

UNIKEY SFP+ Series

ESBxxX-3LCD80

**10Gbps SFP+ Bi-Directional Transceiver, 80km Reach Tx1490/
Rx1550nm / Tx1550/Rx1490nm**

- Up to 11.1Gbps Data Links
- Up to 80km transmission on SMF
- 1490nm EML laser and APD receiver for ESB45X-3LCD80
1550nm EML laser and APD receiver for ESB54X-3LCD80
- 2-wire interface with integrated Digital Diagnostic monitoring
- EEPROM with Serial ID Functionality
- Hot-pluggable SFP+ footprint
- Compliant with SFP+ MSA with LC connector
- Single + 3.3V Power Supply
- Commercial/Industrial case
operating temperature range: -10°C to 70°C /-40°C to 85°C
- Low power dissipation:
- ESPBxx92-3LCD80: 1.5W power dissipation
for Commercial temperature
- ESPBxx92-3LID80: 1.6W power dissipation
for Industrial temperature



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

ESBxxX-3LCD80 is hot pluggable 3.3V Small-Form-Factor transceiver module. It designed expressly for high-speed communication applications that require rates up to 11.1 GB/s, it designed to be compliant with SFF-8472 SFP+ MSA. The module data link is up to 80km in 9/125um single mode fiber.

Ordering information

Product part Number	Data Rate (Gbps)	Media	Wavelength (nm)	Transmission Distance(km)	Temperature Range (Tcase) (°C)	
ESB45X-3LCD80	10.3125	Single mode fiber	1490 TX/1550 RX	80	-10~70	Commercial
ESB54X-3LCD80	10.3125	Single mode fiber	1550 TX/1490 RX	80	-10~70	Commercial

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	Ts	-40	-	85	°C	
Relative Humidity	RH	5	-	95	%	
Power Supply Voltage	V _{CC}	-0.3	-	4	V	
Signal Input Voltage		V _{CC} -0.3	-	V _{CC} +0.3	V	

Optical Characteristics

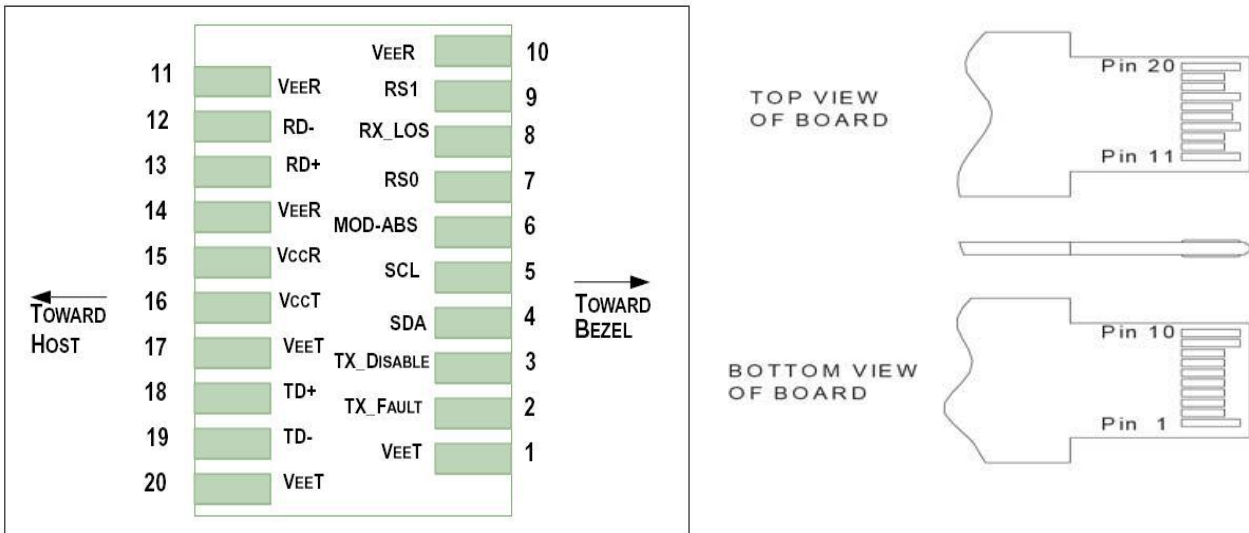
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Average Launched Power	PO	0	-	5	dBm	ESB45X-3LCD80
		-1	-	3	dBm	ESB54X-3LCD80
Average Launched Power(Laser Off)	P _{off}	-	-	-30	dBm	Note (1)
Center Wavelength Range	λ_C	$\lambda-7.5$	λ	$\lambda+7.5$	nm	Note (2)
Side mode suppression ratio	SMSR	30	-	-	dB	
Spectrum Bandwidth(-20dB)	σ	-	-	0.3	nm	

Extinction Ratio	ER	8.2		-	dB	Note (3)
Output Eye Mask	Compliant with IEEE 802.3ae					Note (3)
Receiver						
Input Optical Wavelength	λ IN	1480	1490	1500	nm	ESB54X-3LCD80
		1540	1550	1560	nm	ESB45X-3LCD80
Receiver Sensitivity	Psen	-	-	-24	dBm	Note (4)
Input Saturation Power (Overload)	PSAT	-9	-	-	dBm	Note (4)
LOS Assert	LOSA	-38	-	-	dBm	
LOS De-assert	LOSD	-	-	-26	dBm	
LOS -Hysteresis	PHys	0.5	-	6	dB	

Note:

- 1) The optical power is launched into SMF
- 2) λ is wavelength of room temperature
- 3) Measured with RPBS 2^31-1 test pattern @10.3125Gbs
- 4) Measured with RPBS 2^31-1 test pattern @10.3125Gbs BER=<10^-12

Pin Assignment



Pin out of Connector Block on Host Board

Pin	Symbol	Name/Description	NOTE.
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

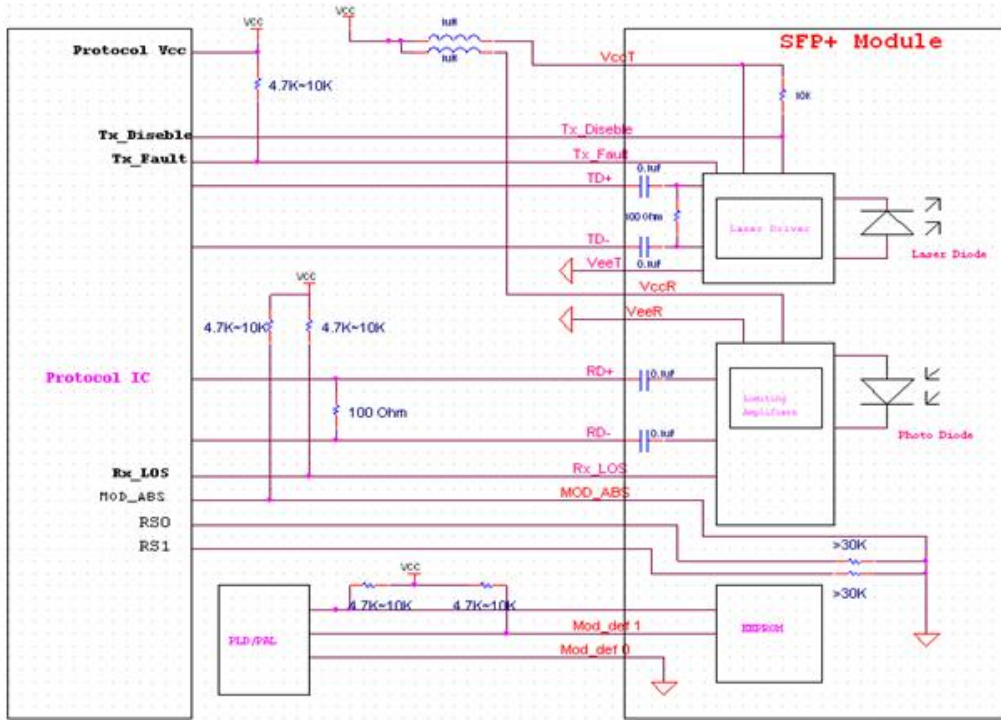
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Total power supply current	I _{cc}	-		450	mA	Commercial
				490	mA	Industrial
Transmitter						
Differential Data Input Voltage	V _{DT}	180	-	1200	mVp-p	
Differential line input Impedance	R _{IN}	80	100	120	Ohm	
Transmitter Fault Output-High	V _{FaultH}	2.4	-	V _{cc}	V	
Transmitter Fault Output-Low	V _{FaultL}	-0.3	-	0.8	V	

Transmitter Disable Voltage- High	VDisH	2	-	Vcc+0.3	V	
Transmitter Disable Voltage- low	VDisL	-0.3	-	0.8	V	
Receiver						
Differential Data Output Voltage	VDR	300	-	850	mVp-p	
Differential line Output Impedance	ROUT	80	100	120	Ohm	
Receiver LOS Pull up Resistor	RLOS	4.7	-	10	KOhm	
Data Output Rise/Fall time	tr/tf	24	-		ps	
LOS Assert Level	VLOS fault	Vcc-1.3		VccHOST	V	
LOS De-assert Level	VLOS norm	Vee		Vee+0.8	V	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note	
Case Operating Temperature	Tcase	-10	-	70	°C	Commercial	
		-40		85	°C	Industrial	
Power Supply Voltage	Vcc	3.14	3.3	3.47	V		
Power Supply Current	Icc	-		450	mA	Commercial	
				490	mA	Industrial	
Data Rate	BR		10.3125		Gbps		
Transmission Distance	TD		-	80	km		
Coupled fiber	Single mode fiber						9/125um SMF

Typical Interface Circuit



Digital Diagnostic Functions

ETU-LINK ESBxxX-3LCD80 transceivers support the 2-wire serial communication protocol as defined in the SFP+MSA.

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 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.

Package Dimensions

