

## ESP8524-03D(I)

2.5Gbps SFP Optical Transceiver, 300M Reach

### PRODUCT FEATURES

- Up to 2.67Gb/s data links
- 850nm VCSEL and PIN photo detector
- Compliant with SFP MSA and SFF-8472 with duplex LC receptacle
- 300m transmission with 50/125µm MMF
- Compatible with RoHS
- +3.3V single power supply
- Operating case temperature:

Standard: 0 to +70°C

Extended: -20 to +85°C

Industrial: -40 to +85°C



### APPLICATIONS

- SDH STM-16 and SONET OC-48 system
- 2X Fiber Channel
- Switch to Switch interface
- Switched backplane applications
- Router/Server interface
- Other optical transmission systems

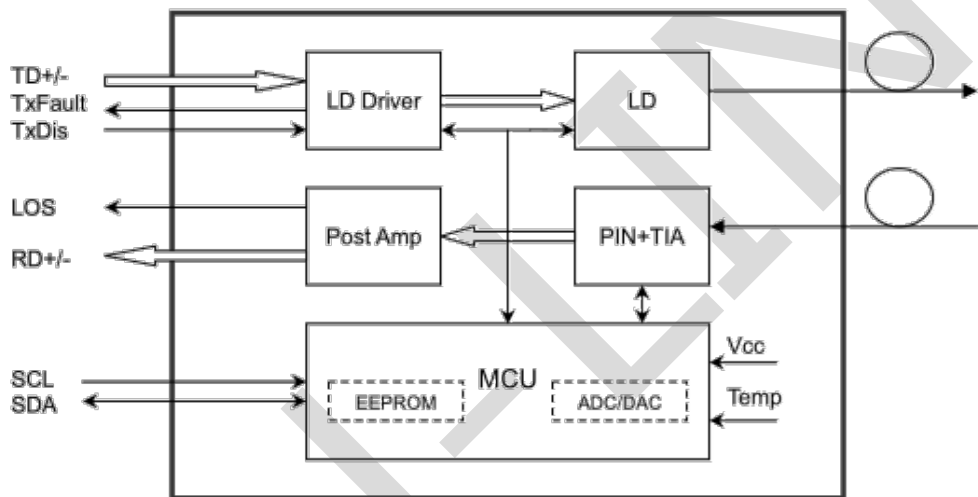
## DESCRIPTIONS

The SFP transceivers are high performance, cost effective modules supporting dual data-rate of 2.67Gbps and 300m transmission distance with MMF.

The transceiver consists of three sections: a VCSEL 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



## Ordering Information

Part No.	Data Rate(optical)	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI	Latch Color
ESP8524-03D	2.488Gbps	VCSEL	MMF	300M	LC	0~70°C	Yes	Black
ESP8524-03DE	2.488Gbps	VCSEL	MMF	300M	LC	-20~85°C	Yes	Black
ESP8524-03DI	2.488Gbps	VCSEL	MMF	300M	LC	-40~85°C	Yes	Black

## 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	

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Case Operating Temperature	TOP	0		70	°C	

## Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	Tc	0		+70	°C	
		-40		+85		
Power Supply Voltage	Vcc	3.135	3.30	3.465	V	
Power Supply Current	Icc		185	250	mA	
Data Rate			2.488	2.67	Gbps	

## Electrical Characteristics

Parameter	Symbol	Min.	Typ	Max.	Unit	Ref.
<b>Transmitter</b>						
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	
<b>Receiver</b>						
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.

## Optical and Characteristics

Parameter	Symbol	Min.	Typ	Max.	Unit	Ref.
<b>Transmitter</b>						
Output Opt. Pwr (End of Life)	POUT	-10.0		-3.0	dBm	1
Optical Wavelength	$\lambda$	830	850	860	nm	
Spectrum Bandwidth(RMS)	$\sigma$			0.85	nm	
Optical Extinction Ratio	ER	8.2			dB	
Optical Rise/Fall Time	tr/ tf		100	160	ps	
<b>Receiver</b>						
Average Rx Sensitivity @ Gigabit Ethernet	RSENS3			-18.0	dBm	2
Maximum Input Power	PMAX	-3.0			dBm	
Optical Center Wavelength	$\lambda_C$	770		860	nm	
LOS De -Assert	LOSD			-19	dBm	
LOS Assert	LOSA	-35			dBm	
LOS Hysteresis		0.5		6	dB	

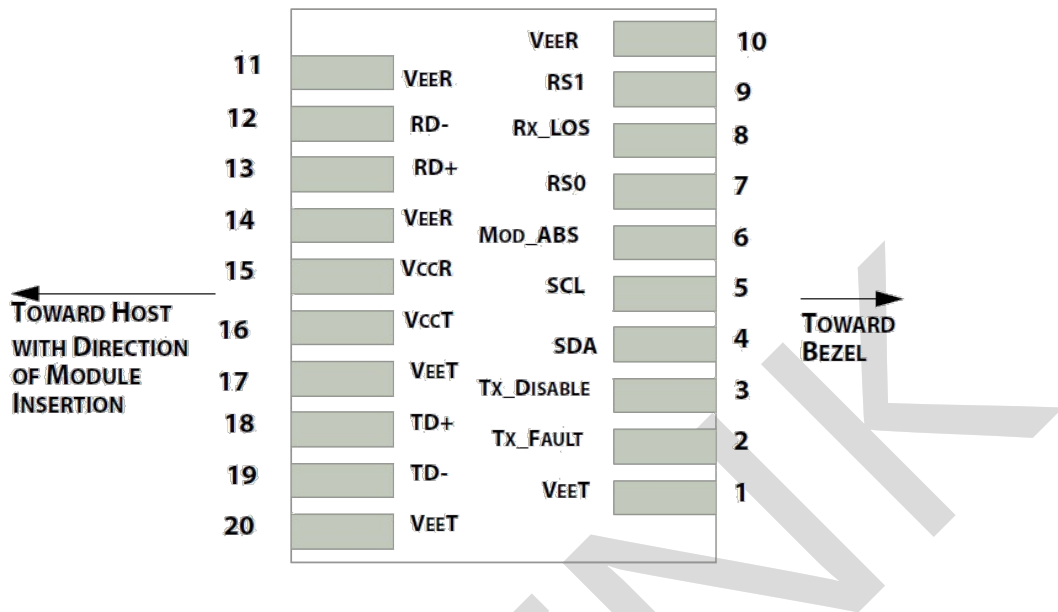
### Notes:

1. Class 1 Laser Safety per FDA/CDRH and IEC-825-1 regulations.
2. with worst-case extinction ratio. Measured with a PRBS 23-1 test pattern, @ 2.488 GB/s, BER<10<sup>-12</sup>.

## Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	0 to +70	°C	±3°C	Internal
	-20 to +85			
	-40 to +85			
Voltage	3.0 to 3.6	V	±3%	Internal
Bias Current	0 to 10	mA	±10%	Internal
TX Power	-10 to -3	dBm	±3dB	Internal
RX Power	-18 to -3	dBm	±3dB	Internal

## Pin Diagram



## Pin Definitions

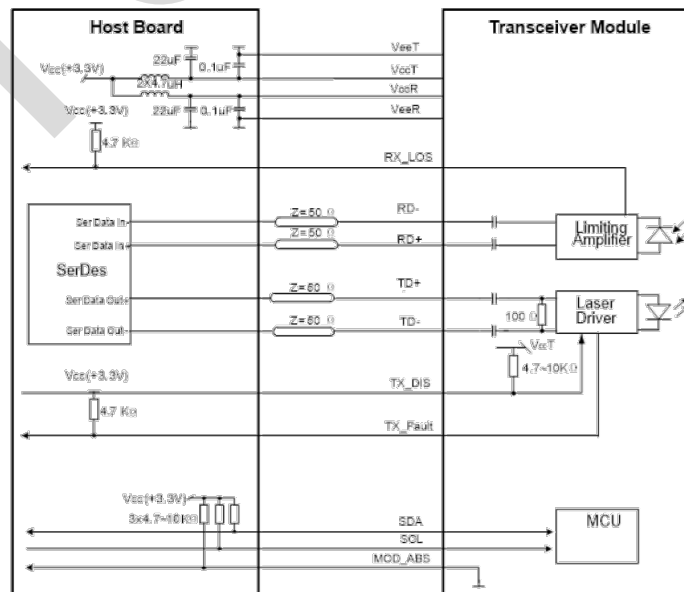
Pin	Name	Function	Notes
1	$V_{EET}$	Transmitter Ground (Common with Receiver Ground)	1
2	$T_{FAULT}$	Transmitter Fault.	2
3	$T_{DIS}$	Transmitter Disable. Laser output disabled on high or open.	3
4	MOD_DEF(2)	Module Definition 2. Data line for Serial ID.	4
5	MOD_DEF(1)	Module Definition 1. Clock line for Serial ID.	4
6	MOD_DEF(0)	Module Definition 0. Grounded within the module.	4
7	Rate Select	No connection required	
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	5
9	$V_{EER}$	Receiver Ground (Common with Transmitter Ground)	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

Pin	Name	Function	Notes
15	V <sub>CCR</sub>	Receiver Power Supply	
16	V <sub>CCT</sub>	Transmitter Power Supply	
17	V <sub>EET</sub>	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 <sub>EET</sub>	Transmitter Ground (Common with Receiver Ground)	1

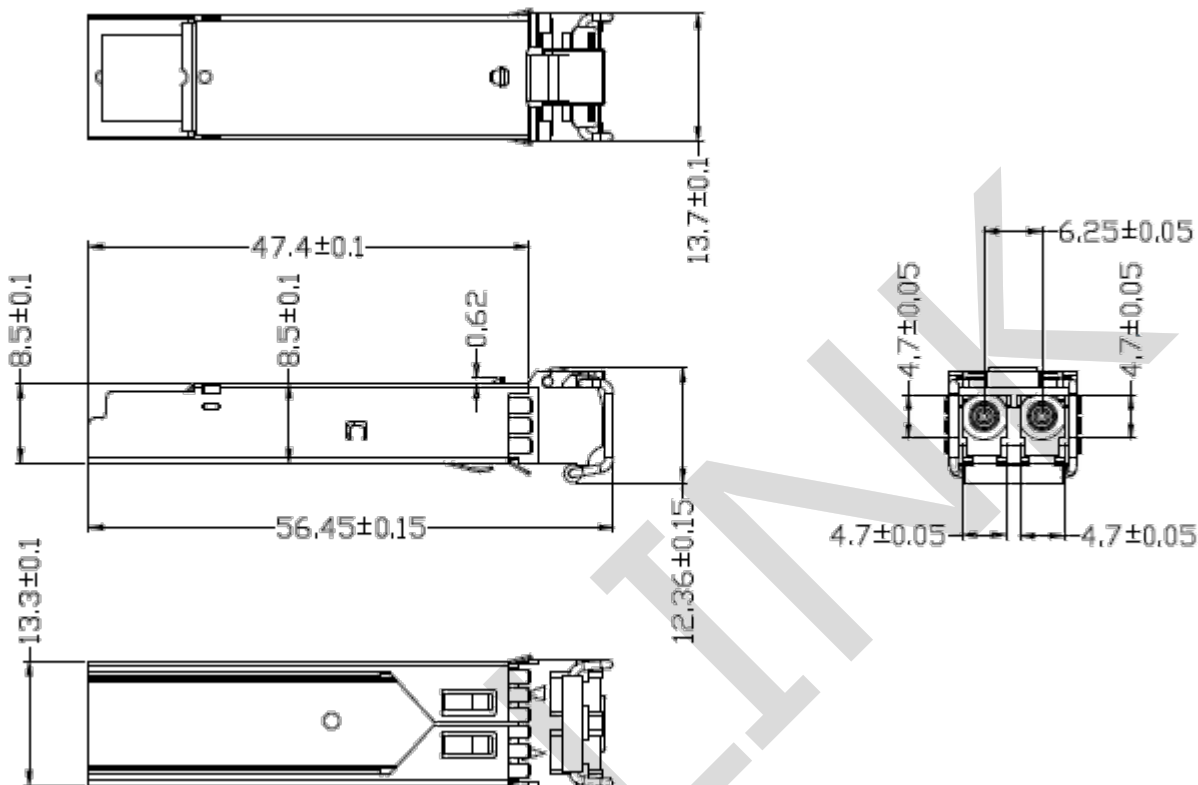
**Notes:**

1. Circuit ground is internally isolated from chassis ground.
2. T<sub>FAULT</sub> 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<sub>DIS</sub> >2.0V or open, enabled on T<sub>DIS</sub> <0.8V.
4. Should be pulled up with 4.7k - 10kohms on host board to a voltage between 2.0V and 3.6V. MOD\_DEF (0) pulls line low to indicate module is plugged in.
5. LOS is open collector output. It should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

**Recommended Interface Circuit**



## Mechanical Diagram



## Revision History

Version No.	Date	Description
1.0	February 8, 2016	Preliminary datasheet
2.0	May 11, 2019	Product upgrades
2.1	Aug 20, 2024	Format change

Company: ETU-Link Technology Co., LTD

Production base: Right side of 3rd floor, No. 102 building, Longguan expressway, Dalang street, Longhua District, Shenzhen city, Guangdong Province, China 518109

R&D base: Floor 4, Building 4, Nanshan Yungu Phase LI, Taoyuan Community, Xili Street, Nanshan District, Shenzhen

Tel: +86-755 2328 4603

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.