


ETU-LINK

Optical Communication System

SFP+ Series

SFP+

ESBxxX-3LCD40

10Gbps SFP+ Bi-Directional Transceiver, 40km Reach Tx1270/1330nm / Rx1330/1270nm

- Supports 9.95Gb/s to 10.3Gb/s data rates
- Simplex LC Connector Bi-Directional SFP+ Optical Transceiver
- Single 3.3V Supply
- Up to 40KM on 9/125um SMF
- A:1270nm DFB Laser transmitter,1330nm receiver
- B:1330nm DFB Laser transmitter,1270nm receiver
- Compliant with IEEE 802.3ae 10GBASE-LR and 10GBASE-LW
- SFP+ MSA SFF-8431 Compliant
- Digital Diagnostic SFF-8472 Compliant
- RoHS compliant and Lead Free
- Operating case temperature:
- Standard: 0 ~ 70 ° C



Applications

- 10GBASE-LR at 10.3125Gbps
- 10GBASE-LW at 9.953Gbps
- Other Optical Links

Standard

- SFP+ MSA Compliant
- SFF-8472 reversion 9.5 compliant
- IEEE802.3-2005 compliant
- Telcordia GR-468-CORE compliant
- FCC 47 CFR Part 15,Class B compliant
- FDA 21 CFR 1040.10 and 1040.11,class1 compliant
- RoHS compliant

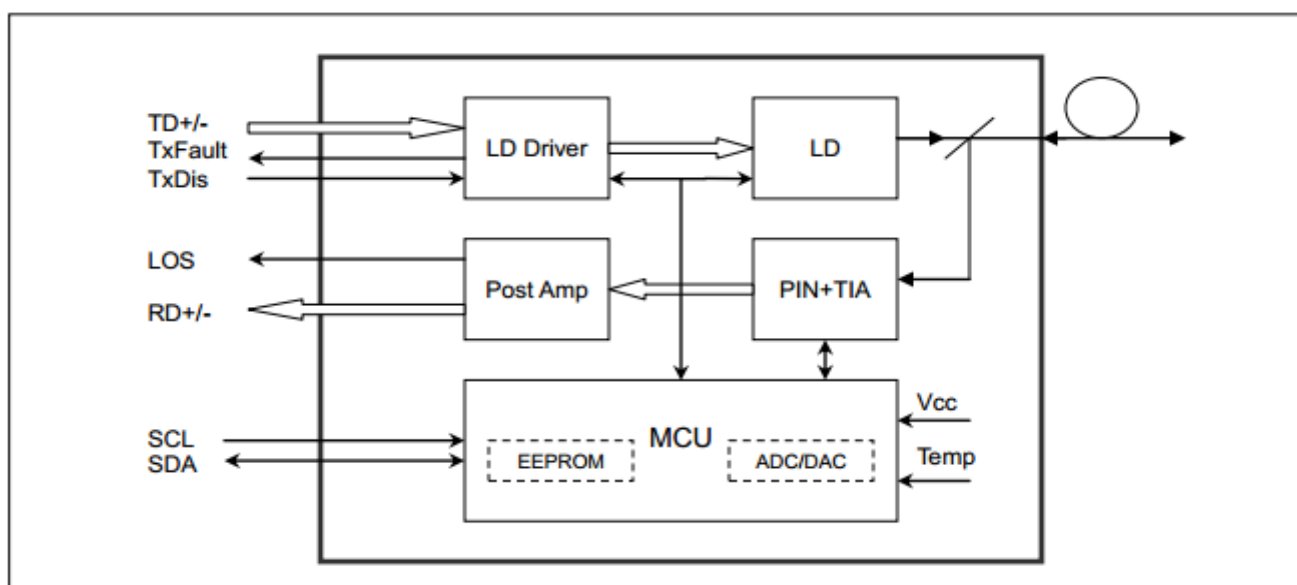
Product Description

The ESBxxX-3LCD40 series single mode transceiver is small form factor pluggable module for duplex optical data communications such as 10GBASE-LR/LW defined by IEEE 802.3ae. It is with the SFP+ 20-pin connector to allow hot plug capability.

The ESBxxX-3LCD40 module is designed for single mode fiber and operates at a nominal wavelength of 1270nm or 1330nm; the transmitter section uses a multiple quantum well DFB, which is class 1 laser compliant according to International Safety Standard IEC-60825.

The receiver section uses an integrated InGaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

Functional Diagram



Absolute Maximum Ratings

| Parameter | Symbol | Min | Typ | Max | Unit | Ref. |
|----------------------------|--------|------|-----|-----|------|------|
| Maximum Supply Voltage | Vcc | -0.5 | | 4.7 | V | |
| Storage Temperature | TS | -40 | | 85 | °C | |
| Case Operating Temperature | Tcase | -5 | | 70 | °C | |

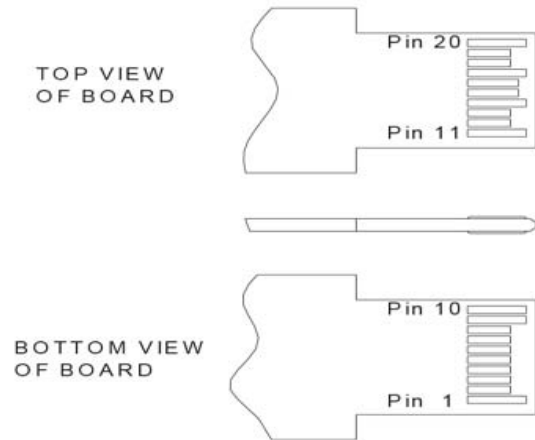
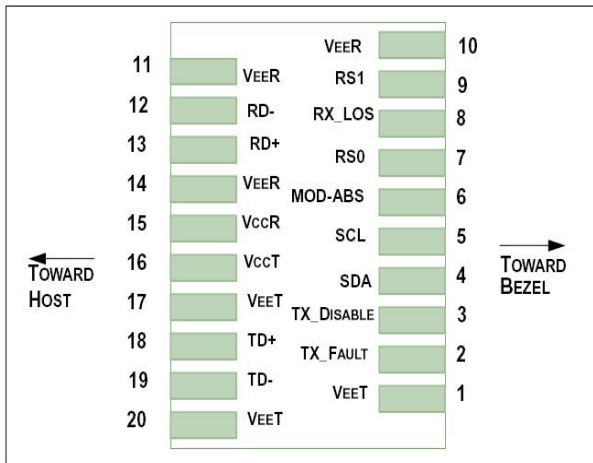
Optical Characteristics

| Parameter | Symbol | Min | Typ | Max | Unit | Ref. |
|------------------------------------|------------------------------|-----|-----------|-------|-------|------|
| Transmitter | | | | | | |
| Output Opt. Pwr | POUT | 0 | | 5 | dBm | 1 |
| Optical Wavelength | λ | | 1270/1330 | | nm | |
| Wavelength Temperature Dependence | | | 0.08 | 0.125 | nm/°C | |
| Spectral Width (-20dB) | σ | | | 1 | nm | |
| Optical Extinction Ratio | ER | 3.5 | | | dB | |
| Transmitter and Dispersion Penalty | TDP | | | 3.2 | dB | |
| Optical Rise/Fall Time | tr/ tf | | 0.1 | 0.26 | ns | |
| RIN | RIN | | | -128 | dB/Hz | |
| Output Eye Mask | Compliant with IEEE 0802.3ae | | | | | |
| Receiver | | | | | | |
| Rx Sensitivity | RSENS | | | -16.4 | dBm | 2 |
| Input Saturation Power (Overload) | Psat | -3 | | | dBm | |
| Wavelength Range | λ_c | | 1330/1270 | | nm | |
| LOS De -Assert | LOSD | | | -20 | dBm | |
| LOS Assert | LOSA | -30 | | | dBm | |
| LOS Hysteresis | | 0.5 | 1.0 | | dB | |

Note:

- 1) TD+/- are internally AC coupled with 100 Ω differential termination inside the module.
- 2) Tx Fault and Rx LOS are open collector outputs, which should be pulled up with 4.7k to 10k Ω resistors on the host board. Pullup voltage between 2.0V and Vcc+0.3V.
- 3) RD+/- outputs are internally AC coupled, and should be terminated with 100 Ω (differential) at the user SERDES.

Pin Assignment



Pin out of Connector Block on Host Board

| Pin | Symbol | Name/Description | Ref. |
|-----|--------------------|--|------|
| 1 | V _{EET} | Transmitter Ground (Common with Receiver Ground) | 1 |
| 2 | T _{FAULT} | Transmitter Fault. | 2 |
| 3 | T _{DIS} | Transmitter Disable. Laser output disabled on high or open. | 3 |
| 4 | SDA | 2-wire Serial Interface Data Line | 4 |
| 5 | SCL | 2-wire Serial Interface Clock Line | 4 |
| 6 | MOD_ABS | Module Absent. Grounded within the module | 4 |
| 7 | RS0 | Rate Select 0 | 5 |
| 8 | LOS | Loss of Signal indication. Logic 0 indicates normal operation. | 6 |
| 9 | RS1 | No connection required | 1 |
| 10 | V _{EER} | Receiver Ground (Common with Transmitter Ground) | 1 |
| 11 | V _{EER} | 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 | V _{EER} | Receiver Ground (Common with Transmitter Ground) | 1 |
| 15 | V _{CCR} | Receiver Power Supply | |
| 16 | V _{CCT} | Transmitter Power Supply | |
| 17 | V _{EET} | 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 | V _{EET} | Transmitter Ground (Common with Receiver Ground) | 1 |

Notes:

- Circuit ground is internally isolated from chassis ground.
- T_{FAULT} is an open collector/drain output, which should be pulled up with a 4.7k – 10k Ohms resistor on the host board if intended for use. Pull up voltage should be between 2.0V to V_{CC} + 0.3V. A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to <0.8V.

- 3) Laser output disabled on $T_{DIS} > 2.0V$ or open, enabled on $T_{DIS} < 0.8V$.
- 4) Should be pulled up with 4.7k Ω - 10k Ω host board to a voltage between 2.0V and 3.6V. MOD_ABS pulls line low to indicate module is plugged in.
- 5) Internally pulled down per SFF-8431 Rev 4.1.
- 6) LOS is open collector output. It should be pulled up with 4.7k Ω – 10k Ω on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

Electrical Interface Characteristics

| Parameter | Symbol | Min | Typ | Max | Unit | Ref. |
|--------------------------------|------------|---------|-----|----------|----------|------|
| Supply Voltage | Vcc | 3.14 | 3.3 | 3.46 | V | |
| Supply Current | Icc | | | 300 | mA | |
| Transmitter | | | | | | |
| Input differential impedance | Rin | | 100 | | Ω | 1 |
| Single ended data input swing | Vin,pp | 180 | | 700 | mV | |
| Transmit Disable Voltage | VD | Vcc-1.3 | | Vcc | V | |
| Transmit Enable Voltage | VEN | Vee | | Vee+ 0.8 | V | 2 |
| Transmit Disable Assert Time | | | | 10 | us | |
| Receiver | | | | | | |
| Differential data output swing | Vout,pp | 300 | | 850 | mV | 3 |
| Data output rise time | tr | 28 | | | ps | 4 |
| Data output fall time | tf | 28 | | | ps | 4 |
| LOS Fault | VLOS fault | Vcc-1.3 | | VccHOST | V | 5 |
| LOS Normal | VLOS norm | Vee | | Vee+0.8 | V | 5 |
| Power Supply Rejection | PSR | 100 | | | mVpp | 6 |

Notes:

- 1) Connected directly to TX data input pins. AC coupled thereafter.
- 2) Or open circuit.
- 3) Into 100 ohms differential termination.
- 4) 20 – 80 %.
- 5) Loss Of Signal is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

Receiver sensitivity is compliant with power supply sinusoidal modulation of 20 Hz to 1.5 MHz up to specified value applied through the recommended power supply filtering network.

SFP+ Module Control and Management

The SFP modules implement the 2-wire serial communication protocol as defined in the SFP MSA. The serial ID information of the SFP modules and Digital Diagnostic Monitor parameters can be accessed through the I2C interface at address A0h and A2h. The memory is mapped in Table

1. Detailed ID information(A0h) is listed in Table
2. And the DDM specification (A2h) is described in Table 3. For more details of the memory map and byte definitions please

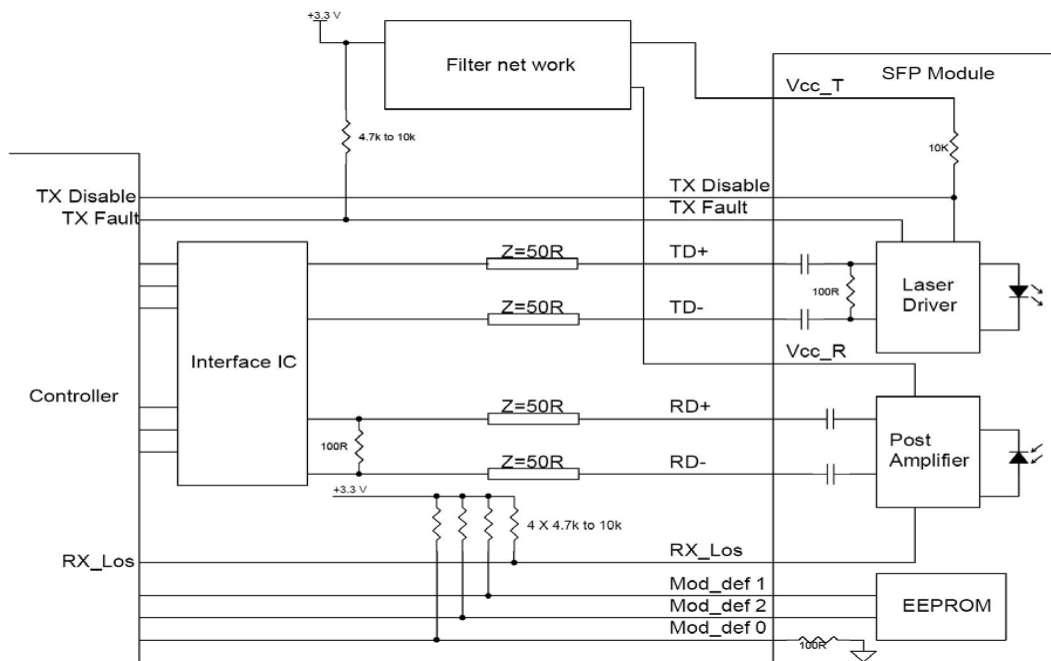
refer to the SFF-8472 (Rev 9.3, Aug. 2002), "Digital Diagnostic Monitoring Interface for Optical Transceivers".

| 2 wire address 1010000X (A0h) | | 2 wire address 1010001X (A2h) | |
|-------------------------------|---|-------------------------------|---|
| Address | Information | Address | Information |
| 0~95 | Serial ID Defined by SFP MSA (96 bytes) | 0~55 | Alarm and Warning Thresholds (56 bytes) |
| 96~127 | Vendor Specific (32 bytes) | 56~95 | Calibration Constants (40 bytes) |
| 128~255 | Reserved, SFF8079 (128 bytes) | 96~119 | Real Time Diagnostic Interface (24 bytes) |
| | | 120~127 | Vendor Specific (8 bytes) |
| | | 128~247 | User Writable EEPROM (120 bytes) |
| | | 248~255 | Vendor Specific (8 bytes) |

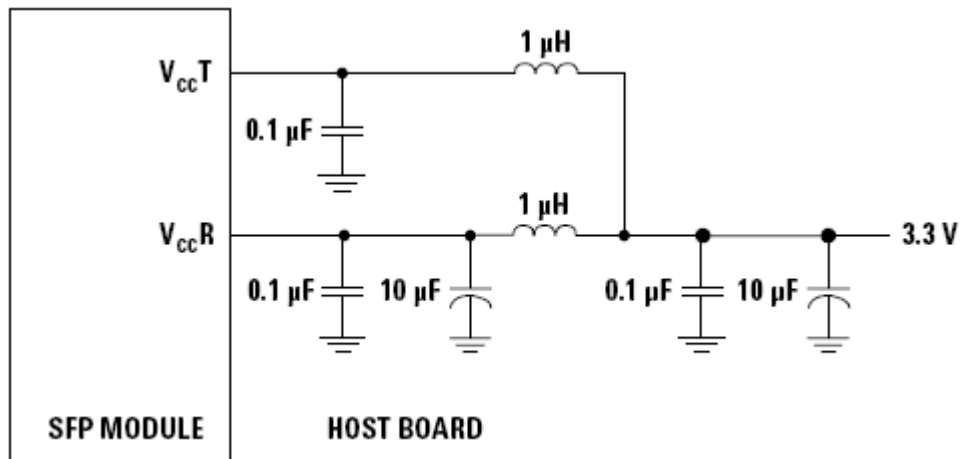
Table 2- DDM Specification

| Parameter | Range | Accuracy | Calibration |
|--------------|-------------|----------|-------------|
| Temperature | -10 ~ +80°C | ±3°C | Internal |
| Voltage | 3.0 ~ 3.6V | ±3% | Internal |
| Bias Current | 0 ~ 85mA | ±10% | Internal |
| TX Power | -5 ~ 3dBm | ±2dB | Internal |
| RX Power | -15 ~ 0dBm | ±2dB | Internal |

Typical Interface Circuit

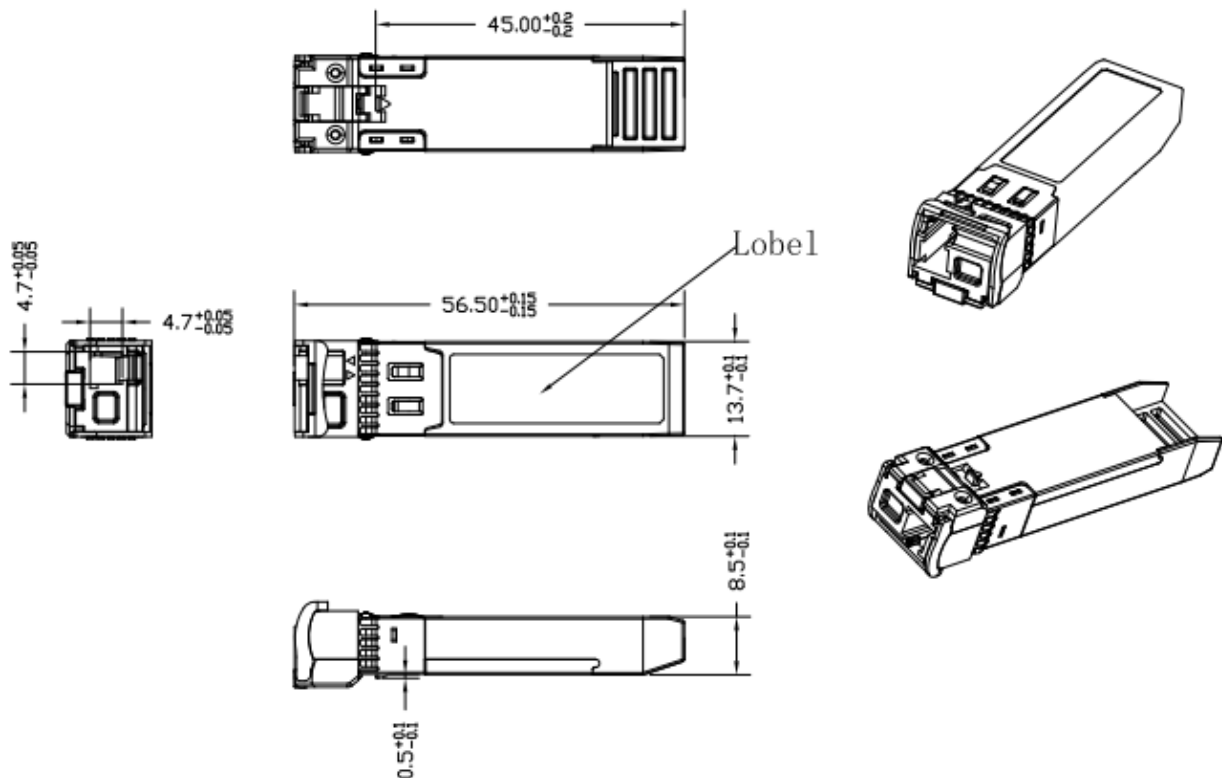


Digital Diagnostic Functions



Note: Inductors with DC resistance of less than 1Ω should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply filtering network is used, hot plugging of the SFP transceiver module will result in an inrush current of no more than 30 mA greater than the steady state value.

Package Dimensions



General Operating Characteristics

| Parameter | | Symbol | Min | Typ | Max | Unit | Ref. |
|----------------------------|-------------|--------|------|---------|-----|------|------|
| Data Rate | 10G Base-LR | | | 10.3125 | | Gb/s | |
| | 10G Base-LW | | | 9.953 | | | |
| Supply Voltage | | Vcc | 3.13 | 3.3 | 3.5 | v | |
| Supply Current | | Icc | | | 280 | mA | |
| Operating case temperature | | Tc | 0 | | 70 | °C | |

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 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

Quality Assurance

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



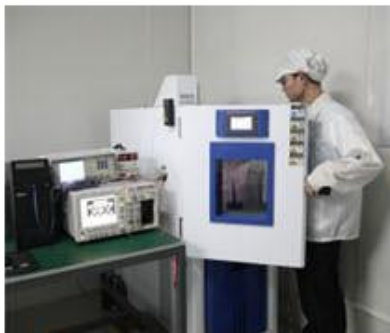
**Standardized
Production Line**



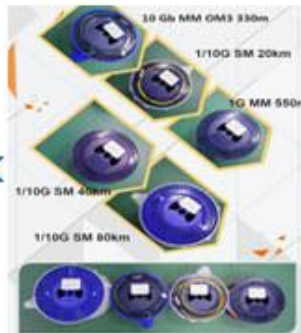
**Professional
Welding**



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.



Company: ETU-Link Technology Co., LTD

Address: 4th Floor, C Building, JinBoLong Industrial Park, QingQuan Road, LongHua District, Shenzhen city, GuangDong

Tel: +86-755 2328 4603

Addresses and phone number also have been listed at www.etulinktechnology.com.

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