ETU-LINK
Optical Communication System

QSFP+ Series

QSFP+

EQBxx4X-3LCD01(SRX)

40Gbps 850nm & 900nm 100M QSFP Bi-direction
Single receiving Optical Transceiver

- Compliant to the 40GbE XLPPI electrical specification per IEEE 802.3ba-2010
- Compliant to QSFP+ SFF-8436 Specification
- Aggregate bandwidth of >40Gbps
- Operates at 10.3125 Gbps per electrical channel with 64b/66b encoded data
- QSFP MSA compliant
- Capable of over 100m transmission on OM3 Multimode Fiber (MMF)and 150m on OM4 MMF
- Single +3.3V power supply operating
- Built-in digital diagnostic functions
- Temperature range 0° C to 70° C
- RoHS Compliant Part
- Utilizes a standard LC duplex fiber cable allowing reuse of existing cable infrastructure

Applications

- 40 Gigabit Ethernet interconnects
- Datacom/Telecom switch & router connections
- Data aggregation and backplane applications
- Proprietary protocol and density applications

Standard

- Compliant to IEEE 802.3ba
- Compliant to SFF-8436
- RoHS Compliant.

General Description

The transceiver internally multiplexes an XLPPI 4x10G interface into two 20Gb/s electrical channels, transmitting and receiving each optically over one simplex LC fiber using bidirectional optics. Link distances up to 100 m using OM3 and 150m using OM4 optical fiber are supported. These modules are designed to operate over multimode fiber systems using a nominal wavelength of 850nm on one end and 900nm on the other end. The electrical interface uses a 38 contact QSFP+ type edge connector.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	Ts	-40	-	85	℃	
Relative Humidity	RH	0	-	85	%	
Power Supply Voltage	VCC	-0.5	-	4	V	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	Tcase	0	-	70	℃	Without air flow
Power Supply Voltage	VCC	3.13	3.3	3.46	V	
Power Supply Current	ICC	-		1000	mA	
Power Dissipation	PD			3.5	W	

Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	NOTE
Data Rate per Channel			10.3125	11.2	Gbps	
Supply Current	Icc		750	1000	mA	
Control I/O Voltage-High	VIH	2.0		Vcc	V	
Control I/O Voltage-Low	VIL	0		0.7	V	
Inter-Channel Skew	TSk			150	pS	
RESETL Duration			10		uS	
RESETL De-assert time				100	mS	
Power On time				100	mS	
Receiver						
Differential data output swing	Vout,pp	600		800	mV	2
Single-ended output voltage		0.3		4.0	V	

Notes:

1. Connected directly to TX data input pins. AC coupled thereafter.

Into 100 ohms differential termination.

Optical Characteristics

| Parameter	Symbol	Min	Typ	Max	Unit	NOTE
Receiver						
Receiver Wavelength CH1	λ	882	900	918	nm	
Receiver Wavelength CH2	λ	832	850	868	nm	
Rx Sensitivity per channel	RSENS			-11	dBm	1
Maximum Input Power	Pmax	+0.5			dBm	
Receiver Reflectance	Rrx			-12	dB	
LOS De-Assert	LOSD			-14	dBm	
LOS Assert	LOSA	-30			dBm	
LOS Hysteresis			0.5		dBm	

Notes:

Measured with a PRBS 2^{31}-1 test pattern, @10.325Gb/s, BER<10^{-12} .

Diagnostic Monitoring Interface

Digital diagnostics monitoring function is available on all QSFP+ SRBD. A 2-wire serial interface provides user to contact with module. The structure of the memory is shown in flowing. The memory space is arranged into a lower single page, address space of 128 bytes and multiple upper address space pages. This structure permits timely access to addresses in the lower page, such as Interrupt Flags and Monitors. Less time critical time entries, such as serial ID information and threshold settings, are available with the Page Select function. The interface address used is A0xh and is mainly used for time critical data like interrupt handling in order to enable a one-time-read for all data related to an interrupt situation. After an interrupt, IntL, has been asserted, the host can read out the flag field to determine the affected channel and type of flag.

Byte Address	Description	Type
0	Identifier(1 Byte)	Read Only
1-2	Status (2 Bytes)	Read Only

3-21	Interrupt Flags (31 Bytes)	Read Only
22-33	Module Monitors (12 Bytes)	Read Only
34-81	Channel Monitors (48 Bytes)	Read Only
82-85	Reserved (4 Bytes)	Read /Write
86-97	Control (12 Bytes)	Read /Write
98-99	Reserved (2 Bytes)	Read /Write
100-106	Module and Channel Masks (7 Bytes)	Read /Write
107-118	Reserved (12 Bytes)	Read /Write
119-122	Reserved (4 Bytes)	Read /Write
123-126	Reserved (4 Bytes)	Read /Write
127	Page Select Byte	Read /Write
128-175	Module Thresholds (48 Bytes)	Read Only
176-223	Reserved (48 Bytes)	Read Only
224-225	Reserved (2 Bytes)	Read /Write
226-239	Reserved (14 Bytes)	Read /Write
240-241	Channel Controls (2 Bytes)	Read /Write
242-253	Reserved (12 Bytes)	Read /Write
254-255	Reserved (2 Bytes)	Read /Write
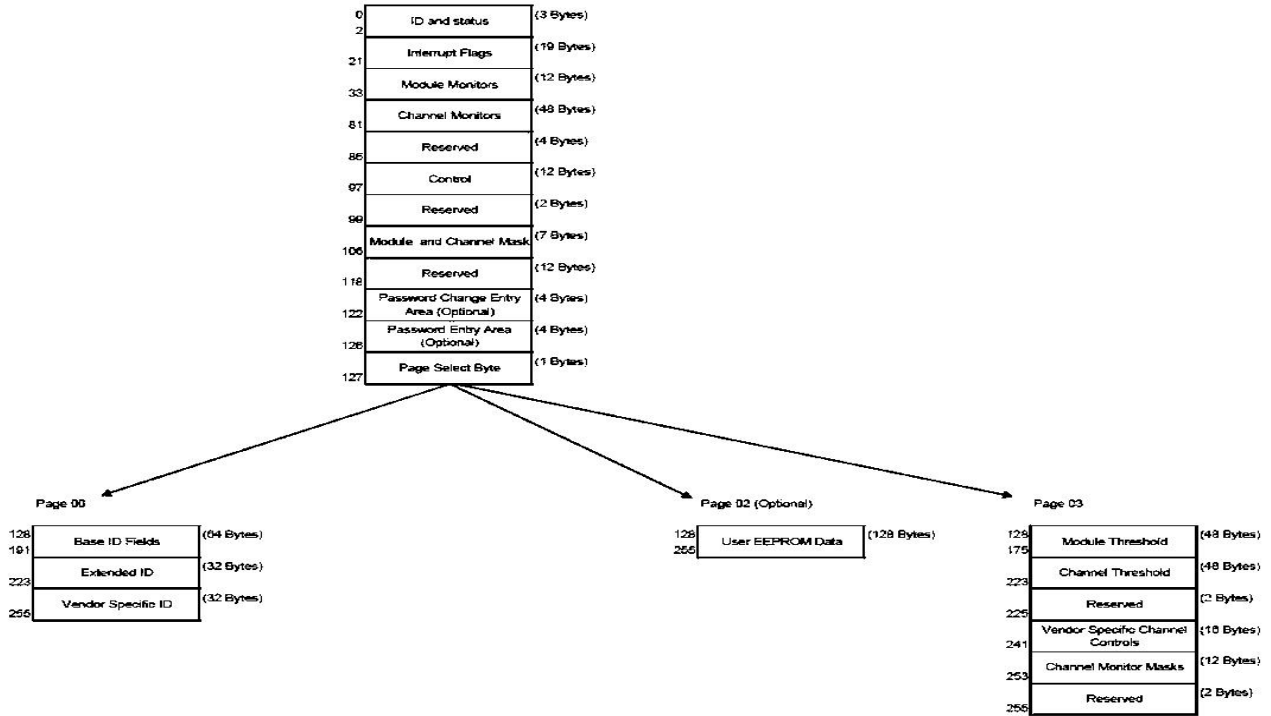
Address	Name	Description
128	Identifier (1 Byte)	Identifier Type of serial transceiver
129	Ext. Identifier (1 Byte)	Extended identifier of Serial transceiver
130	Connector (1 Byte)	Code for connector type
131-138	Transceiver (8 Bytes)	Code for electronic compatiblility or optical compatibility
139	Encoding (1 Byte)	Code for serial encoding algorithm
140	BR, nominal (1 Byte)	Nominal bit rate, units of 100 Mbits/s
141	Extended RateSelect Compliance (1 Byte)	Tags for Extended RateSelect compliance

142	Length SMF (1 Byte)	Link length supported for SM fiber in km
143	Length E-50μm (1 Byte)	Link length supported for EBW 50/125 μm fiber, units of 2m
144	Length 50 μm (1 Byte)	Link length supported for 50/125μm fiber, units of 1m
145	Length 62.5μm (1 Byte)	Link length supported for 62.5/125μm fiber, units of 1m
146	Length copper (1 Byte)	Link length supported for copper, units of 1m
147	Device Tech (1 Byte)	Device technology
148-163	Vendor name (16 Bytes)	QSFP vendor name (ASCII)
164	Extended Transceiver (1 Byte)	Extended Transceiver Codes for InfiniBand↑
165-167	Vendor OUI (3 Bytes)	QSFP vendor IEEE vendor company (ASCII)
168-183	Vendor PN (16 Bytes)	Part number provided by QSFP vendor (ASCII)
184-185	Vendor rev (2 Bytes)	Revision level for part number provided by vendor (ASCII)
186-187	Wavelength (2 Bytes)	Nominal laser wavelength (Wavelength = value / 20 in nm
		Guaranteed range of laser wavelength (+/- value) from

Address	Name	Description
188-189	Wavelength Tolerance (2 Bytes)	Nominal wavelength (Wavelength Tol. = value/ 200 in nm
190	Max Case Temp (1 Byte)	Maximum Case Temperature in Degree C

Address	Name	Description
191	CC-BASE (1 Byte)	Check code for Base ID fields (addresses 128-190)
192-195	Options (4 Bytes)	Rate Select, TX Disable, TX Fault, LOS
196-211	Vendor SN (16 Bytes)	Serial number provided by vendor (ASCII)
212-219	Date code (8 Bytes)	Vendor's manufacturing date code
220	Diagnostic Monitoring Type (1Byte)	Indicates which type of diagnostic monitoring is implemented
221	Enhanced Options (1Byte)	Indicates which optional enhanced features are implemented
222	Reserved (1Byte)	Reserved
223	CC-EXT	Check code for the Extended ID Fields (addresses 192-222)
224-255	Vendor Specific (32 Bytes)	Vendor Specific EEPROM

Page02 is User EEPROM and its format decided by user.

The detail description of low memory and page00.page03 upper memory please see SFF-8436 document.

Timing for Soft Control and Status Functions

Parameter	Symbol	Max	Unit	Conditions
Initialization Time	t_init	2000	ms	Time from power on1, hot plug or rising edge of Reset until the module is fully functional2
Reset Init Assert Time	t_reset_init	2	μs	A Reset is generated by a low level longer than the minimum reset pulse time present on the ResetL pin.
Serial Bus Hardware Ready Time	t_serial	2000	ms	Time from power on1 until module responds to data transmission over the 2-wire serial bus
Monitor Data ReadyTime	t_data	2000	ms	Time from power on1 to data not ready, bit 0 of Byte 2, deasserted and IntL asserted
Reset Assert Time	t_reset	2000	ms	Time from rising edge on the ResetL pin until the module is fully functional2
LPMode Assert Time	ton_LPMode	100	μs	Time from assertion of LPMode (Vin:LPMode =Vih) until module power consumption enters lower Power Level
IntL Assert Time	ton_IntL	200	ms	Time from occurrence of condition triggering IntL until Vout:IntL = Vol
IntL Deassert Time	toff_IntL	500	μs	toff_IntL 500 μs Time from clear on read3 operation of associated flag until Vout:IntL = Voh. This includes deassert times for Rx LOS, Tx Fault and other flag bits.
				Time from Rx LOS state to Rx LOS bit set and IntL

Parameter	Symbol	Max	Unit	Conditions
Rx LOS Assert Time	ton_los	100	ms	asserted
Flag Assert Time	ton_flag	200	ms	Time from occurrence of condition triggering flag to associated flag bit set and IntL asserted
Mask Assert Time	ton_mask	100	ms	Time from mask bit set4 until associated IntL assertion is inhibited
Mask De-assert Time	toff_mask	100	ms	Time from mask bit cleared4 until associated IntlL operation resumes

Timing for Soft Control and Status Functions

Parameter	Symbol	Max	Unit	Conditions
ModSelL Assert Time	ton_ModSelL	100	µs	Time from assertion of ModSelL until module responds to data transmission over the 2-wire serial bus
ModSelL Deassert Time	toff_ModSelL	100	µs	Time from deassertion of ModSelL until the module does not respond to data transmission over the 2-wire serial bus
Power_over-ride or Power-set Assert Time	ton_Pdown	100	ms	Time from P_Down bit set 4 until module power consumption enters lower Power Level
Power_over-ride or Power-set De-assert Time	toff_Pdown	300	ms	Time from P_Down bit cleared4 until the module is fully functional3

Notes:

1. Power on is defined as the instant when supply voltages reach and remain at or above the minimum specified value.

2. Fully functional is defined as IntL asserted due to data not ready bit, bit 0 byte 2 de-asserted.

3. Measured from falling clock edge after stop bit of read transaction.
4. Measured from falling clock edge after stop bit of write transaction.
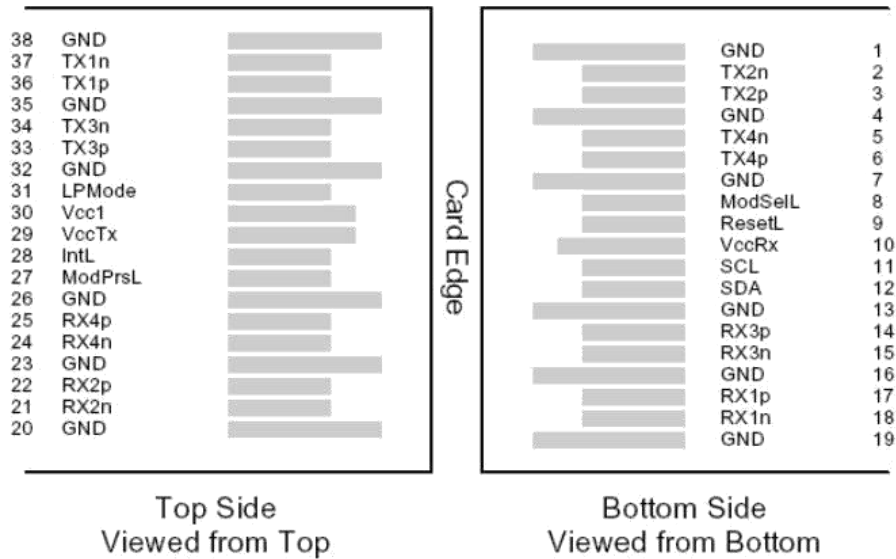
Pin Description

Top Side
Viewed from Top

Bottom Side
Viewed from Bottom

Diagram of Host Board Connector Block Pin Numbers and Name Diagram

Pin	Logic	Symbol	Name/Description	Ref.
1		GND	Ground	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	
3	CML-I	Tx2p	Transmitter Non-Inverted Data output	
4		GND	Ground	1
5	CML-I	Tx4n	Transmitter Inverted Data Output	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Output	
7		GND	Ground	1

Pin	Logic	Symbol	Name/Description	Ref.
8	LVTTL-I	ModSelL	Module Select	
9	LVTTL-I	ResetL	Module Reset	
10		VccRx	+3.3V Power Supply Receiver	2

12

Pin	Logic	Symbol	Name/Description	Ref.
11	LVCMOS-I/O	SCL	2-Wire Serial Interface Clock	
12	LVCMOS-I/O	SDA	2-Wire Serial Interface Data	
13		GND	Ground	1
14	CML-O	Rx3p	Receiver Inverted Data Output	
15	CML-O	Rx3n	Receiver Non-Inverted Data Output	
16		GND	Ground	1
17	CML-O	Rx1p	Receiver Inverted Data Output	
18	CML-O	Rx1n	Receiver Non-Inverted Data Output	
19		GND	Ground	1
20		GND	Ground	1
21	CML-O	Rx2n	Receiver Inverted Data Output	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	
23		GND	Ground	1
24	CML-O	Rx4n	Receiver Inverted Data Output	
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	

Pin	Logic	Symbol	Name/Description	Ref.
26		GND	Ground	1
27	LVTTL-O	ModPrsL	Module Present	
28	LVTTL-O	IntL	Interrupt	
29		VccTx	+3.3V Power Supply Transmitter	2
30		Vcc1	+3.3V Power Supply	2
31	LVTTL-I	LPMode	Low Power Mode	
32		GND	Ground	1
33	CML-I	Tx3p	Transmitter Inverted Data Output	

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Pin	Logic	Symbol	Name/Description	Ref.
34	CML-I	Tx3n	Transmitter Non-Inverted Data Output	
35		GND	Ground	1
36	CML-I	Tx1p	Transmitter Inverted Data Output	
37	CML-I	Tx1n	Transmitter Non-Inverted Data Output	
38		GND	Ground	1

Notes:

1. GND is the symbol for single and supply(power) common for QSFP modules, All are common within the QSFP module and all module voltages are referenced to this potential otherwise noted. Connect these directly to the host board signal common ground plane. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.

2. VccRx, Vcc1 and VccTx are the receiver and transmitter power suppliers and shall be applied concurrently. Recommended host board power supply filtering is shown below. VccRx, Vcc1 and VccTx may be internally connected within the QSFP transceiver module in any combination. The connector pins are each rated for maximum current of 500mA.

Recommended Circuit
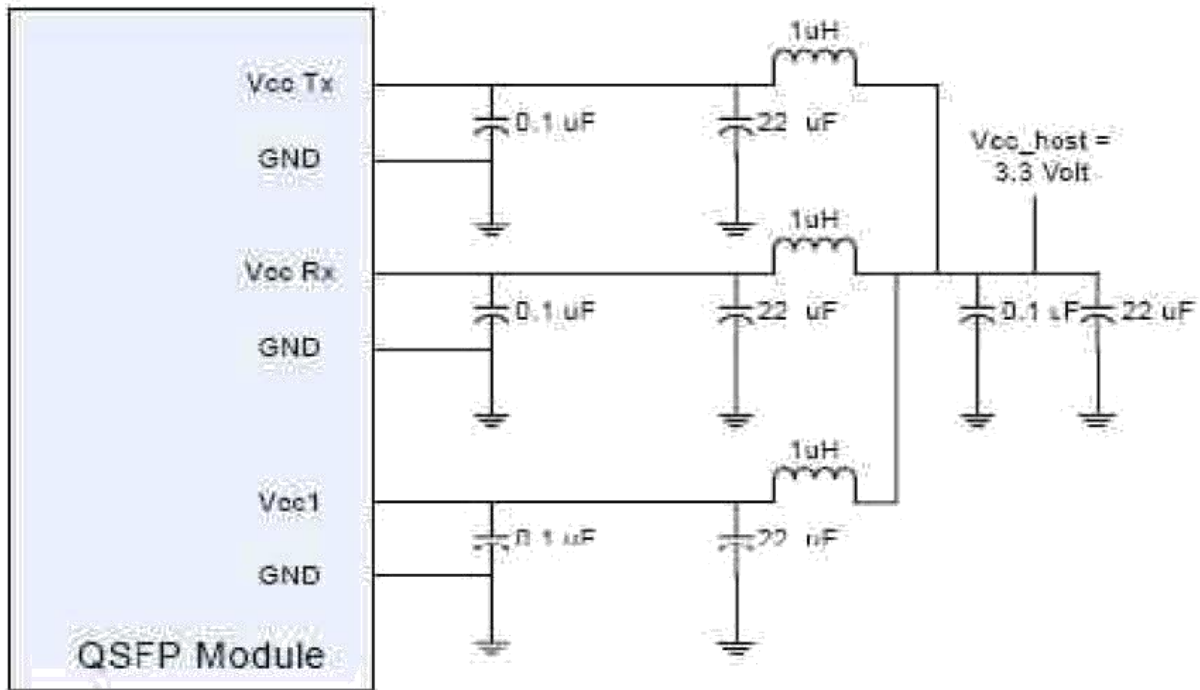
Mechanical Dimensions
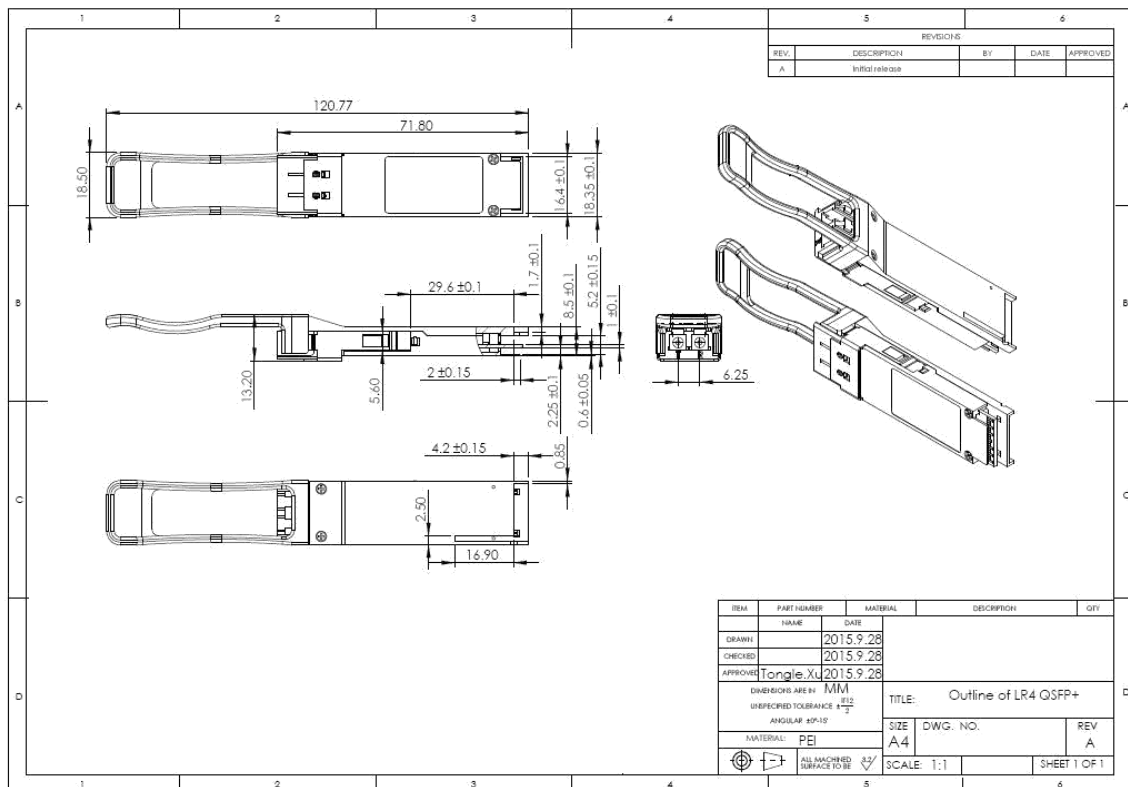
Compatibility Test

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.
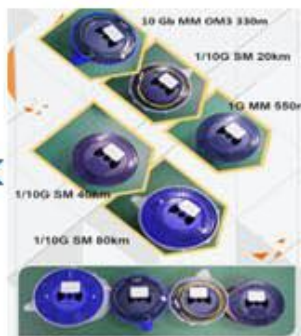
Standardized Production Line

Professional Welding

Assembling

Aging Testing

Distance Testing

Cleaning end face

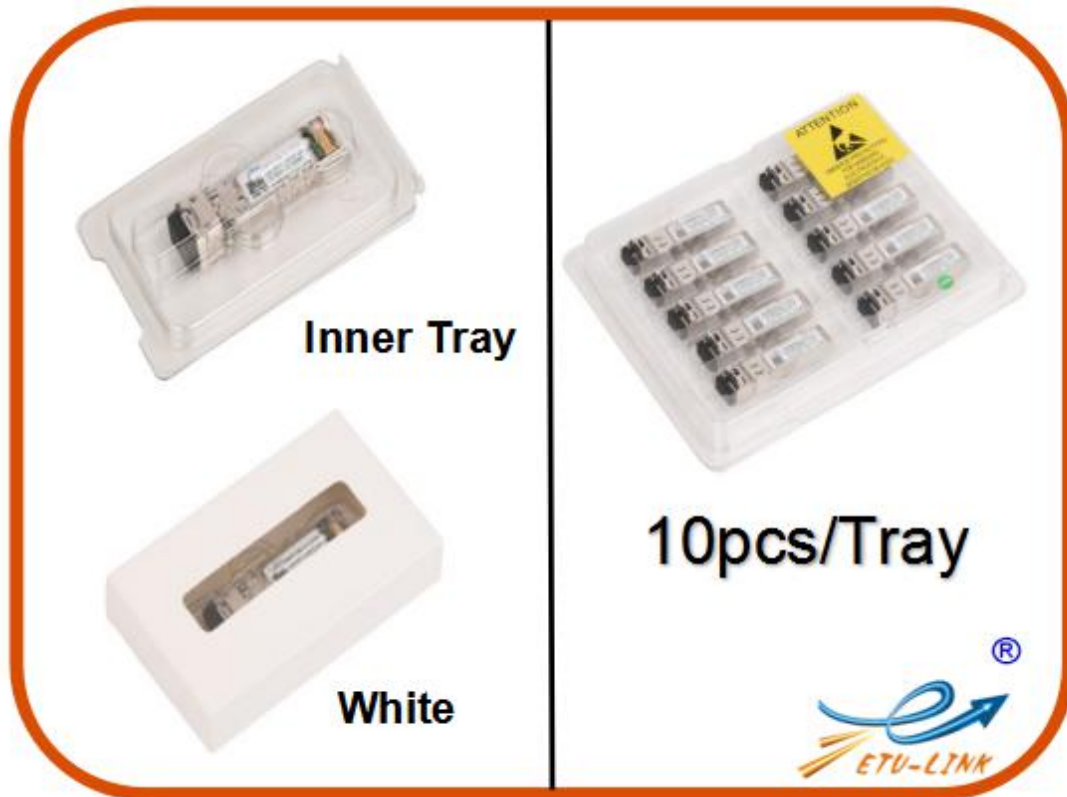**Product Initial Test**

Switch Testing

Product Final Test

Packaging

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

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Please e-mail us at sales@etulinktechnology.com or call us for assistance.