SFP+ Series

ETU-LINK
Optical Communication System

SFP+

ESPBxx92-3LCD40

10Gbps SFP+ Bi-Directional Transceiver, 40km Reach Tx1270/Rx1330nm / Tx1330/Rx1270nm

➢ 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 ESPBXX92-3LCD40series 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 ESPBXX92-3LCD40 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
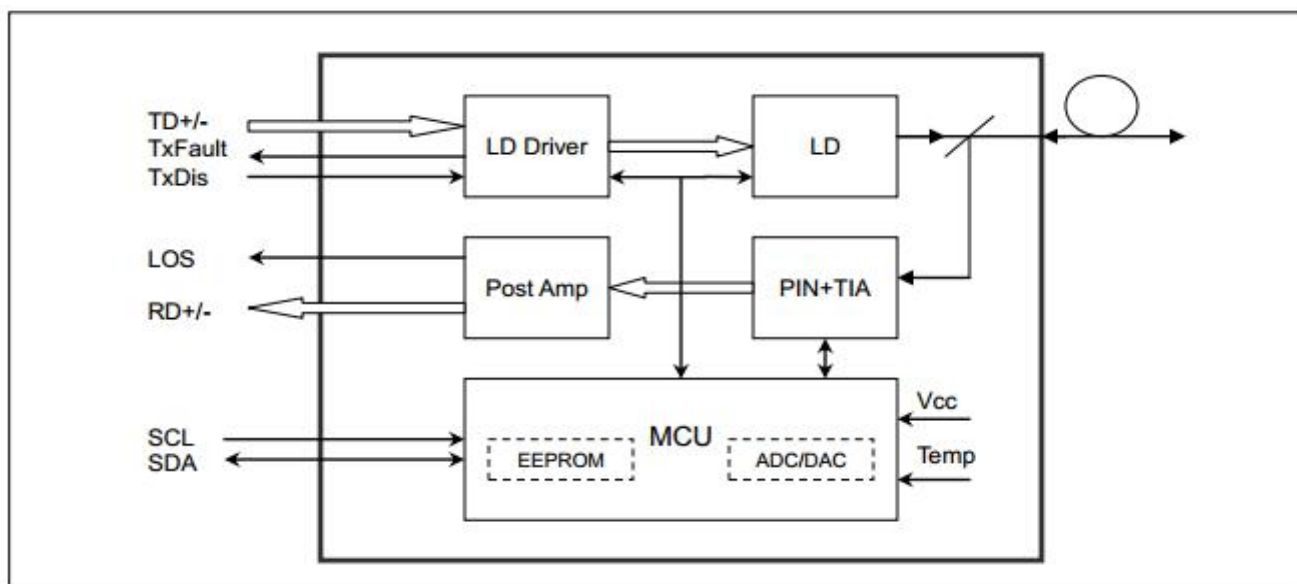
Absolute Maximum Ratings

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	1		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 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. Pullup voltage between 2.0V and Vcc+0.3V.

3) RD+/- outputs are internally AC coupled, and should be terminated with 100Ω (differential) at the user SERDES.

Pin Assignment
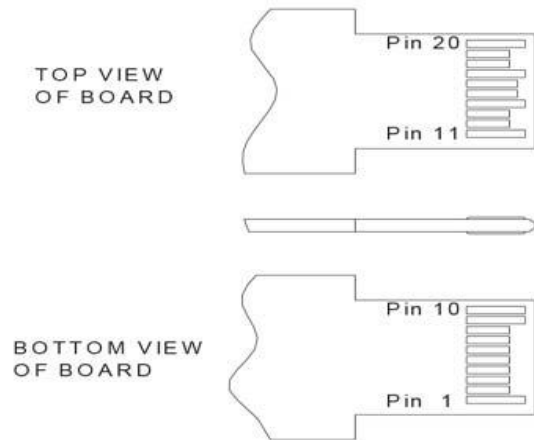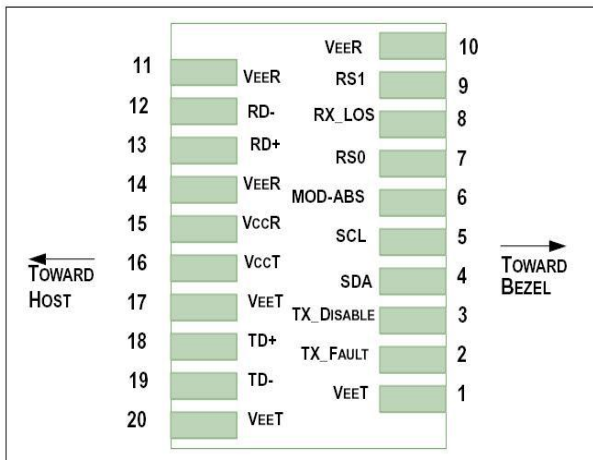
Pin out of Connector Block on Host Board

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:

1) Circuit ground is internally isolated from chassis ground.

2) 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 Vcc + 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 4.7kΩ- 10kΩ 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 4.7kΩ – 10kΩ 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 LVTTL. 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 theI2C 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)	
Address	Information
0~95	Serial ID Defined by SFP MSA (96 bytes)
96~127	Vendor Specific (32 bytes)
128~255	Reserved,SFF8079 (128 bytes)

| 2 wire address 1010001X (A2h)	
Address	Information
0~55	Alarm and Warning Thresholds (56 bytes)
56~95	Calibration Constants (40 bytes)
96~119	Real Time Diagnostic Interface (24 bytes)
120~127	Vender Specific (8 bytes)
128~247	User Writable EEPROM (120 bytes)
248~255	Vender 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
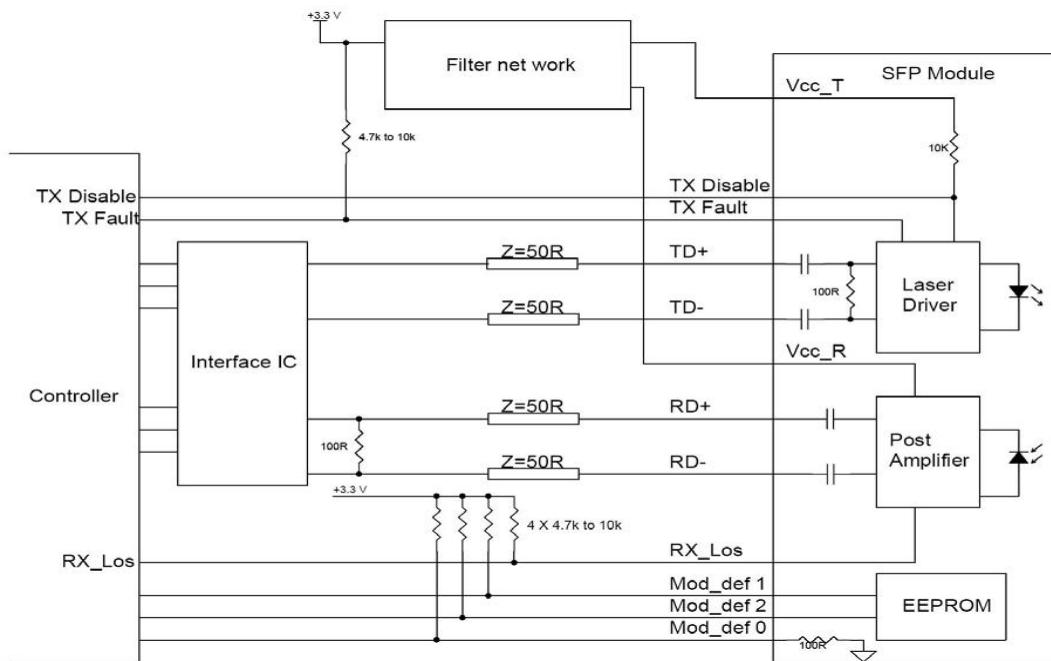
Digital Diagnostic Functions
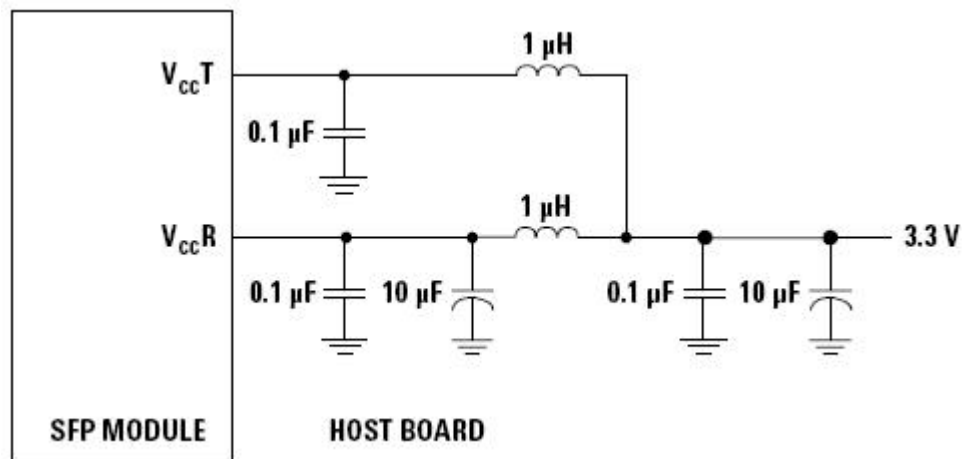
Note: Inductors with DC resistance of less than 1Ω should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply filtering network is used, hot plugging of the SFP transceiver module will result in an inrush current of no more than 30 mA greater than the steady state value.

Package Dimensions
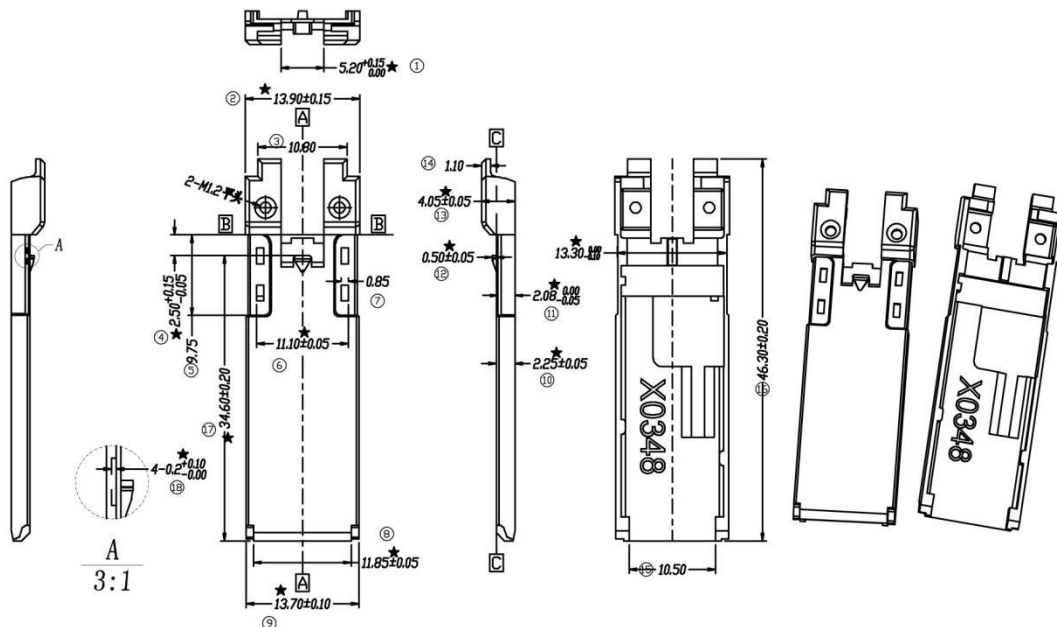
General Operating Characteristics

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	℃	

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

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.
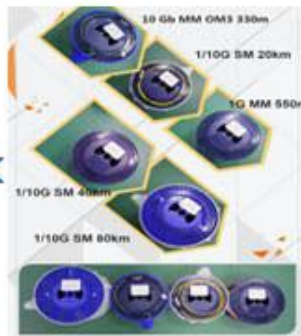

Standardized Production Line

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

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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.