	dBm	
Receive power, each lane (OMA)		-8.6		4.5	dBm	2
Receiver reflectance				-26	dB	
LOS Assert		-24		-13.6	dBm	
LOS De-Assert				-11.6	dBm	
LOS Hysteresis		0.5		6	dB	

Notes:
1. Hit ratio 5×10^{-5}.
2. Sensitivity is specified at BER@1E-12.

OUT4 Operation (EOL, TOP = 0 ~ 70 ℃, VCC = 3.135 to 3.465 V)

Parameters	Symbol	Min	Typical	Max	Unit	Notes
Transmitter						
Signal Speed per Lane	BR	27.9525 ± 100 ppm			Gb/s	
Transmit wavelength	λ_0	1294.53		1296.59	nm	
	λ_1	1299.02		1301.09	nm	
	λ_2	1303.54		1305.63	nm	
	λ_3	1308.09		1310.19	nm	
Side-Mode Suppression Ratio	SMSR	30			dB	
Total Average Launch Power	P_{total}			10	dBm	
Average launch power, each lane	P_{out}	-0.6		4	dBm	
Optical Modulation Amplitude (OMA), each lane	P_{OMA}	-1.3		4.5	dBm	
Launch power OFF per lane				-30	dBm	
Extinction Ratio (ER)	ER	4			dB	
Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3}	{0.25, 0.4, 0.45, 0.25, 0.28, 0.4}					1
Mask margin		15			%	1
Receiver						

Signaling Speed per Lane	BR	27.9525 ± 100 ppm			Gb/s	
Receive wavelength	λ_0	1294.53		1296.59	nm	
	λ_1	1299.02		1301.09	nm	
	λ_2	1303.54		1305.63	nm	
	λ_3	1308.09		1310.19	nm	
Damage threshold, each lane		5.5			dBm	
Average receive power, each lane		-6.9		4	dBm	2
Receive power, each lane (OMA)		-8.6		4.5	dBm	2
Receiver sensitivity (AOP), each lane				-8.6	dBm	2
Receiver reflectance				-26	dB	
LOS Assert		-24		-13.6	dBm	
LOS De-Assert				-11.6	dBm	
LOS Hysteresis		0.5		6	dB	

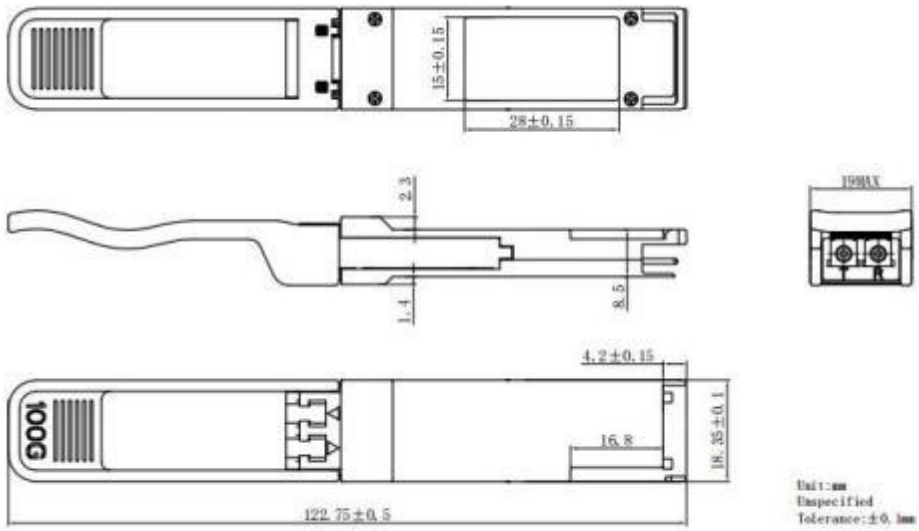
Notes:
1. Hit ratio 5×10^{-5}
2. Sensitivity is specified at BER@1E-6

Digital Diagnostic Monitoring Functions

It support the I2C-based Diagnostic Monitoring Interface (DMI) defined in document SFF-8665. The host can access real-time performance of transmitter and receiver optical power, temperature, supply voltage and bias current.

Parameter	Accuracy	Unit
Case Temperature	±3	℃
Supply Voltage	±3%	V
Tx Bias Current	±10%	mA
Tx Optical Power	±3	dB
Rx Optical Power	±3	dB

Mechanical Specifications



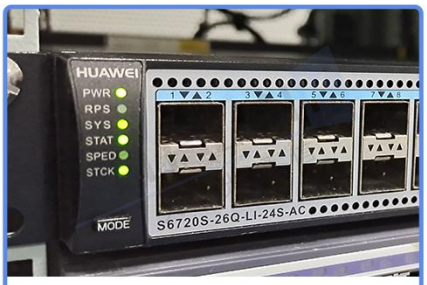
Regulatory Compliance

Feature	Reference	Performance
EMC	EN61000-3	Compatible with standards
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 EC/EN IEC/EN 60825-2 60825-1	Class 1 laser product
Component Recognition	IEC/EN 60950, L 60950	Compatible with standards
RoHS	2011/65/EU	Compatible with standards

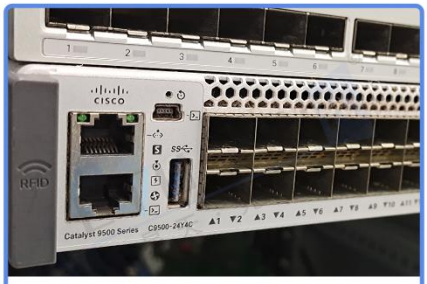
Compatibility Test

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.



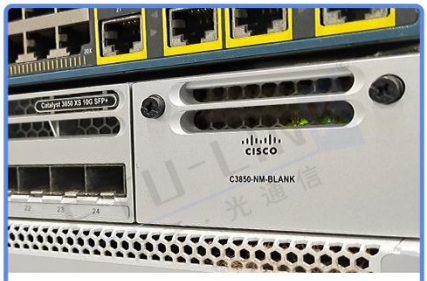
HUAWEI S6720S



CISCO Catalyst 9500

DELL S5048F

H3C S3100V2

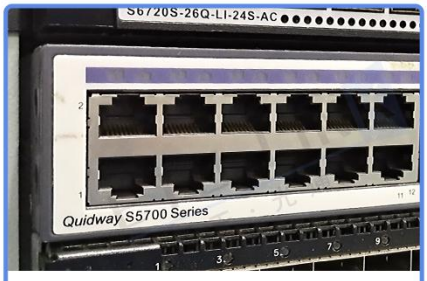


CISCO C3850

Aruba 2930F

Juniper EX 4200

HP J9264A

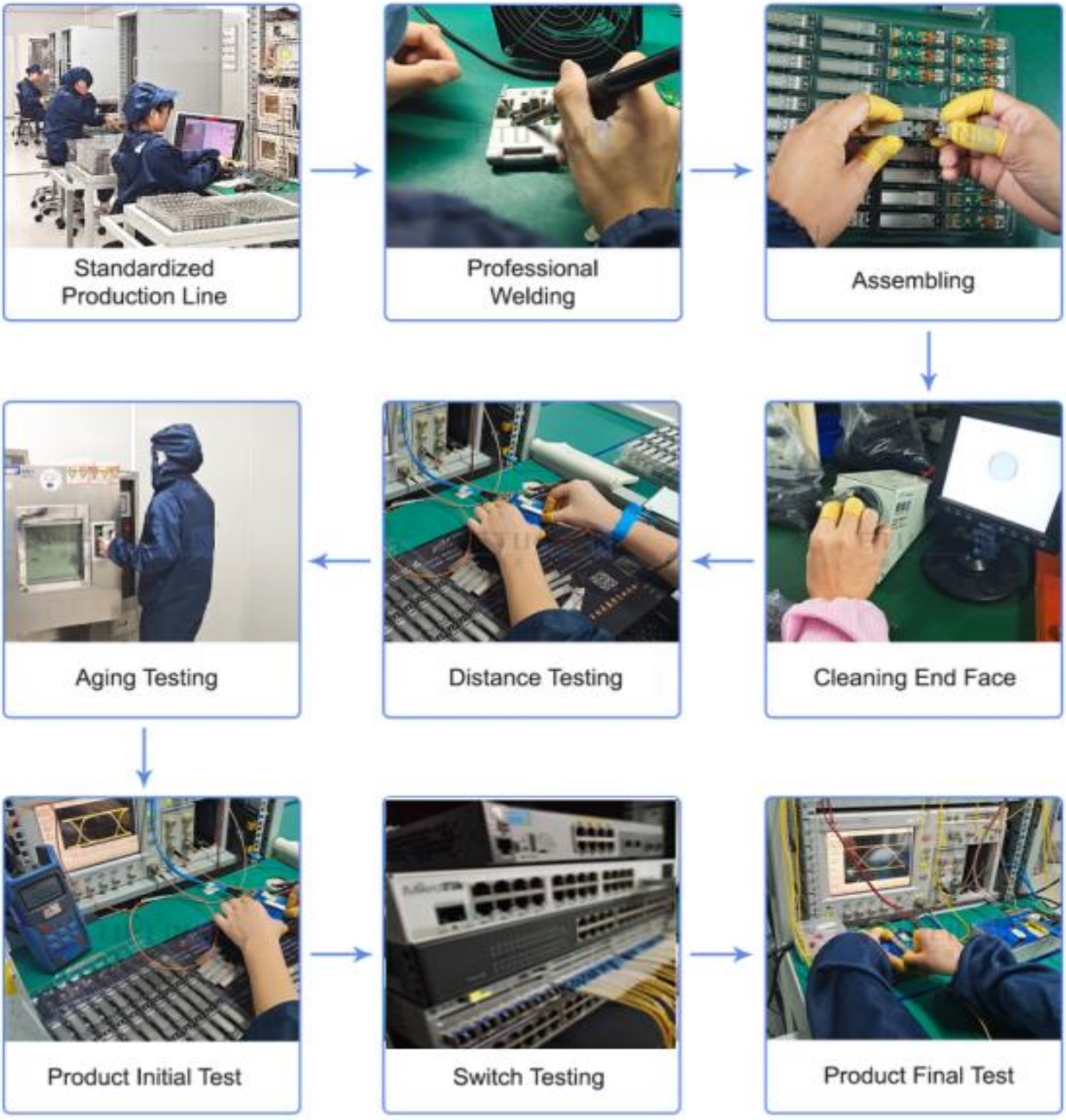


Quidway S5700

Product Production Process

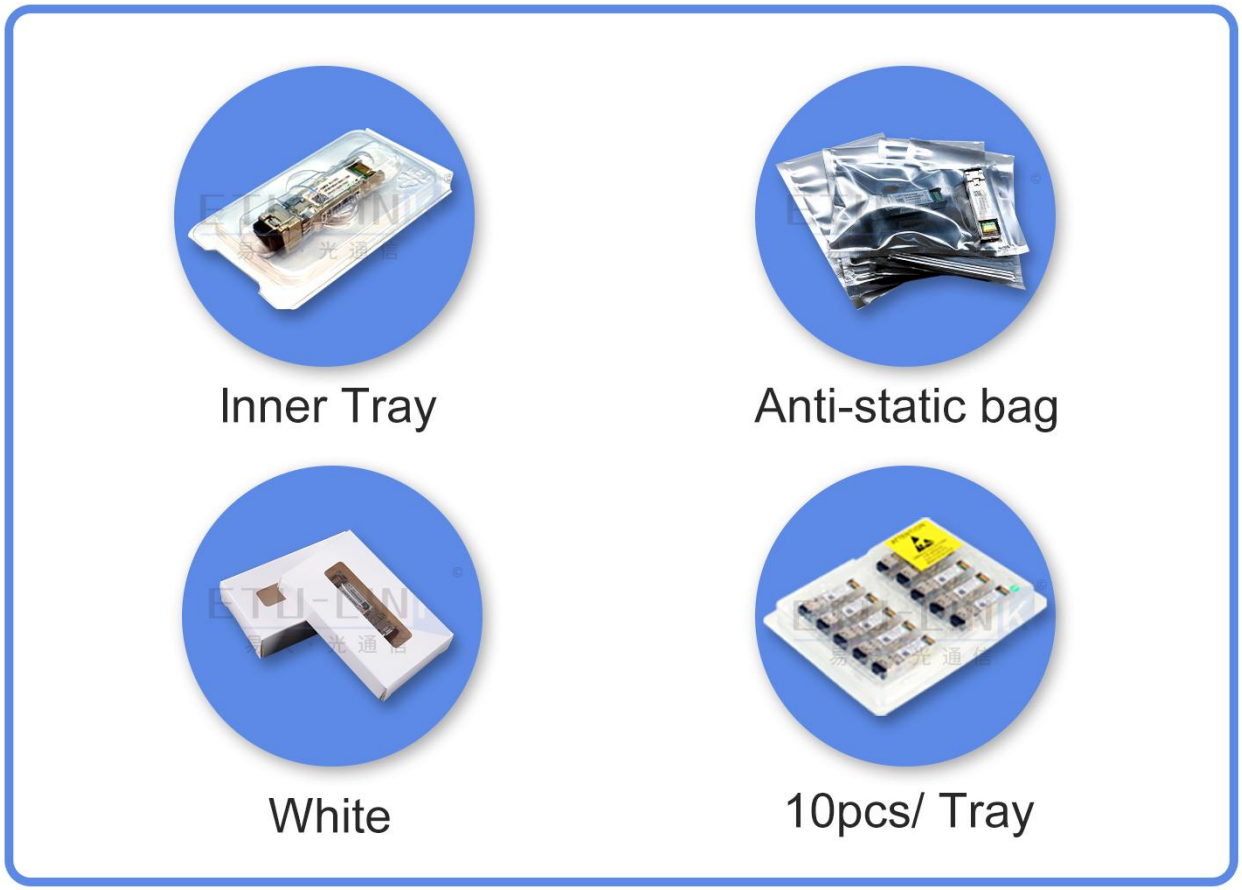
Quality Assurance

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



Packaging

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



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