**SFP Series**

**ETU-LINK**
Optical Communication System

# SFP

## ESDxx24-3LED80
### 2.67Gbps DWDM 80KM SFP Transceiver Reach

➢ Wavelength selectable to C-band ITU-T grid wavelengths
➢ Suitable for use in 100GHz channel spacing DWDM systems
➢ DWDM SFP MSA Compliant
➢ Dual data-rate of 2.67Gbps/1.25Gbps/1.063Gbps operation
➢ OC-48 80KM range
➢ Up to 2.67Gb/s data rate
➢ Cold Start up Wavelength Compliance
➢ Low Power Dissipation <1.3W Maximum
➢ Operating Case Temperature: -10ºC to 70ºC
➢ Diagnostic Performance Monitoring of module temperature, supply Voltages, laser bias current, transmit optical power, receive optical power, Laser temperature and TEC current
➢ Extended link budget with APD receiver technology
➢ RoHS compliant and lead free

## Applications

➢ SFP Transceivers for DWDM SONET/ SDH
➢ Ethernet IEEE 802.3ae
➢ Fiber Channel

## Description

ETU-Link DWDM SFP Transceiver exhibits excellent wavelength stability, supporting operation at 100 GHz channel, cost effective module. It is designed for DWDM SONET/ SDH, Gigabit Ethernet and Fiber-Channel applications.

The transceiver consists of two sections: The transmitter section incorporates a cooled DFB laser. And the receiver section consists of an APD photodiode integrated with a TIA. All modules satisfy class I laser safety requirements. ETU-Link DWDM SFP transceiver provides an enhanced monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage, laser temperature and TEC current.

## Pin Descriptions

| Pin | Symbol | Name/Description | NOTE |
|-----|--------|-----------------|------|
| 1 | VEET | Transmitter Ground   (Common with Receiver Ground) | 1 |
| 2 | TFAULT | Transmitter Fault. | |
| 3 | TDIS | Transmitter Disable. Laser output disabled on high or open. | 2 |
| 4 | MOD_DEF(2) | Module Definition 2. Data line for Serial ID. | 3 |
| 5 | MOD_DEF(1) | Module Definition 1. Clock line for Serial ID. | 3 |
| 6 | MOD_DEF(0) | Module Definition 0. Grounded within the module. | 3 |
| 7 | Rate Select | No connection required | 4 |
| 8 | LOS | Loss of Signal indication.   Logic 0 indicates normal operation. | 5 |
| 9 | VEER | Receiver Ground   (Common with Transmitter Ground) | 1 |
| 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 | VEET | 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 | **VEET** | **Transmitter Ground   (Common with Receiver Ground)** | 1 |

**Notes:**

1) Circuit ground is internally isolated from chassis ground.

2) Laser output disabled on $T_{DIS} > 2.0V$ or open, enabled on $T_{DIS} < 0.8V$.

3) Should be pulled up with 4.7k - 10kohms on host board to a voltage between 2.0V and 3.6V.MOD_DEF (0) pulls line low to indicate module is plugged in.

4) This is an optional input used to control the receiver bandwidth for compatibility with multiple data rates (most likely Fiber Channel 1x and 2x Rates).If implemented, the input will be internally pulled down with > 30kΩ resistor. The input states are:

Low (0 – 0.8V):        Reduced Bandwidth

(>0.8, < 2.0V):        Undefined

High (2.0 – 3.465V):    Full Bandwidth

Open:                Reduced Bandwidth

5) LOS is open collector output should be pulled up with 4.7k - 10kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.
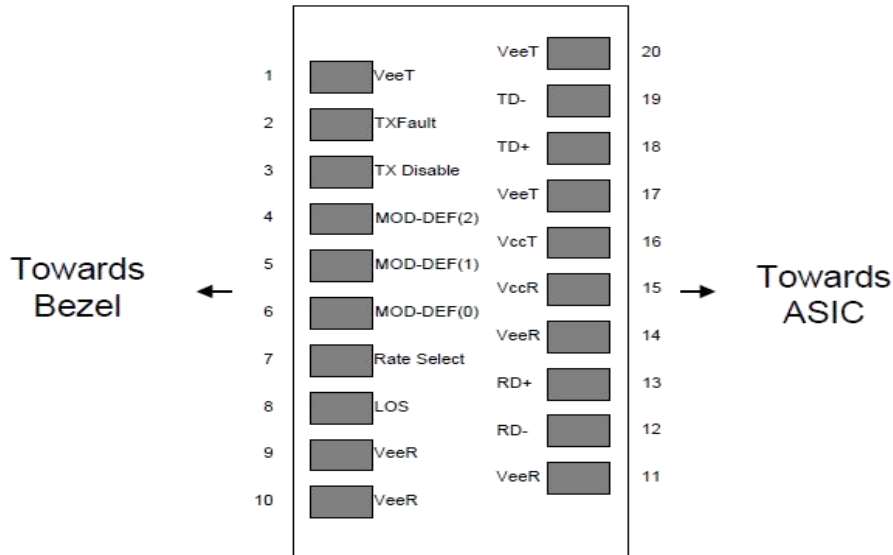


**Figure2. Pin out of Connector Block on Host Board**

## Absolute Maximum Ratings

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Storage Temperature | Ts | -40 | | 85 | ºC | |
| Relative Humidity | RH | 5 | | 95 | % | |
| Power Supply Voltage | VCC | -0.5 | | 4 | V | |
| Signal Input Voltage | | -0.3 | | Vcc+0.3 | V | |
| Receiver Damage Threshold | | +5 | | | dBm | |

## Recommended Operating Conditions

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Case Operating Temperature | Tcase | -10 | | 70 | ºC | |
| Power Supply Voltage | VCC | 3.13 | 3.3 | 3.47 | V | |
| Power Supply Current | ICC | | | 500 | mA | |
| Power Supply Noise Rejection | | | | 100 | mVp-p | 100Hz to 1MHz |
| Data Rate | | | 2500/2500 | 2670 | Mbps | TX Rate/RX Rate |
| Transmission Distance | | | | 80 | KM | |
| Coupled Fiber | | Single mode fiber | | 9/125um SMF | | |

## Specification of Transmitter

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Center Wavelength Spacing | | | 100 | | GHz | |
| Center Wavelength | λ | X-100 | X | X+100 | pm | Note (1) |
| Average Output Power | POUT | 0 | | 4 | dBm | |
| Extinction Ratio | ER | 9 | | | dB | |
| Side Mode Suppression Ratio | SMSR | 30 | | | dB | |
| Spectrum Bandwidth(-20dB) | σ | | | 0.3 | nm | |
| Transmitter OFF Output Power | POff | | | -45 | dBm | |
| Differential Line Input Impedance | RIN | 90 | 100 | 110 | Ohm | |
| Output Eye Mask | Compliant with IEEE 802.3 Z | | | | | Note (2) |

**Note:**

6) X = specified ITU center wavelength. (To See "Ordering Information")

7) Transmitter eye mask definition.
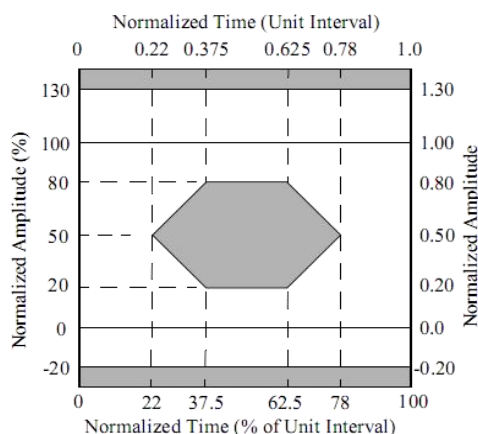


## Specification of Receiver

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Input Optical Wavelength | λIN | 1270 | | 1610 | nm | APD |
| Receiver Sensitivity | PIN | | | -28 | dBm | Note (1) |
| Input Saturation Power (Overload) | PSAT | -9 | | | dBm | |
| Los Of Signal Assert | PA | -40 | | | dBm | |
| Los Of Signal De-assert | PD | | | -30 | dBm | Note (2) |
| LOS Hysteresis | PA-PD | 0.5 | 2 | 6 | dB | |

8)  Measured with Light source 1550nm, ER=9dB; BER =<10^-12 @PRBS=2^23-1 NRZ

9)  When LOS de-asserted, the RX data+/- output is High-level (fixed)

## Electrical Interface Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| **Transmitter** | | | | | | |
| Total Supply Current | ICC | | | A | mA | Note (1) |
| Transmitter Disable Input-High | VDISH | 2 | | Vcc+0.3 | V | |
| Transmitter Disable Input-Low | VDISL | 0 | | 0.8 | V | |
| Transmitter Fault Input-High | VTxFH | 2 | | Vcc+0.3 | V | |
| Transmitter Fault Input-Low | VTxFL | 0 | | 0.8 | V | |
| **Receiver** | | | | | | |
| Total Supply Current | ICC | | | B | mA | Note (1) |
| LOSS Output Voltage-High | VLOSH | 2 | | Vcc+0.3 | V | LVTTL |
| LOSS Output Voltage-Low | VLOSL | 0 | | 0.8 | V | |

**Note:**

10)  A (TX) + B (RX) = 500mA       (Not include termination circuit)

## Digital Diagnostic Functions

ETU-LINK ESDXX24-3LED80 transceivers support the 2-wire serial communication protocol as defined in the SFP MSA. It is very closely related to the E2PROM defined in the GBIC standard, with the same electrical specifications.

The standard SFP serial ID provides access to identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information.

Additionally, ETU-LINK SFP transceivers provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage .It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

The SFP MSA defines a 256-byte memory map in E2PROM that is accessible over a 2-wire serial interface at the 8 bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8 bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged. The interface is identical to, and is thus fully backward compatible with both the GBIC Specification and the SFP Multi Source Agreement.

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through a 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL, Mod Def 1) is generated by the host. The positive edge clocks data into the SFP transceiver into those segments of the E2PROM that are not write-protected. The negative edge clocks data from the SFP transceiver.   The serial data signal (SDA, Mod Def 2) 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.

Digital diagnostics for the ESDXX24-3LED80 are internally calibrated by default.。

## Host - Transceiver Interface Block Diagram
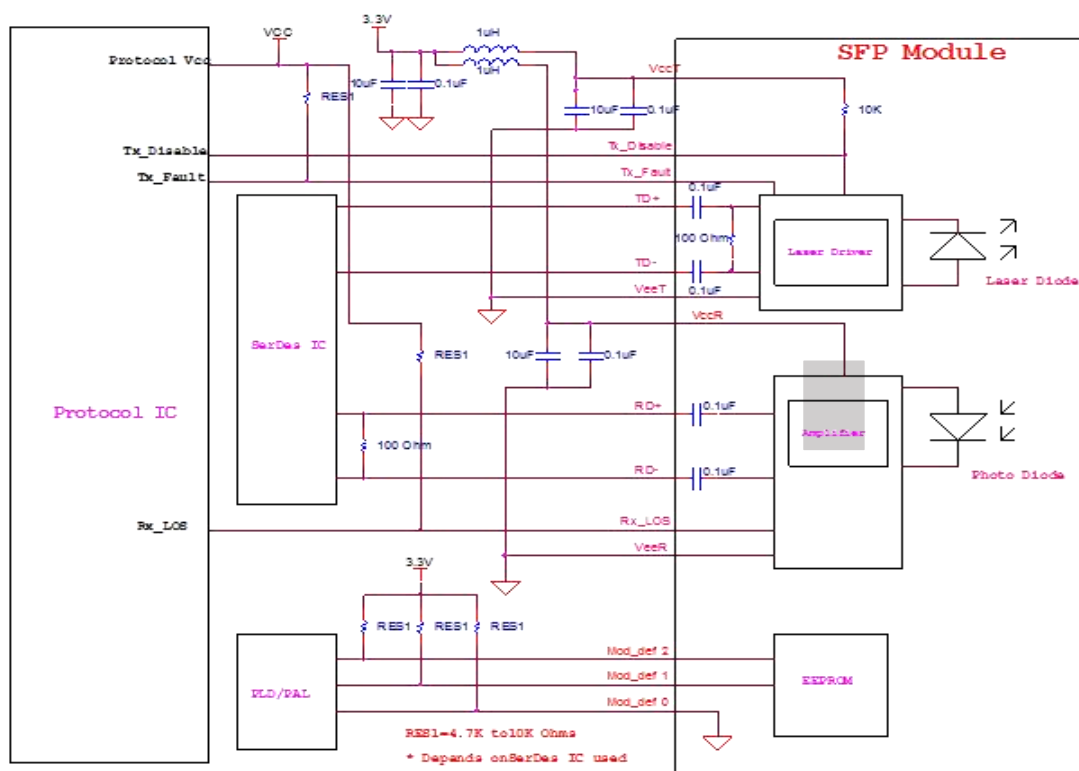
## Outline Dimensions

Units in mm
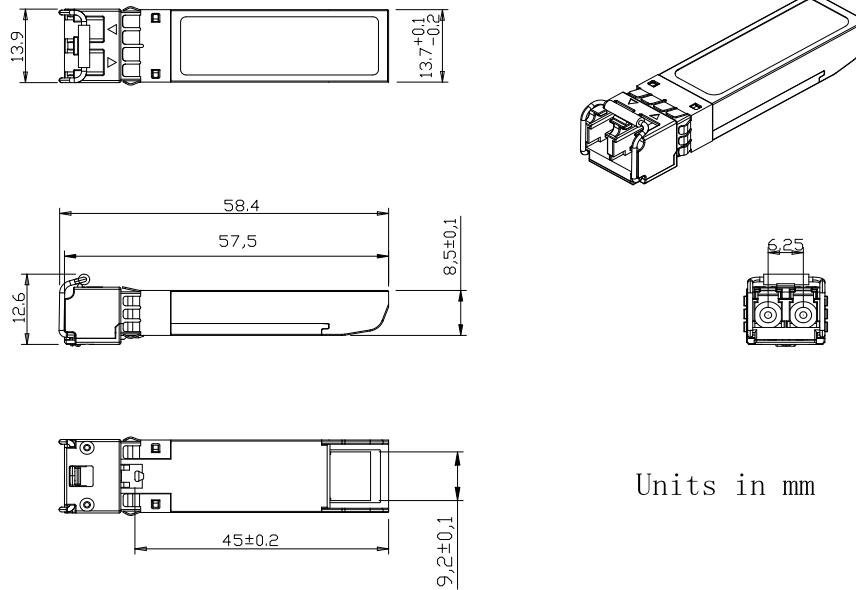
## Regulatory Compliance

| 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 |

## Ordering Information

| Code | Frequency (THz) | Center Wavelength(nm) | Code | Frequency (THz) | Center Wavelength(nm) |
|---|---|---|---|---|---|
| C17 | 191.7 | 1563.86 | C40 | 194.0 | 1545.32 |
| C18 | 191.8 | 1563.05 | C41 | 194.1 | 1544.53 |
| C19 | 191.9 | 1562.23 | C42 | 194.2 | 1543.73 |
| C20 | 192.0 | 1561.42 | C43 | 194.3 | 1542.94 |
| C21 | 192.1 | 1560.61 | C44 | 194.4 | 1542.14 |
| C22 | 192.2 | 1559.79 | C45 | 194.5 | 1541.35 |
| C23 | 192.3 | 1558.98 | C46 | 194.6 | 1540.56 |
| C24 | 192.4 | 1558.17 | C47 | 194.7 | 1539.77 |
| C25 | 192.5 | 1557.36 | C48 | 194.8 | 1538.98 |
| C26 | 192.6 | 1556.55 | C49 | 194.9 | 1538.19 |
| C27 | 192.7 | 1555.75 | C50 | 195.0 | 1537.40 |
| C28 | 192.8 | 1554.94 | C51 | 195.1 | 1536.61 |
| C29 | 192.9 | 1554.13 | C52 | 195.2 | 1535.82 |
| C30 | 193.0 | 1553.33 | C53 | 195.3 | 1535.04 |
| C31 | 193.1 | 1552.52 | C54 | 195.4 | 1534.25 |
| C32 | 193.2 | 1551.72 | C55 | 195.5 | 1533.47 |
| C33 | 193.3 | 1550.92 | C56 | 195.6 | 1532.68 |
| C34 | 193.4 | 1550.12 | C57 | 195.7 | 1531.90 |
| C35 | 193.5 | 1549.32 | C58 | 195.8 | 1531.12 |
| C36 | 193.6 | 1548.51 | C59 | 195.9 | 1530.33 |
| C37 | 193.7 | 1547.72 | C60 | 196.0 | 1529.55 |
| C38 | 193.8 | 1546.92 | C61 | 196.1 | 1528.77 |
| C39 | 193.9 | 1546.12 | | | |

## 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.
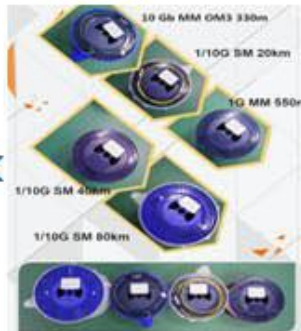
**Standardized Production Line**

**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.



Inner Tray

White

10pcs/Tray

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.