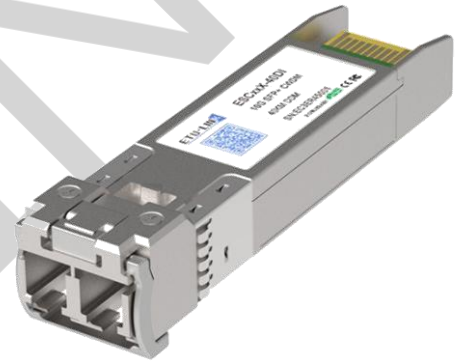


## ESCxxX-40D(I)

10Gb/s SFP+ CWDM Transceiver, Single Mode, 40km Reach

### PRODUCT FEATURES

- Supports up to 11.3Gbps bit rates
- Hot-Pluggable SFP Footprint and Single LC Connector
- CWDM EML laser from 1471nm to 1611nm, with step 20nm and PIN receiver
- Compatible with RoHS
- Single +3.3V power supply
- Real Time Digital Diagnostic Monitoring
- Operating case temperature:
  - Temperature Range:
    - Commercial: 0°C ~70°C
    - Extended: -20°C ~85°C
    - Industrial: -40°C ~85°C
- Low power consumption :<1.5W
- Compliant with SFP-8431
- Compliant with SFP-8432
- Compliant with SFP-8472
- Compliant with IEEE802.3ae
- Complies with EU Directive 2015/863/EU



### APPLICATIONS

- 10Gbps CWDM Optical systems
- 10GBASE-ER at 10.3125Gbps
- 10GBASE-EW at 9.953Gbps
- Other Optical links

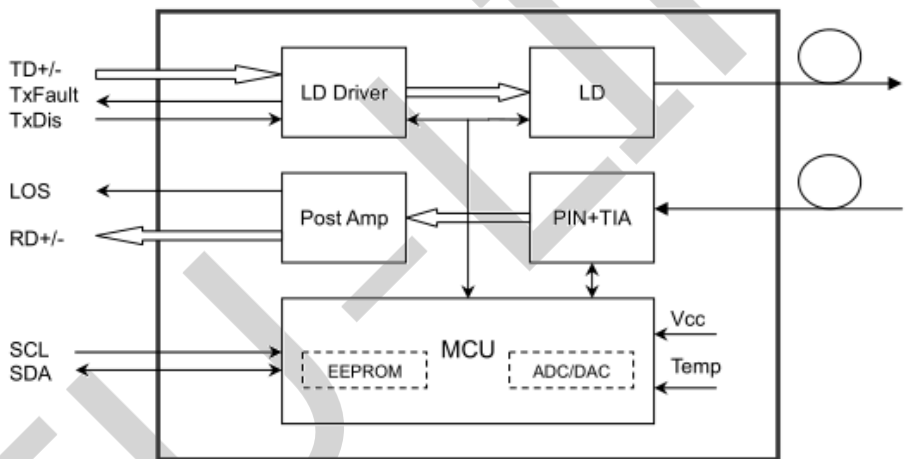
## DESCRIPTIONS

The SFP+ transceivers are high performance, cost effective modules supporting data rate of 10Gbps and 40km transmission distance with SMF.

The transceiver consists of three sections: a Cooled EML 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 and SFF-8472 digital diagnostics functions.

## Module Block Diagram



## Ordering Information

Part No.	Data Rate(optical)	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI
ESCxxX-40D	10.3125Gbps	EML	SMF	40km	LC	0~70°C	Y
ESCxxX-40DE	10.3125Gbps	EML	SMF	40km	LC	-20~85°C	Y
ESCxxX-40DI	10.3125Gbps	EML	SMF	40km	LC	-40~85°C	Y

## Wavelength Guide Pin Descriptions

Part No.	Channel	Wavelength(nm)		
		min	typical	max
ESC41X-40D	C41	1404.5	1411	1417.5
ESC43X-40D	C43	1424.5	1431	1437.5
ESC45X-40D	C45	1444.5	1451	1457.5
ESC47X-40D	C47	1464.5	1471	1477.5
ESC49X-40D	C49	1484.5	1491	1497.5
ESC51X-40D	C51	1504.5	1511	1517.5
ESC53X-40D	C53	1524.5	1531	1537.5
ESC55X-40D	C55	1544.5	1551	1557.5
ESC57X-40D	C57	1564.5	1571	1577.5
ESC59X-40D	C59	1584.5	1591	1597.5
ESC61X-40D	C61	1604.5	1611	1617.5
ESC41X-40DI	C41	1403.5	1411	1418.5
ESC43X-40DI	C43	1423.5	1431	1438.5
ESC45X-40DI	C45	1443.5	1451	1458.5
ESC47X-40DI	C47	1463.5	1471	1478.5
ESC49X-40DI	C49	1483.5	1491	1498.5
ESC51X-40DI	C51	1503.5	1511	1518.5
ESC53X-40DI	C53	1523.5	1531	1538.5
ESC55X-40DI	C55	1543.5	1551	1558.5
ESC57X-40DI	C57	1563.5	1571	1578.5
ESC59X-40DI	C59	1583.5	1591	1598.5
ESC61X-40DI	C61	1603.5	1611	1618.5

## Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage Temperature	T <sub>stg</sub>	-40		+85	°C	
Relative Humidity - Storage	R <sub>HS</sub>	5		95	%	
Relative Humidity - Operating	R <sub>HO</sub>	5		85	%	
DC Supply Voltage	V <sub>CC</sub>	0		3.6	V	

## Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Case Operating Temperature	Top	0	-	70	°C	Commercial
		-40		85		Industrial
Power Supply Voltage	V <sub>CC</sub>	3.13	3.3	3.47	V	
Transmission Distance	TD	-	-	40	km	Over SMF

## Electrical Characteristics

High-Speed Signal: Compliant to CEI-11G-SR

Low-Speed Signal: Compliant to SFF-8419

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes	
Supply Voltage	V <sub>CC</sub>	3.135		3.465	V		
Supply Current	I <sub>CC</sub>			450	mA		
Power Consumption	P			1.5	W		
<b>Transmitter (Module Input)</b>							
Differential Input Resistance	R <sub>Rdin</sub>	80	100	120	Ω		
Input Differential Voltage	R <sub>Vdiff</sub>	110	-	1050	mVpp		
Tx_Disable	Normal Operation	V <sub>IL</sub>	-0.3	-	0.8	V	
	Laser Disable	V <sub>IH</sub>	2.0	-	V <sub>CC</sub> +0.3	V	
<b>Receiver (Module Output)</b>							
Differential Resistance	T <sub>Rd</sub>	80	100	120	Ohm		
Output Differential Voltage	T <sub>Vdiff</sub>	360	-	770	mVpp		
Differential Termination Resistance Mismatch	T <sub>Rdm</sub>	-	-	5	%		
Rx los	Normal Operation	V <sub>OL</sub>	-0.3	-	0.4	V	
	Loss Signal	V <sub>OH</sub>	2		V <sub>CC</sub> HOST	V	

## Optical and Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
<b>Transmitter</b>						
Centre Wavelength	λ <sub>c</sub>	λ <sub>c</sub> -6.5	λ <sub>c</sub>	λ <sub>c</sub> +6.5	nm	
Spectral Width (-20dB)	Δλ			1	nm	
Side-Mode Suppression Ratio	SMSR	30	-		dB	
Average Output Power	P <sub>out</sub>	-1		4	dBm	1
Extinction Ratio	ER	8.2			dB	

RIN <sub>20</sub> OMA	RIN			-128	dB/Hz	2
<b>Receiver</b>						
Centre Wavelength	$\lambda_c$	1260		1620	nm	
Receiver Sensitivity				-16	dBm	3
Receiver Overload		0.5			dBm	
LOS De-Assert	LOS <sub>D</sub>			-17	dBm	
LOS Assert	LOS <sub>A</sub>	-30			dBm	
LOS Hysteresis		0.5			dB	

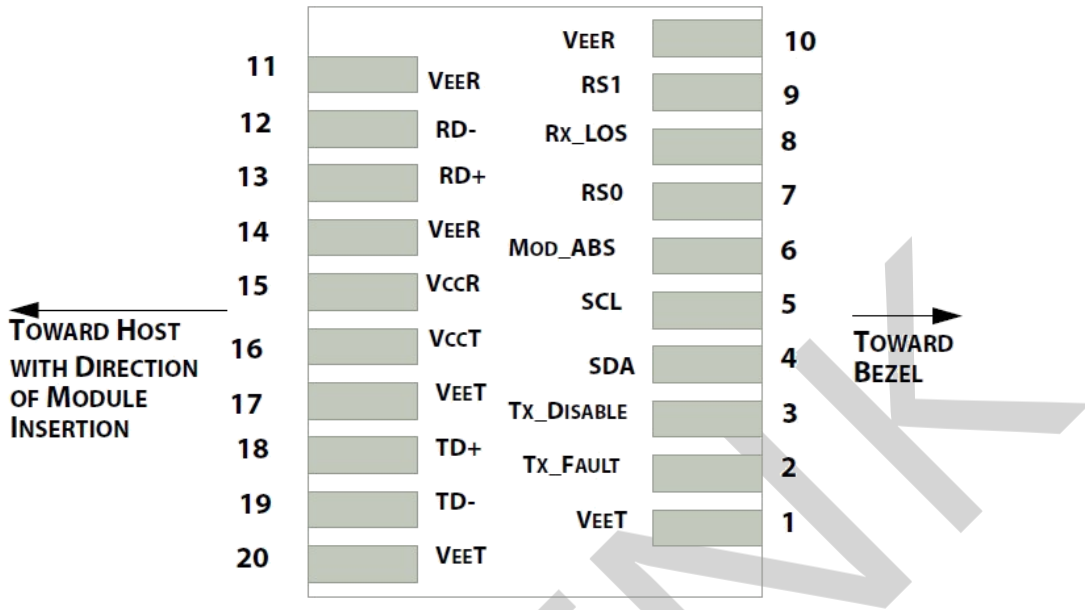
**Notes:**

1. Output is coupled into a 9/125um SMF.
2. 12dB reflection
3. Measured with worst ER, BER less than 1E-12 and PRBS 2<sup>31</sup>-1 at 10.3125Gbps.

## Digital Diagnostics

Parameter	Range	Unit	Accuracy	Calibration
Temperature	-40 to +85	°C	±3°C	Internal
Voltage	3.0 to 3.6	V	±3%	Internal
Bias Current	0 to 100	mA	±10%	Internal
TX Power	-1 to +4	dBm	±3dB	Internal
RX Power	-16 to -1	dBm	±3dB	Internal

## Pin Diagram



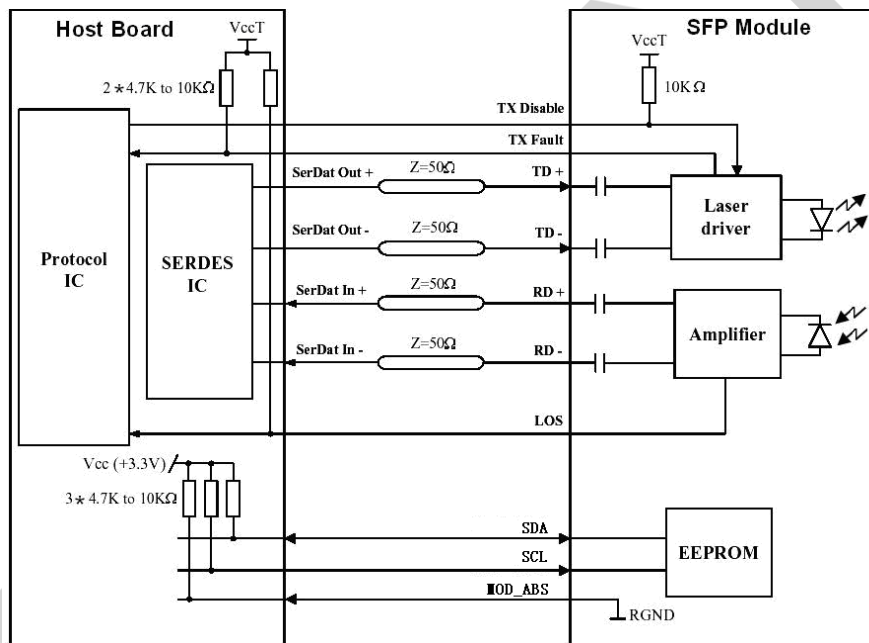
## Pin Definitions

PIN #	Name	Function	Notes
1	VeeT	Module transmitter ground	1
2	Tx Fault	Module transmitter fault	2
3	Tx Disable	Transmitter Disable; Turns off transmitter laser output	3
4	SDL	2 wire serial interface data input/output (SDA)	4
5	SCL	2 wire serial interface clock input (SCL)	4
6	MOD-ABS	Module Absent, connect to VeeR or VeeT in the module	4
7	RS0	Rate select0, optionally control SFP+ receiver. When high, input data rate >4.5Gb/ s; when low, input data rate <=4.5Gb/s	5
8	LOS	Receiver Loss of Signal Indication	6
9	RS1	Rate select0, optionally control SFP+ transmitter. When high, input data rate >4.5Gb/s; when low, input data rate <=4.5Gb/s	1
10	VeeR	Module receiver ground	1
11	VeeR	Module receiver ground	1
12	RD-	Receiver inverted data output	
13	RD+	Receiver non-inverted data output	
14	VeeR	Module receiver ground	1
15	VccR	Module receiver 3.3V supply	
16	VccT	Module transmitter 3.3V supply	
17	VeeT	Module transmitter ground	1
18	TD+	Transmitter inverted data output	
19	TD-	Transmitter non-inverted data output	
20	VeeT	Module transmitter ground	1

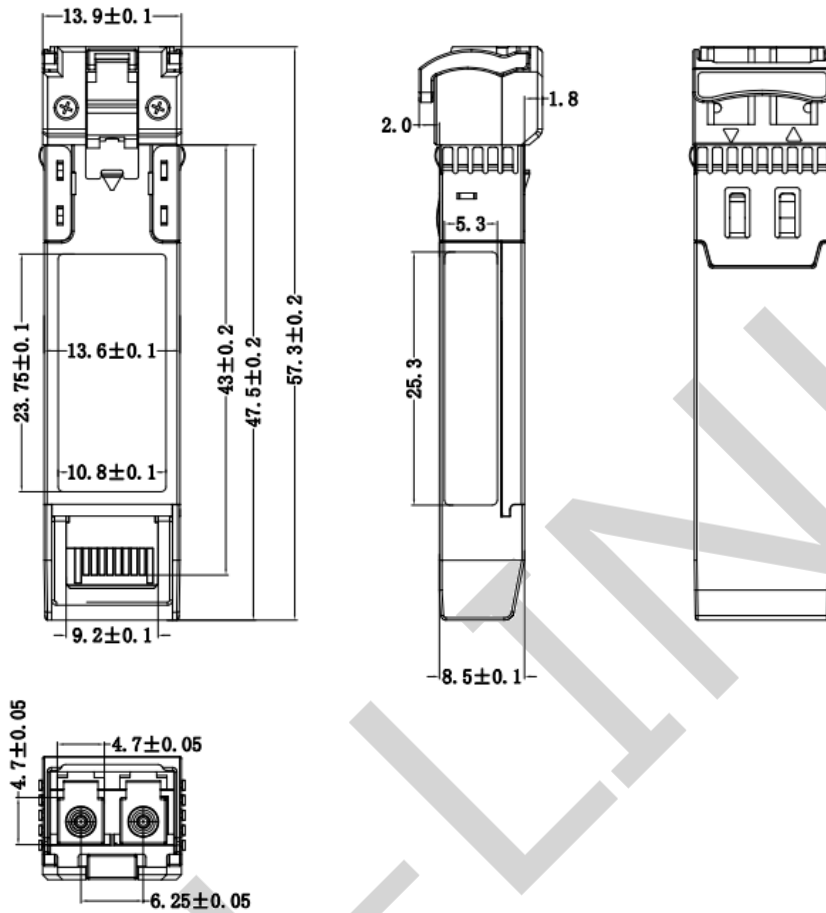
Notes:

1. Circuit ground is internally isolated from chassis ground
2. Tx 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 Tx DIS >2.0V or open, enabled on Tx 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.

Recommended Interface Circuit



## Mechanical Diagram



## Revision History

Version No.	Date	Description
1.0	February 4, 2016	Preliminary datasheet
2.0	December 15, 2023	Product upgrades
2.0	Aug 26, 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.