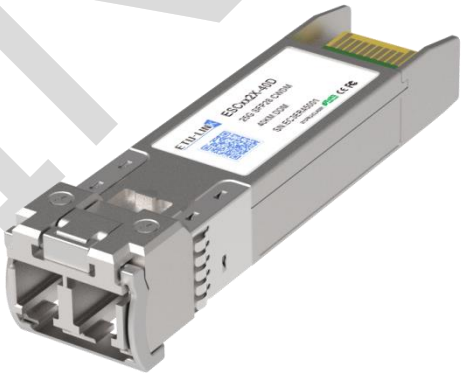
ESCxx2X-40D(I)

25Gb/s SFP28 CWDM 40km DDM Transceiver

PRODUCT FEATURES



- **Support data rate up to 25.78125Gb/s**
- **Hot-Pluggable SFP Footprint and duplex LC receptacle**
- **Up to 40km reach for G.652 SMF**
- **CWDM DFB laser and APD receiver**
- **Temperature Range:**
  - **Commercial:0°C ~70°C**
  - **Industrial: -40°C ~85°C**
- **Power consumption**
  - **Commercial:1W**
  - **Industrial:1.2W**
- **RoHS 6 compliance**
- **Compliant to IEEE 802.3cc, SFF-8472 and SFF-8419**
- **Complies with EU Directive 2015/863/EU**

APPLICATIONS

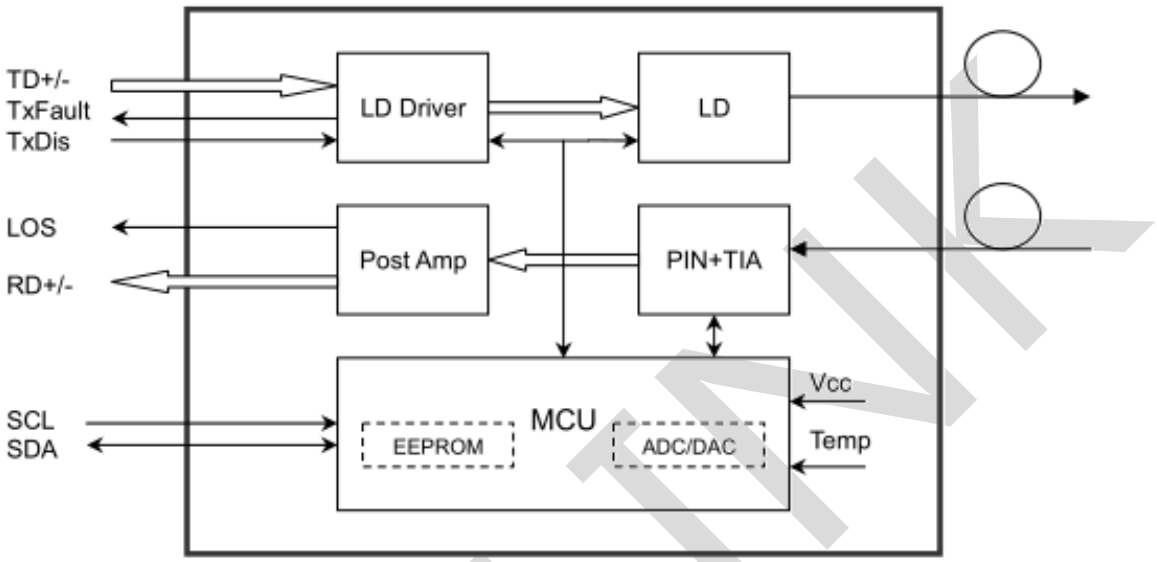
- **25GBASE Ethernet**
- **CPRI option 10**

DESCRIPTIONS

The ESCxx2X-40D(I) is a single Channel, Pluggable, Fiber Optic SFP28 for 25 Gigabit Ethernet Application. It is a high performance module for short-range data communication and interconnect applications which operate at 25.78125 Gbps up to 40km. They are compliant with SFF-8431, SFF-8432. The transmitter converts serial CML electrical data into serial optical data. The receiver converts serial optical data into serial CML electrical data. Digital

diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472.

Module Block Diagram



Ordering Information

Part No.	Data Rate(optical)	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI
ESCxx2X-40D	25.78125Gbps	DFB	SMF	40km	LC	0~70℃	Y
ESCxx2X-40DI	25.78125Gbps	DFB	SMF	40km	LC	-40~85℃	Y

Wavelength Guide Table

Part No.	Channel	Wavelength(nm)		
		min	typical	max
ESC272X-40D	C27	1264.5	1271	1277.5
ESC292X-40D	C29	1284.5	1291	1297.5
ESC312X-40D	C31	1304.5	1311	1317.5
ESC332X-40D	C33	1324.5	1331	1337.5
ESC272X-40DI	C27	1263.5	1271	1278.5
ESC292X-40DI	C29	1283.5	1291	1298.5
ESC312X-40DI	C31	1303.5	1311	1318.5
ESC332X-40DI	C33	1323.5	1331	1338.5

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage Temperature	T_{stg}	-40		+85	°C	
Case Operating Temperature(Commercial)	T_O	0		70	°C	
Case Operating Temperature (Industrial)	T_O	-40		85	°C	
Relative Humidity - Storage	R_{HS}	5		95	%	
Relative Humidity - Operating	R_{HO}	5		85	%	
DC Supply Voltage	V_{CC}	0		3.6	V	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Case Operating Temperature	Top	0	-	70	℃	Commercial
		-40		85		Industrial
Power Supply Voltage	V_{CC}	3.13	3.3	3.47	V	
Transmission Distance	TD	-	-	40	km	Over SMF

Electrical Characteristics

High-Speed Signal: Compliant to CEI-25G-VSR

Low-Speed Signal: Compliant to SFF-8419

Parameter		Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter (Module Input)							
Differential Input Resistance		R_R_{din}	90	100	110	Ω	
Input Differential Voltage		R_V_{diff}	-	-	900	mVpp	
Tx_Disable	Normal Operation	V_{IL}	-0.3	-	0.8	V	
	Laser Disable	V_{IH}	2.0	-	V_{CC}+0.3	V	
Receiver (Module Output)							
Differential Resistance		T_R_d	90	100	110	Ohm	
Output Differential Voltage		T_V_{diff}	-	-	900	mVpp	
Differential Termination Resistance Mismatch		T_R_{dm}	-	-	10	%	
Rx los	Normal Operation	V_{OL}	-0.3	-	0.4	V	
	Loss Signal	V_{OH}	2		VCCHOST	V	

Optical and Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter						
Optical Modulation Amplitude(OMA)	POMA	1		7	dBm	
Average Output Power	POUT	0		6	dBm	

Average Output Power(Laser Off)	POFF			-30	dBm	
Spectrum Bandwidth @ -20dB	Δλ			1	nm	
Side mode suppression ratio(SMSR)	SMSR	30			dB	
Extinction ratio	ER	3.5			dB	
$RIN_{20}OMA$	RIN			-130	dB/Hz	
Receiver						
Wavelength	λ	1260		1620	nm	
Received Sensitivity(OMA)	$P_{SEN-OMA}$			-18	dBm	1
Optical Power Overload	$P_{IN}(SAT)$	-4			dBm	
Receiver Reflectance	RFL			-26	dB	
Rx_LOS of Signal Assert	P_A	-38			dBm	
Rx_LOS of Signal De-assert	P_D			-21	dBm	
Rx_LOS of Signal Hysteresis	P_{Hy}	0.5		5	dB	
Optical Return Loss Tolerance	ORLT	20			dB	

Notes:

1. Test pattern: PRBS31. BER<$5x10^{-5}$;

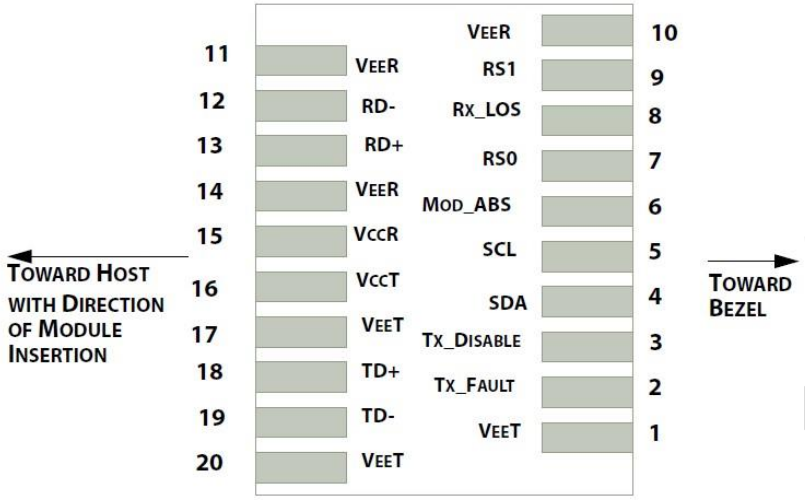
Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	-40 to 85	±3	℃	Internal
Voltage	3.13 to 3.47	±3%	V	Internal
Tx Bias Current	0 to 100	±10%	mA	Internal
Tx Output Power	0 to 6	±3	dB	Internal
Rx Input Power	-21 to -4	±3	dB	Internal

Communication Interface Timing Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
TX_Disable Assert Time	t_off			100	us	
TX_Disable Negate Time	t_on			2	ms	
Time to Initialize Include Reset of TX_FAULT	t_int			300	ms	
TX_FAULT from Fault to Assertion	t_fault			100	us	
TX_Disable Time to Start Reset	t_reset	10			us	
Receiver Loss of Signal Assert Time	T_A,RX_LOS			100	us	
Receiver Loss of Signal Deassert Time	T_d,RX_LOS			100	us	
Rate-Select Chage Time	t_ratesel			10	us	

Pin Diagram



Pin Definitions

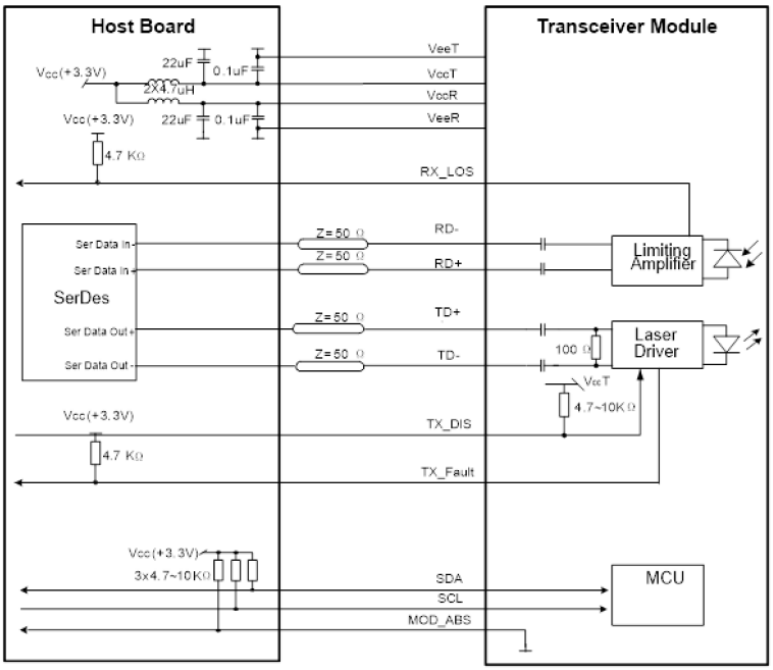
PIN #	Name	Function	Notes
1	VeeT	Transmitter Ground	1
2	Tx Fault	Transmitter Fault - High indicates a fault condition	2
3	Tx Disable	Transmitter Disable – High or open disables the transmitter	
4	SDL	2-wire Serial Interface Data Line (MOD-DEF2)	3
5	SCL	2-wire Serial Interface Clock (MOD-DEF1)	3
6	MOD-ABS	Module Absent, connected to VeeT or VeeR in the module	
7	RS0	Rate Select 0	5
8	RX_LOS	Receiver Loss of Signal(LVTTL-O). Logic 0 indicates normal operation	4
9	RS1	Rate Select 1	1
10	VeeR	Receiver Ground	1
11	VeeR	Receiver Ground	1
12	RD-	Inverse Received Data out (CML-O), AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	VeeR	Receiver Ground	1
15	VccR	Receiver Power Supply	
16	VccT	Transmitter Power Supply	
17	VeeT	Transmitter Ground	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	VeeT	Transmitter Ground	1

Notes:

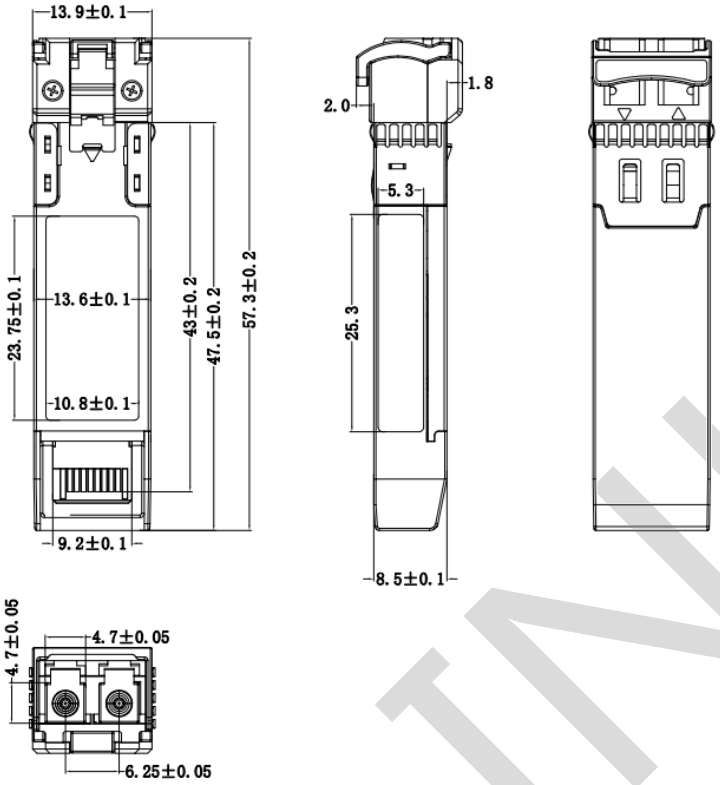
1. Module ground pins GND are isolated from the module case.
2. Tx_Fault is an open collector/drain output, which should be pulled up with a 4.7k – 10k Ohms resistor on Host board.

3. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V.
4. LOS is open collector output. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V.
5. RS0 and RS1 pins are pulled low to GND with a resistor > 30KΩ in module.

Recommended Interface Circuit



Mechanical Diagram



Revision History

Version No.	Date	Description
1.0	February 8, 2021	Preliminary datasheet
2.0	Aug 21, 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, GuangDongProvince,China 518109
R&D base: Floor 4, Building 4, Nanshan Yungu Phase LI, Taoyuan Community, XiliStreet,Nanshan District, Shenzhen
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.