

SFP+

ESPDxx92-3LCD40

10Gbps DWDM 40KM SFP+ Transceiver

- Up to 11.3Gbps Data Links
- Up to 40km transmission on SMF
- DWDM EML transmitter and PIN receiver
- Metal enclosure for lower EMI
- 2-wire interface with integrated Digital Diagnostic monitoring
- Hot-pluggable SFP+ footprint
- Specifications compliant with SFF 8472
- Compliant with SFP+ MSA with LC connector
- Single 3.3V power supply
- Case operating temperature range: -40°C to 85°C
- Without CDR or with CDR supported 9.95 to 11.3Gb/s reference-free
- Low power dissipation:



Applications

- 10GBASE-ER/EW & 10G Ethernet
- SDH STM64

ESPDxx92-3LID40: 1.5W power dissipation without CDR for Industrial temperature

ESPCDxx92-3LID40: 1.6W power dissipation with CDR for Industrial temperature

Standard

- Compliant to SFF-8431
- Compliant to SFF 8472
- RoHS Compliant.

Ordering information

Product part Number	Media	Wavelength (nm)	Transmission Distance(km)	Temperature Range (Tcase) (℃)	With/Without CDR
ESPDxx92-3LID40	Single-mode fiber	Refer to wavelength selection	40	-40~85	Without CDR
ESPCDxx92-3LID40	Single-mode fiber	Refer to wavelength selection	40	-40~85	With CDR

Wavelength Selection

C-band λ c Wavelength Guide Pin Descriptions

Channel	Wavelength (nm)	Frequency (THZ)	Channel	Wavelength (nm)	Frequency (THZ)
C17	1563.86	191.70	C39	1546.12	193.90
C18	1563.05	191.80	C40	1545.32	194.00
C19	1562.23	191.90	C41	1544.53	194.10
C20	1561.42	192.00	C42	1543.73	194.20
C21	1560.61	192.10	C43	1542.94	194.30
C22	1559.79	192.20	C44	1542.14	194.40
C23	1558.98	192.30	C45	1541.35	194.50
C24	1558.17	192.40	C46	1540.56	194.60
C25	1557.36	192.50	C47	1539.77	194.70
C26	1556.55	192.60	C48	1538.98	194.80

C27	1555.75	192.70	C49	1538.19	194.90
C28	1554.94	192.80	C50	1537.40	195.00
C29	1554.13	192.90	C51	1536.61	195.10
C30	1553.33	193.00	C52	1535.82	195.20
C31	1552.52	193.10	C53	1535.04	195.30
C32	1551.72	193.20	C54	1534.25	195.40
C33	1550.92	193.30	C55	1533.47	195.50
C34	1550.12	193.40	C56	1532.68	195.60
C35	1549.32	193.50	C57	1531.90	195.70
C36	1548.51	193.60	C58	1531.12	195.80
C37	1547.72	193.70	C59	1530.33	195.90
C38	1546.92	193.80	C60	1529.55	196.00
Non-ITU	Peak wavelength between 1528.77nm-1563.86		C61	1528.77	196.10

Product Description

ETU-LINK's ESPDxx92-3LID40 serial SFP+ transceiver is designed for use in 10-Gigabit Ethernet links up to 40km over single mode fiber. The module consists of DWDM EML Laser, InGaAs PIN and Pre-amplifier in a high-integrated optical sub-assembly. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF8472. The module data link up to 40km in 9/125um single mode fiber.

Absolute Maximum Ratings

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

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	Top	-40		85	V	ESPDxx92-3LID40 ESPCDxx92-3LID40
		3.14	3.3	3.47		
Power Supply Voltage	V _{CC}		10.3125		Gbps	
Data Rate	BR		40		km	
Max transmission Distance	TD	9/125um SMF				
Coupled fiber						

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Average Launched Power	PO	-1		+3	dBm	Note (1)
Extinction Ratio	ER	8.2			dB	
Center Wavelength	λ_c	$\lambda_c - 0.1$		$\lambda_c + 0.1$	nm	Note (2)
Center Wavelength Spacing			100		GHz	Note (2)
Spectrum Band Width (RMS)	σ			1.0	nm	
SMSR		30			dB	
Transmitter OFF Output Power	POff			-30	dBm	
Transmitter and Dispersion Penalty	TDP			2.0	dB	
Output Eye Mask	Compliant with IEEE 802.3ae					
Receiver						
Input Optical Wavelength	λ	1270		1610	nm	
Receiver Sensitivity	P _{sen}			-16.0	dBm	Note (3)
Input Saturation Power (Overload)	P _{sat}	-3			dBm	
LOS Detect -Assert Power	P _A	-28			dBm	
LOS Detect - Deassert Power	P _{Dea}			-19	dBm	
LOS Detect Hysteresis	P _{hys}	0.5			dB	

Note:

1. Launched power (avg.) is power coupled into a single mode fiber with master connector. (Before of Life)
2. λ_c refer to wavelength selection, and corresponds to approximately 0.8 nm.
3. Measured with conformance test signal for BER = 10^{-12} .@10.3125Gbps, PRBS=2³¹-1,NRZ,Optical source with worst ER, Wavelength between 1528.77nm and 1563.86nm; back to back

Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	NOTE
Supply Voltage	V _{CC}	3.14	3.3	3.46	V	
				460	mA	ESPDxx92-3LID40
				490		ESPCDxx92-3LID40
Transmitter						
Input differential impedance	R _{in}		100		Ω	2
Single ended data input swing	V _{in-pp}	180		700	mV	
Transmit Disable Voltage	V _{Dis}	2.0		V _{CC}	V	3
Transmit Enable Voltage	V _{EN}	V _{ee}		V _{ee} + 0.8	V	
Transmit Disable Assert Time				10	us	
Receiver						
Differential data output swing	V _{out-pp}	400		800	mV	4
Data output rise time	t _r	28			ps	5
Data output fall time	t _f	28			ps	5
LOS output high level	V _{LOS-H}	2.0		V _{CCHOST}	V	6
LOS output low level	V _{LOS-L}	V _{ee}		V _{ee} +0.8	V	6
Power Supply Rejection	PSR	100			mVpp	7

Notes:

1. Measured with receive Pin=Psen, V_{CC}=3.3V, operation temperature range, without air flow
2. Connected directly to TX data input pins. AC coupled.
3. Or open circuit.
4. Into 100 ohms differential termination.
5. 20 – 80 %.
6. Loss of Signal is LVTTTL. 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.

Pin Descriptions

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	no connection	
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	5
9	RS1	Internally connect to circuit ground	
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

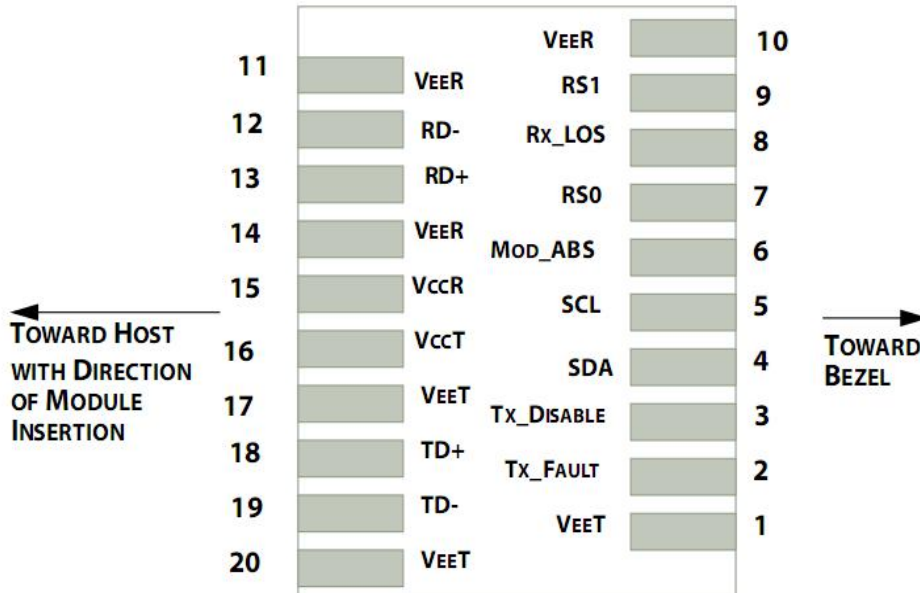


Diagram of Host Board Connector Block Pin Numbers and Name

Notes:

1. Circuit ground is internally isolated from chassis ground.
2. T_{FAULT} is an LVTTTL output. A high output indicates a transmitter fault caused by either the TX bias current or the TX output

power or the laser temperature 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 $4.7k\Omega$ - $10k\Omega$ on host board to a typical $3.3V$ voltage. MOD_ABS pulls low to indicate module is plugged in.

5. LOS is open collector output. It should be pulled up with $4.7k\Omega$ – $10k\Omega$ on host board to a typical $3.3V$ voltage. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

Digital Diagnostic Functions

ETU-LINK's ESPDxx92-3LID40 serial 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.

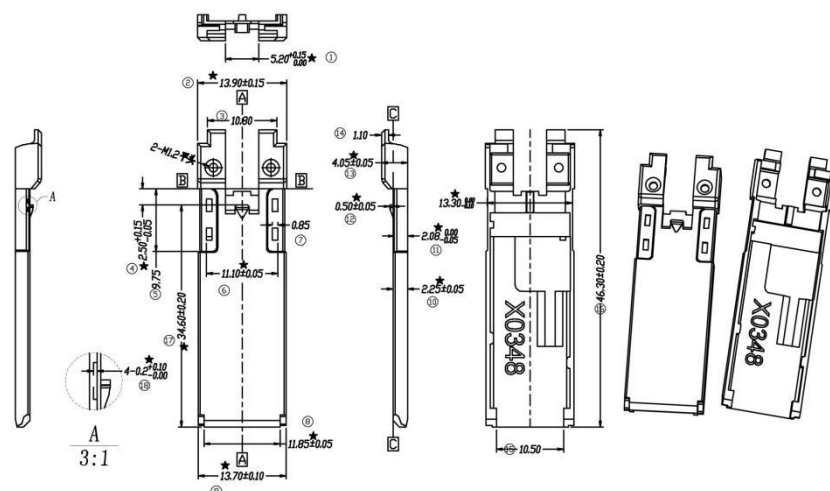
Additionally, ETU-LINK SFP+ transceivers provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, and received optical power and transceiver supply voltage. 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.

Host - Transceiver Interface Block Diagram

Comply with SFF-8432 rev5.0, the improved Pluggable form factor specification.



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**



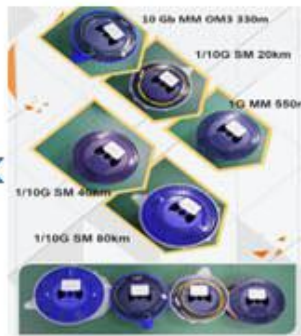
**Professional
Welding**



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.



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