



ESB5412-3LCD80

1.25Gbps SFP Bi-Directional Transceiver, 80KM Reach

Tx1550nm/Rx1490nm

Features

- Dual data-rate of 1.25Gbps/1.063Gbps operation
- 1550nm DFB laser and PIN photodetector for 80KM transmission
- Compliant with SFP MSA and SFF-8472 with simplex LC receptacle
- Digital Diagnostic Monitoring:
Internal Calibration or External Calibration
- Compatible with SONET OC-24-LR-1
- Compatible with RoHS
- +3.3V single power supply
- Operating case temperature range:
0 °C to +70 °C (Commercial)
-40 °C to +85 °C (Industrial)

Applications

- Gigabit Ethernet
- Fiber Channel
- Switch to Switch interface
- Switched backplane applications
- Router/Server interface
- Other optical transmission systems

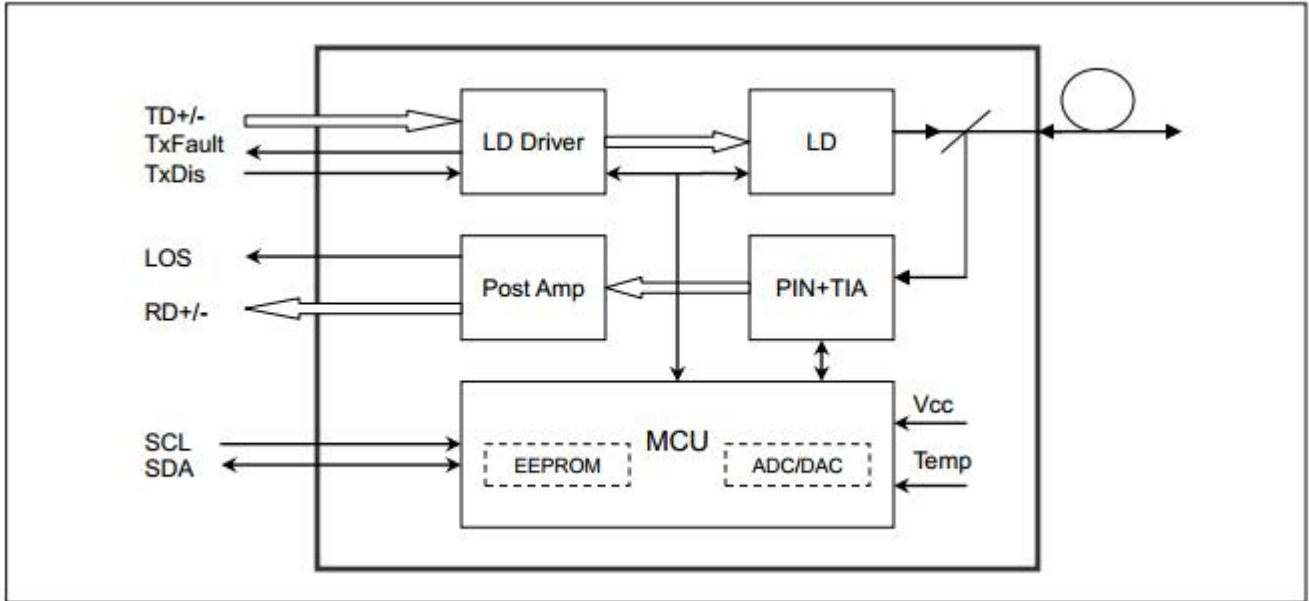
Description

The SFP-BIDI transceivers are high performance, cost effective modules supporting dual data-rate of 1.25Gbps/1.0625Gbps and 80KM 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 Characteristics (TOP = 0 to 70°C, VCC = 3.15 to 3.60Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Supply Voltage	Vcc	3.15	3.3	3.6	V	
Supply Current	Icc		185	280	mA	
Transmitter						
Input differential impedance	Rin		100		Ω	1
Single ended data input swing	Vin,pp	250		1200	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						
Single ended data output swing	Vout,pp	250		800	mV	3
Data output rise time	tr		100	175	ps	4
Data output fall time	tf		100	175	ps	4
LOS Fault	VLOS fault	Vcc-0.5		VccHOST	V	5
LOS Normal	VLOS norm	Vee		Vee+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.

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	Vcc+0.3	V	2
	L	VOL	0	0.8		

Note:

- 7) TD+/- are internally AC coupled with 100Ω differential termination inside the module.
- 8) 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 Vcc+0.3V.
- 9) 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_C	1530	1550	1570	nm	
Ave. output power (Enabled)	P_o	0		5	dBm	1
Extinction Ratio	ER	10			dB	1
RMS spectral width	$\Delta\lambda$			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					

Note:

- 10) Measure at 2²³-1 NRZ PRBS pattern
- 11) Transmitter eye mask definition

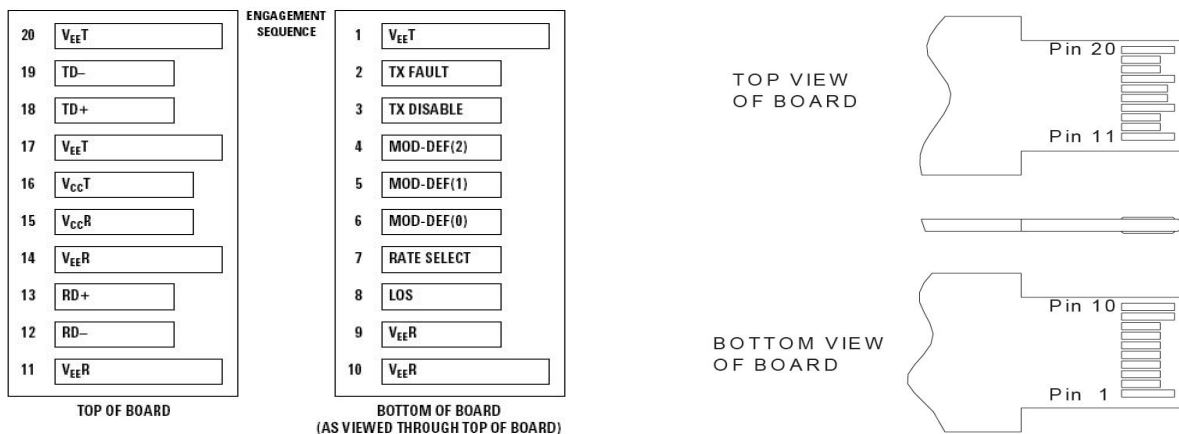
Receiver

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Operating Wavelength		1470		1510	nm	
Sensitivity	P_{sen}			-26	dBm	1
Min. overload	P_{imax}	-3			dBm	
LOS Assert	P_a	-36			dBm	
LOS De-assert	P_d			-32	dBm	2
LOS Hysteresis	P_d-P_a	0.5		6	dB	

Note :

- 12) Measured with Light source 1550nm (1490nm), ER=10dB; BER =<10⁻¹² @PRBS=2²³-1 NRZ.
- 13) When LOS de-asserted, the RX data+/- output is signal output.

Pin Definitions and Functions





Digital Diagnostic Functions

ETU-LINK'S ESB5412-3LCD80 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.

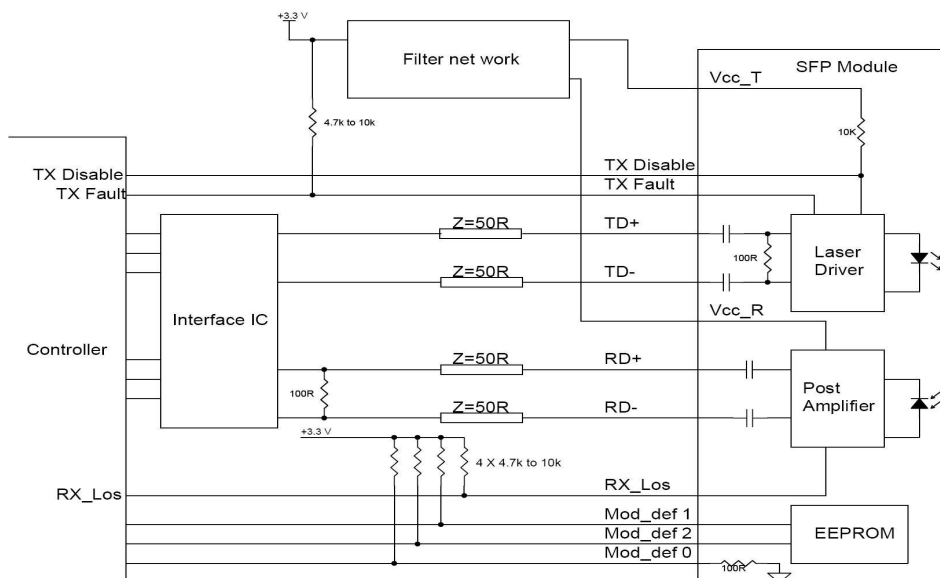
The standard SFP serial ID provides access to identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information.

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.

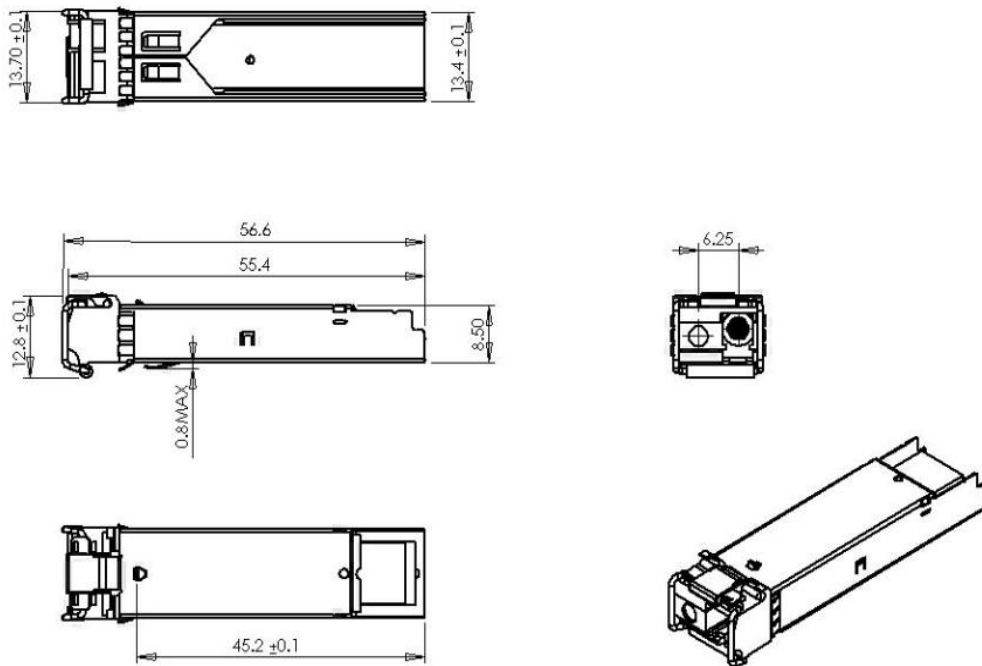
The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through a 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL, Mod Def 1) is generated by the host. 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 ESB5412-3LCD80 are Internally calibrated by default.

Typical Interface Circuit





Package Dimensions



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