


**ETU-LINK**

Optica Communication System

**SFP+ Series**

## SFP+

### ES8561-3LCD03

#### 6.25Gbps SFP+ Optical Transceiver, 300M Reach

- Supports up to 6.25Gbps bit rates
- Hot-pluggable SFP+ footprint
- 850nm VCSEL laser and PIN photodiode, Up to 300m for OM3-MMF transmission
- Compliant with SFP+ MSA and SFF-8472 with duplex LC receptacle
- Compatible with RoHS
- Single +3.3V power supply
- Real Time Digital Diagnostic Monitoring
- Operating case temperature:
  - Commercial: 0 to +70°C
  - Industrial: -40 to +85°



## Applications

- 6.144Gbps Optical systems
- LTE systems
- Other Optical links

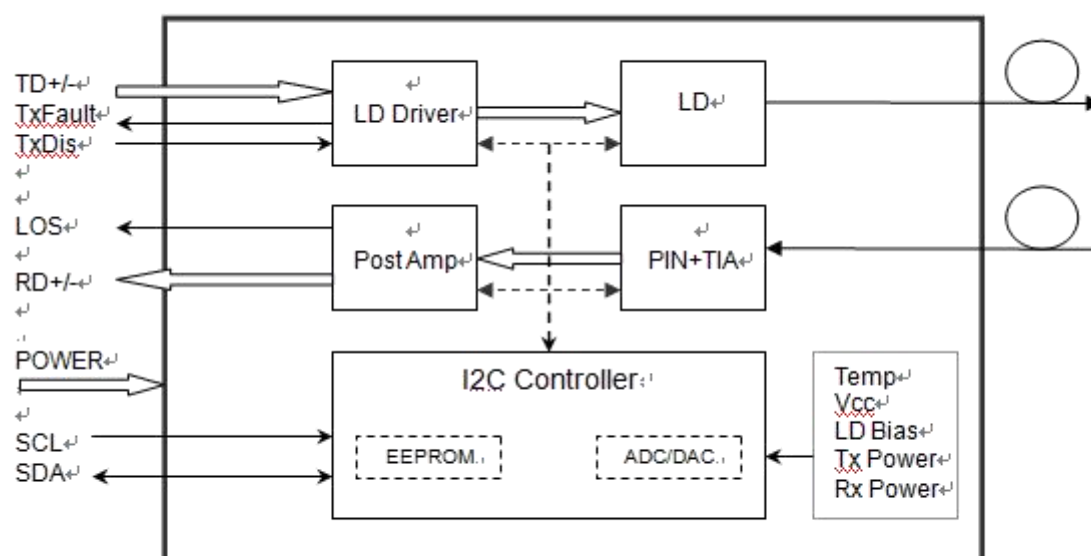
## Description

The SFP+ transceivers are high performance, cost effective modules supporting data rate of 6.1Gbps.

The transceiver consists of three sections: a VCSEL laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier (TIA) and MCU control unit. All modules satisfy class I laser safety requirements.

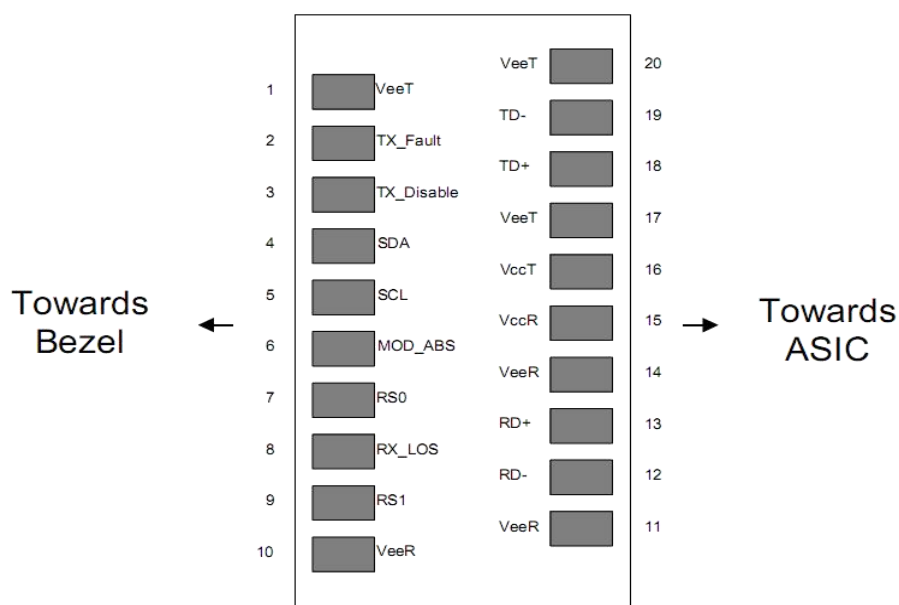
The transceivers are compatible with SFP Multi-Source Agreement and SFF-8472 digital diagnostics functions.

## Module Block Diagram



### Transceiver functional diagram

## Pin Definitions



### Pinout of Connector Block on Host Board

## Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V <sub>cc</sub>	-0.5	4.5	V
Storage Temperature	T <sub>s</sub>	-40	+85	°C
Operating Humidity	-	5	85	%

## Optical Characteristics

Parameter		Symbol	Min	Typical	Max	Unit	Notes
Transmitter							
Centre Wavelength		$\lambda_C$	840	850	860	nm	
Spectral Width (RMS)		$\Delta\lambda$			0.65	nm	
Side-Mode Suppression Ratio		SMSR	-	-	-	dB	
Average Output Power		P <sub>out</sub>	-6.0		-0.5	dBm	1
Extinction Ratio		ER	3.0			dB	
Data Input Swing Differential		V <sub>IN</sub>	180		950	mV	2
Input Differential Impedance		Z <sub>IN</sub>	90	100	110	$\Omega$	
TX Disable	Disable		2.0		V <sub>cc</sub>	V	
	Enable		0		0.8	V	
TX Fault	Fault		2.0		V <sub>cc</sub>	V	
	Normal		0		0.8	V	
Receiver							
Centre Wavelength		$\lambda_C$	840	850	860	nm	
Receiver Sensitivity					-10.5	dBm	3
Receiver Overload			0.5			dBm	3
LOS De-Assert		LOS <sub>D</sub>			-12	dBm	
LOS Assert		LOS <sub>A</sub>	-22			dBm	
LOS Hysteresis			0.5		4	dB	
Data Output Swing Differential		V <sub>out</sub>	500	700	900	mV	4
LOS	High		2.0		V <sub>cc</sub>	V	
	Low				0.8	V	

### Notes:

1. The optical power is launched into MMF.
2. PECL input, internally AC-coupled and terminated.

3. Measured with a PRBS 2<sup>31</sup>-1 test pattern @6144Mbps, BER  $\leq 1 \times 10^{-12}$ .

4. Internally AC-coupled.

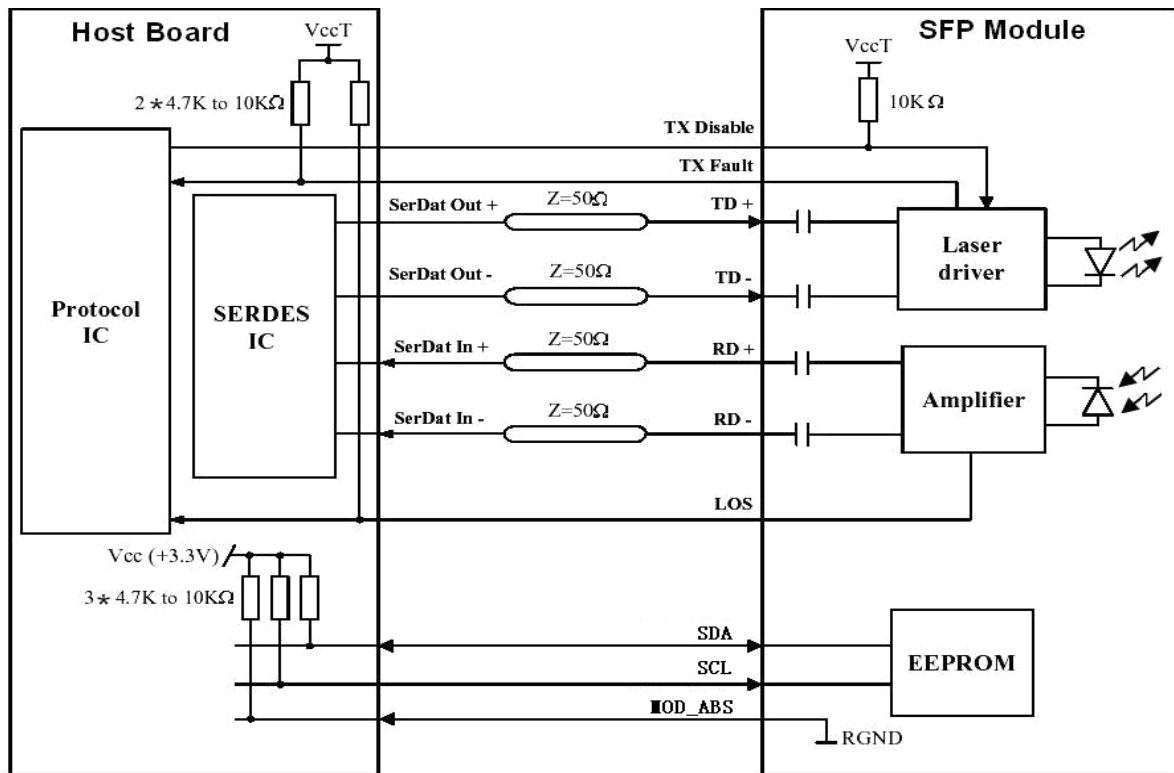
## Pin Descriptions

Pin	Signal Name	Description	Plug Seq.	Notes
1	V <sub>EET</sub>	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note1
3	TXDISABLE	Transmitter Disable	3	Note2
4	SDA	SDA Serial Data Signal	3	
5	SCL	SCL Serial Clock Signal	3	
6	MOD_ABS	Module Absent. Grounded within the module	3	
7	RS0	Not Connected	3	
8	LOS	Loss of Signal	3	Note 3
9	RS1	Not Connected	3	
10	V <sub>EER</sub>	Receiver ground	1	
11	V <sub>EER</sub>	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 4
13	RD+	Received Data Out	3	Note 4
14	V <sub>EER</sub>	Receiver ground	1	
15	V <sub>CCR</sub>	Receiver Power Supply	2	
16	V <sub>CCT</sub>	Transmitter Power Supply	2	
17	V <sub>EET</sub>	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 5
19	TD-	Inv. Transmit Data In	3	Note 5
20	V <sub>EET</sub>	Transmitter Ground	1	

### Notes:

- Circuit ground is internally isolated from chassis ground.
- T<sub>FAULT</sub> 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<sub>cc</sub> + 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.
- Laser output disabled on T<sub>DIS</sub> > 2.0V or open, enabled on T<sub>DIS</sub> < 0.8V.
- 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.
- LOS is open collector output. Should be pulled up with 4.7k – 10 kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

## Typical Interface Circuit



## Electrical Interface Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
<b>Transmitter</b>						
Centre Wavelength	$\lambda_C$	840	850	860	nm	
Spectral Width (RMS)	$\Delta\lambda$			0.65	nm	
Side-Mode Suppression Ratio	SMSR	-	-	-	dB	
Average Output Power	$P_{out}$	-6.0		-0.5	dBm	1
Extinction Ratio	ER	3.0			dB	
Data Input Swing Differential	$V_{IN}$	180		950	mV	2
Input Differential Impedance	$Z_{IN}$	90	100	110	$\Omega$	
TX Disable	Disable	2.0		$V_{cc}$	V	
	Enable	0		0.8	V	
TX Fault	Fault	2.0		$V_{cc}$	V	
	Normal	0		0.8	V	
<b>Receiver</b>						
Centre Wavelength	$\lambda_C$	840	850	860	nm	

Receiver Sensitivity				-10.5	dBm	3
Receiver Overload		0.5			dBm	3
LOS De-Assert	LOS <sub>D</sub>			-12	dBm	
LOS Assert	LOS <sub>A</sub>	-22			dBm	
LOS Hysteresis		0.5		4	dB	
Data Output Swing Differential	V <sub>out</sub>	500	700	900	mV	4
LOS	High	2.0		V <sub>cc</sub>	V	
	Low			0.8	V	

**Notes:**

1. The optical power is launched into MMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS 2<sup>31</sup>-1 test pattern @6144Mbps, BER ≤1×10<sup>-12</sup>.
4. Internally AC-coupled.

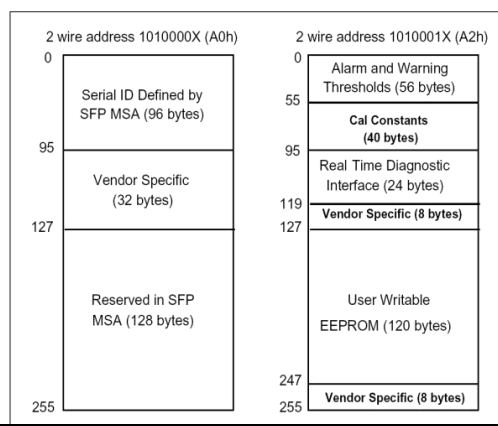
## Digital Diagnostic Functions

ETU-LINK ES8561-3LCD03 transceivers support the 2-wire serial communication protocol as defined in the SFP MSA1. It is very closely related to the EEPROM defined in the GBIC standard, with the same electrical specifications.

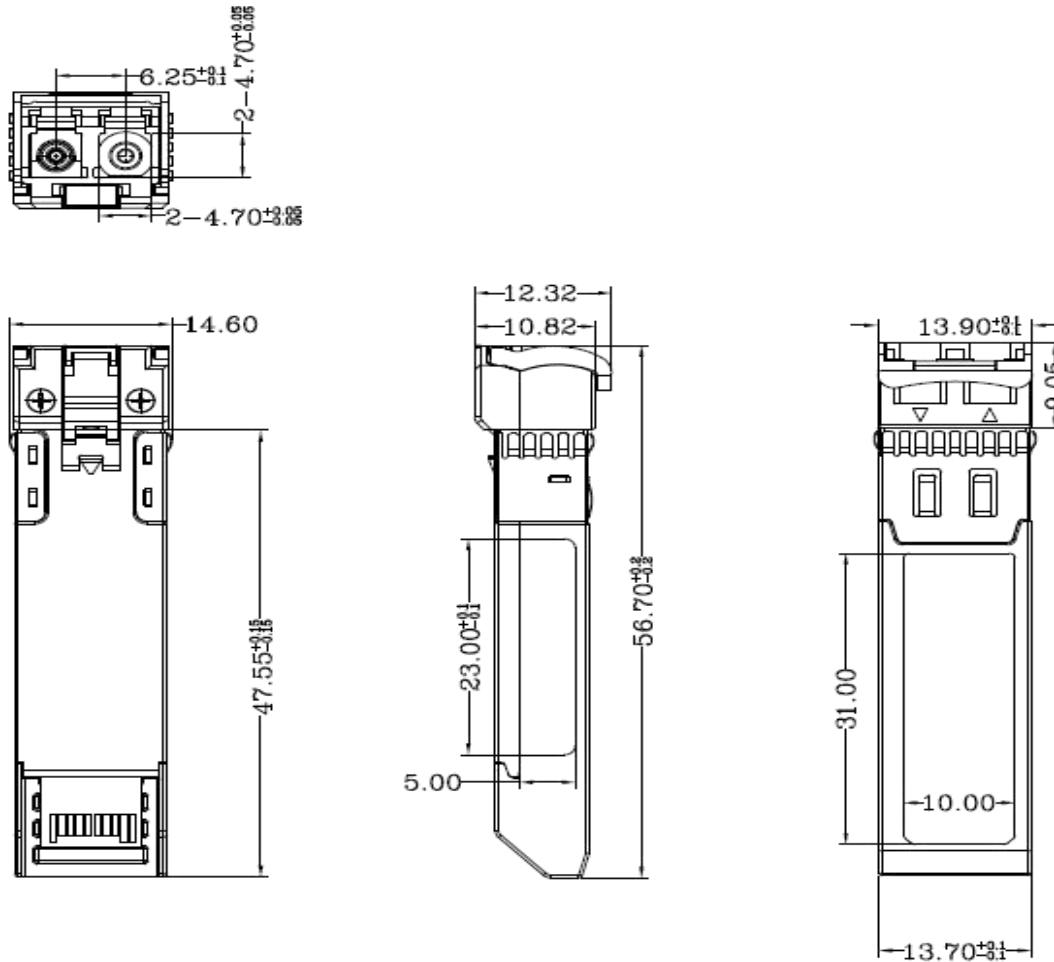
The standard SFP serial ID provides access to identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information. Additionally, ETU-LINK SFP transceivers provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, and 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 EEPROM 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 ESP8561-3LCD03 are internally calibrated by default.



## Mechanical Specifications



## 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**



**Alcatel 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**



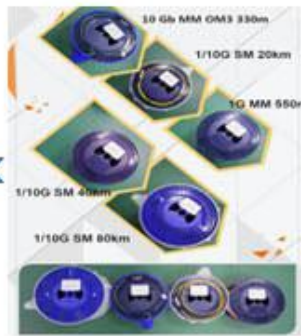
**Professional  
Welding**



**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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Addresses and phone number also have been listed at [www.etulinktechnology.com](http://www.etulinktechnology.com).

Please e-mail us at [sales@etulinktechnology.com](mailto:sales@etulinktechnology.com) or call us for assistance.