



## SFP

### ESB5324-3LCD3

#### 2.488Gbps SFP Bi-Directional Transceiver, 3KM Reach Tx1550nm/Rx1310nm

- Dual data-rate of 2.488Gbps/2.125Gbps operation
- 1550nm DFB laser and PIN photodetector for 3KM transmission
- Compliant with SFP MSA and SFF-8472 with simplex LC receptacle
- Digital Diagnostic Monitoring:  
Internal Calibration or External Calibration
- Compatible with SONET OC-48 system
- Compatible with RoHS
- +3.3V single power supply
- Operating case temperature range of  
0°C to +70°C (Commercial)  
-40°C to +85°C (Industrial)



## Applications

- SDH STM-16 and SONET OC-48 system
- Fiber Channel
- Switch to Switch interface
- Switched backplane applications
- Router/Server interface
- Other optical transmission systems

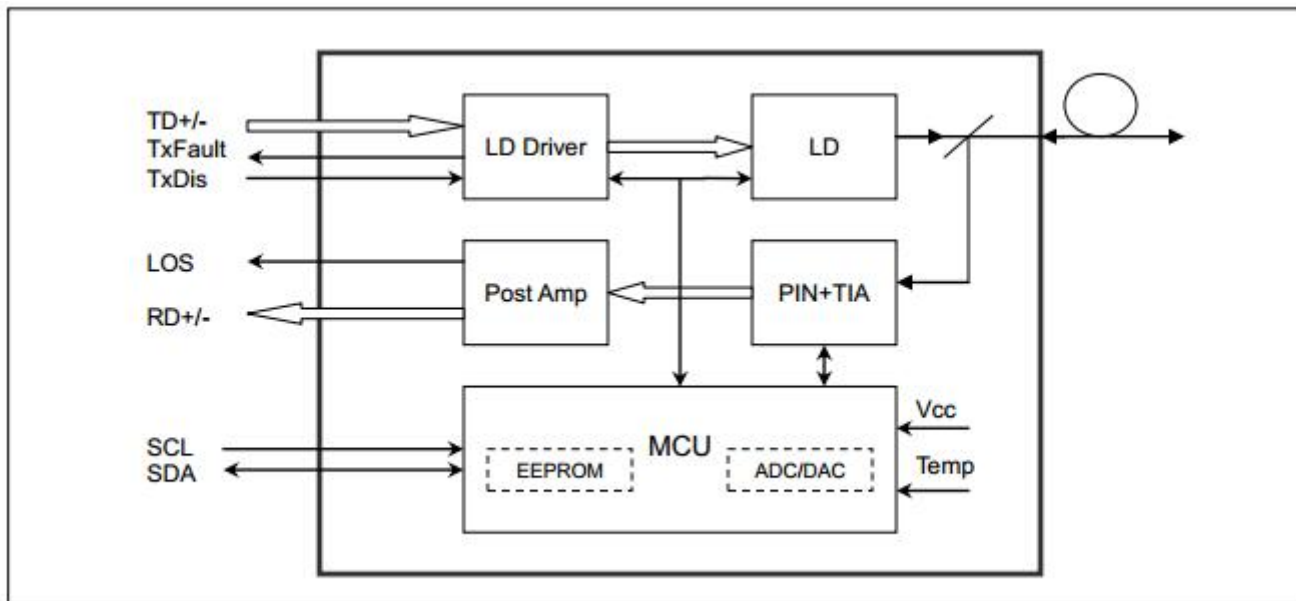
## Description

The SFP-BIDI transceivers are high performance, cost effective modules supporting dual data-rate of 2.488Gbps/2.125Gbps and 3KM transmission distance with SMF.

The transceiver consists of three sections: a DFB 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 (MSA) and SFF-8472. For further information, please refer to SFP MSA.

## Module Block 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	TOP	0		70	°C	

## Electrical Input / Output Characteristics

### Transmitter

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Diff. input voltage swing		120		820	mVpp	1
Tx Disable input	H	VIH	2.0	Vcc+0.3	V	
	L	VIL	0	0.8		
Tx Fault output	H	VOH	2.0	Vcc+0.3	V	2
	L	VOL	0	0.8		
Input Diff. Impedance	Zin		100		Ω	

**Receiver**

Parameter		Symbol	Min.	Typ	Max.	Unit	Note
Diff. output voltage swing			340	650	800	mVpp	3
Rx LOS Output	H	VOH	2.0		V <sub>cc</sub> +0.3	V	2
	L	VOL	0		0.8		

**Notes:**

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

## Optical Characteristics

**Transmitter**

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Operating Wavelength	λ <sub>C</sub>	1530	1550	1570	nm	
Ave. output power (Enabled)	P <sub>o</sub>	-5		0	dBm	1
Extinction Ratio	ER	10			dB	1
RMS spectral width	Δλ			4	nm	
Rise/Fall time (20%~80%)	Tr/Tf			0.26	ps	2
Output Eye Mask	Telcordia GR-253-CORE and ITU-T G.957 compatible					

**Notes:**

1. Measure at 2<sup>23</sup>-1 NRZ PRBS pattern
2. Transmitter eye mask definition

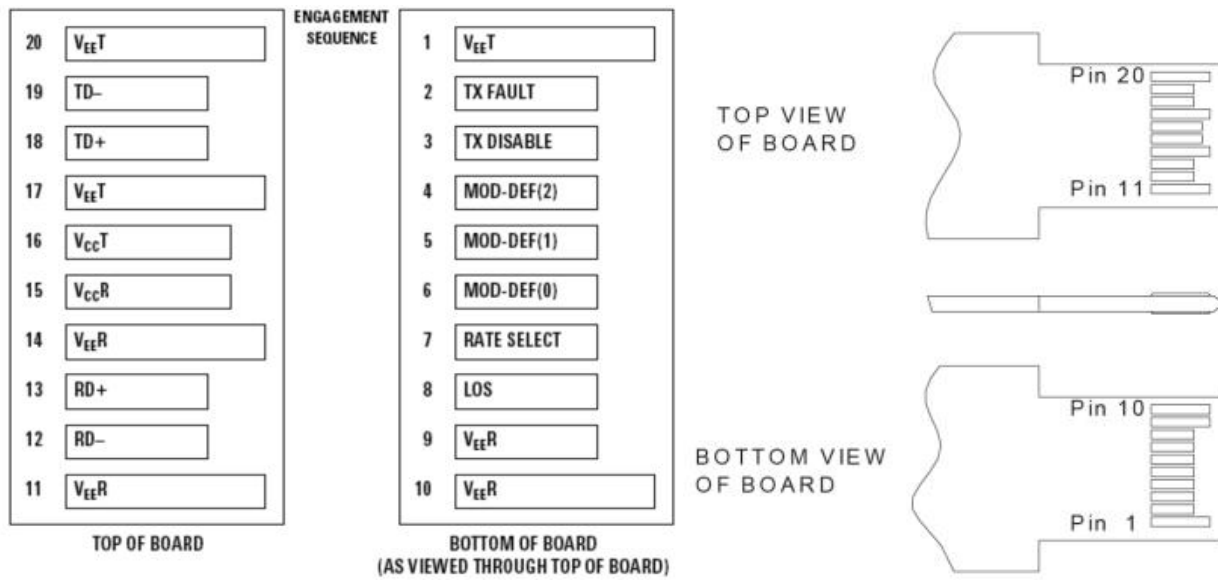
**Receiver**

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Operating Wavelength		1260		1360	nm	
Sensitivity	P <sub>sen</sub>			-24	dBm	1
Min. overload	P <sub>imax</sub>	-3			dBm	
LOS Assert	P <sub>a</sub>	-40			dBm	
LOS De-assert	P <sub>d</sub>			-26	dBm	2
LOS Hysteresis	P <sub>d</sub> -P <sub>a</sub>	0.5		6	dB	

**Notes:**

1. Measured with Light source 1550nm(1310nm), ER=10dB; BER =<10<sup>-12</sup>@PRBS=2<sup>23</sup>-1 NRZ.
2. When LOS de-asserted, the RX data+/- output is signal output.





## Electrical Interface Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Supply Voltage	$V_{cc}$	3.15	3.3	3.6	V	
Supply Current	$I_{cc}$		185	280	mA	
<b>Transmitter</b>						
Input differential impedance	$R_{in}$		100		$\Omega$	1
Single ended data input swing	$V_{in,pp}$	250		1200	mV	
Transmit Disable Voltage	VD	$V_{cc}-1.3$		$V_{cc}$	V	
Transmit Enable Voltage	VEN	$V_{ee}$		$V_{ee}+0.8$	V	2
Transmit Disable Assert Time				10	us	
<b>Receiver</b>						
Single ended data output swing	$V_{out,pp}$	250		800	mV	3
Data output rise time	$t_r$		100	175	ps	4
Data output fall time	$t_f$		100	175	ps	4
LOS Fault	VLOS fault	$V_{cc}-0.5$		$V_{cc}HOST$	V	5
LOS Normal	VLOS norm	$V_{ee}$		$V_{ee}+0.5$	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.
6. 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.

## Digital Diagnostic Functions

ETU-LINK'S ESB5324-3LCD3 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.

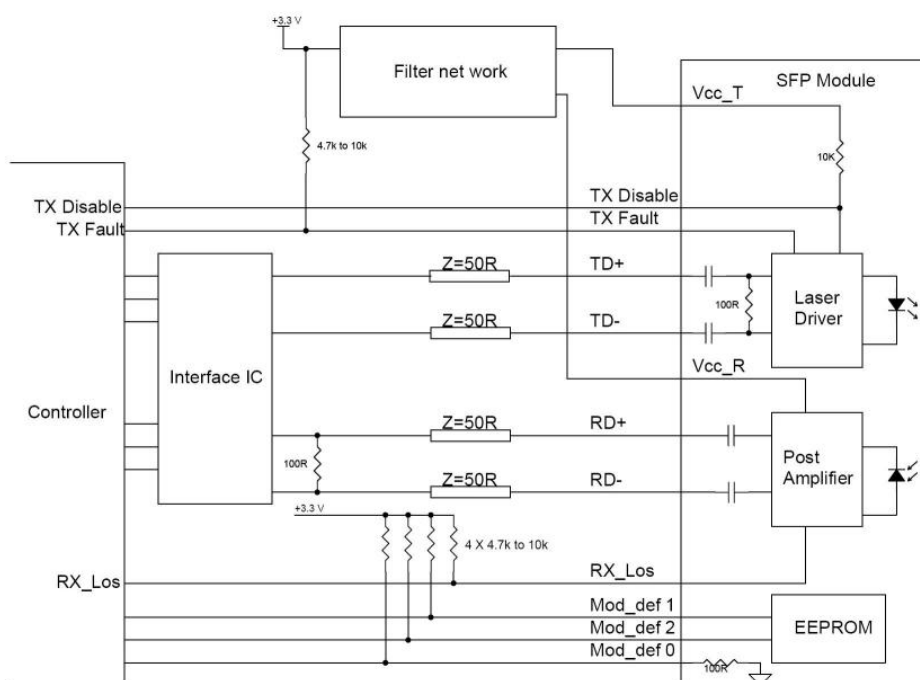
The standard SFP serial ID provides access to identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information.

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.

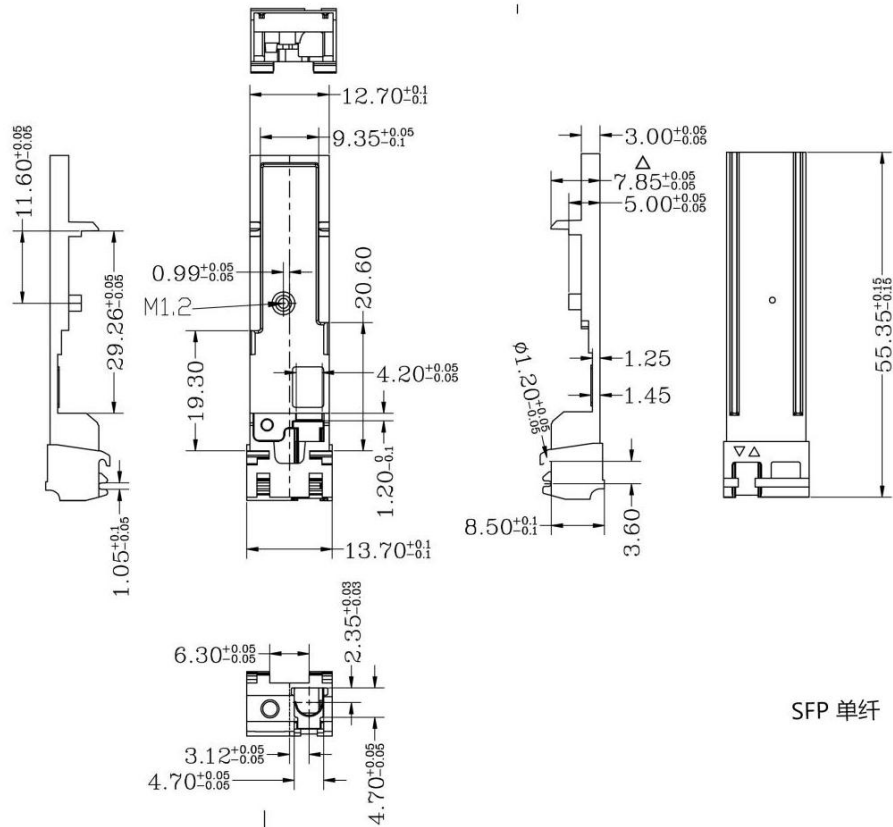
The SFP MSA defines a 256-byte memory map in E2PROM that is accessible over a 2-wire serial interface at the 8bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8 bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged. The interface 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 ESB5324-3LCD3 are Internally calibrated by default.

## Typical Interface Circuit



## 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 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 S5700 Series, 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**



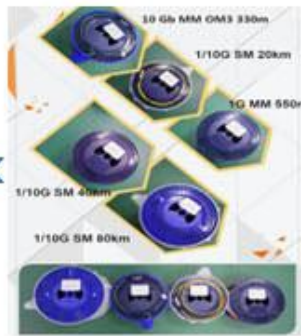
**Professional  
Welding**



**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.