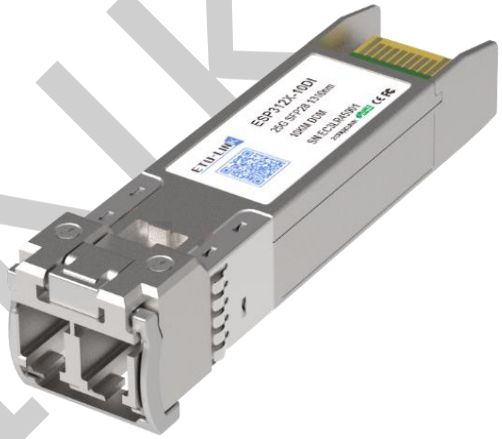
ESCxx2X-10D(I)

25Gb/s SFP28 CWDM 10km DDM Transceiver

PRODUCT FEATURES



- **Support data rate up to 25.78125Gb/s**
- **Hot-Pluggable SFP Footprint and Single LC Connector**
- **Up to 10km reach for G.652 SMF**
- **CWDM DFB laser and PIN 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**

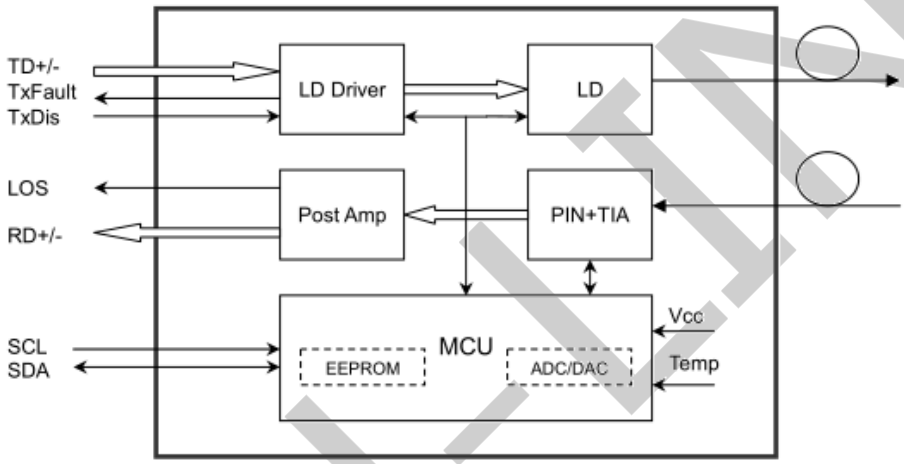
APPLICATIONS

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

DESCRIPTIONS

The ESCxx2X-10D(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 10km. 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-10D	25.78125Gbps	DFB	SMF	10km	LC	0~70℃	Y
ESCxx2X-10DI	25.78125Gbps	DFB	SMF	10km	LC	-40~85℃	Y

Wavelength Guide Table

Part No.	Channel	Wavelength(nm)		
		min	typical	max
ESC272X-10D	C27	1264.5	1271	1277.5
ESC292X-10D	C29	1284.5	1291	1297.5
ESC312X-10D	C31	1304.5	1311	1317.5
ESC332X-10D	C33	1324.5	1331	1337.5
ESC352X-10D	C35	1344.5	1351	1357.5

ESC372X-10D	C37	1364.5	1371	1377.5
ESC272X-10DI	C27	1263.5	1271	1278.5
ESC292X-10DI	C29	1283.5	1291	1298.5
ESC312X-10DI	C31	1303.5	1311	1318.5
ESC332X-10DI	C33	1323.5	1331	1338.5
ESC352X-10DI	C35	1343.5	1351	1358.5
ESC372X-10DI	C37	1363.5	1371	1378.5

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	-	-	10	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	0		6	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)	$P_{SEN-OMA}$			-13.3	dBm	1
Optical Power Overload	$P_{IN}(SAT)$	0.5			dBm	
Receiver Reflectance	RFL			-26	dB	
Rx_LOS of Signal Assert	P_A	-30			dBm	
Rx_LOS of Signal De-assert	P_D			-16	dBm	
Rx_LOS of Signal Hysteresis	P_{Hy}	0.5		5	dB	
Optical Return Loss Tolerance	ORLT	20			dB	

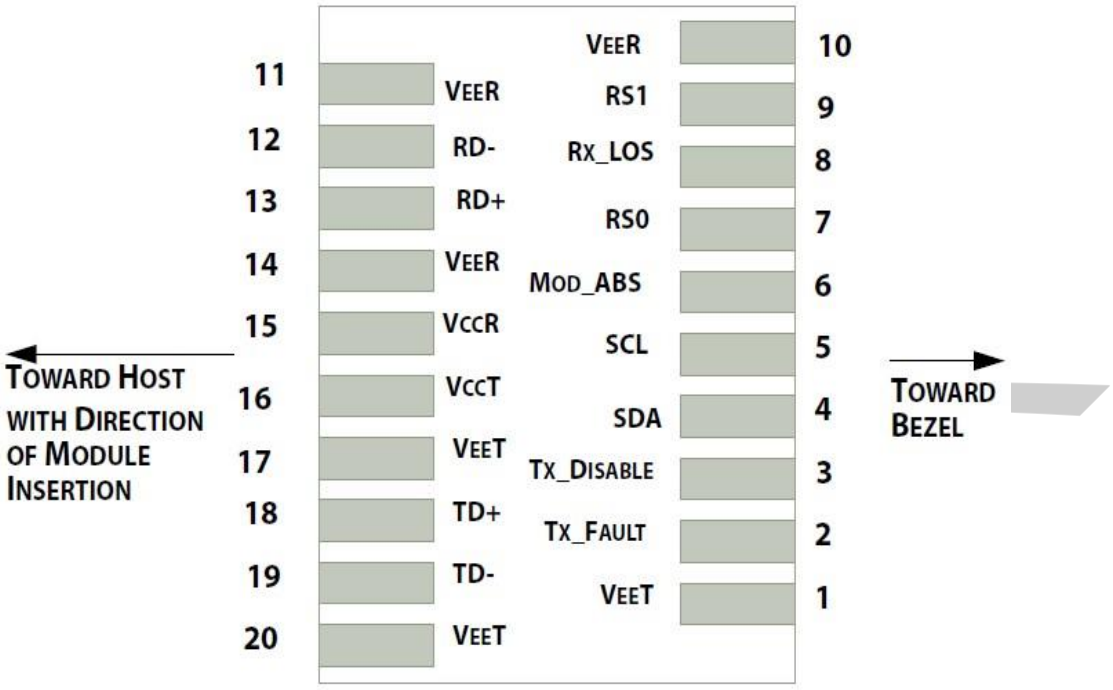
Notes:

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

Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	-40 to 85	±3	ºC	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	-16 to 0	±3	dB	Internal

Pin Diagram



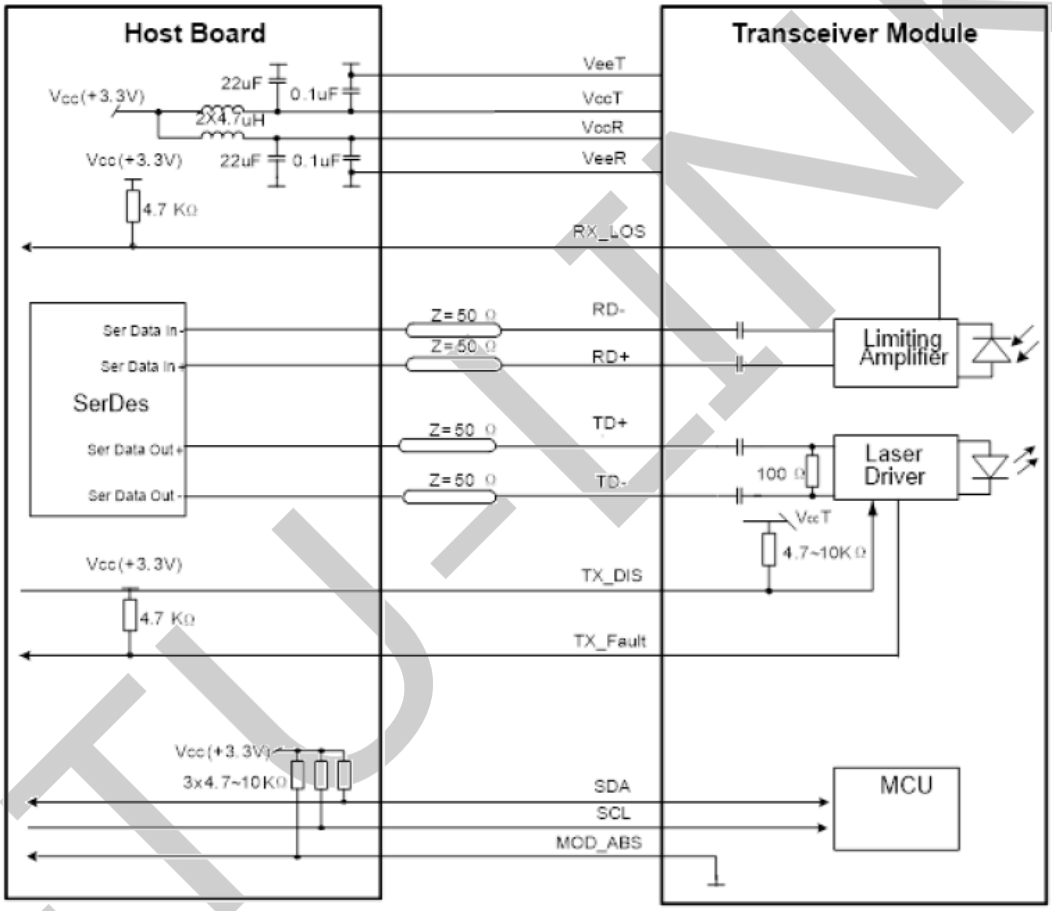
Pin Definitions

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

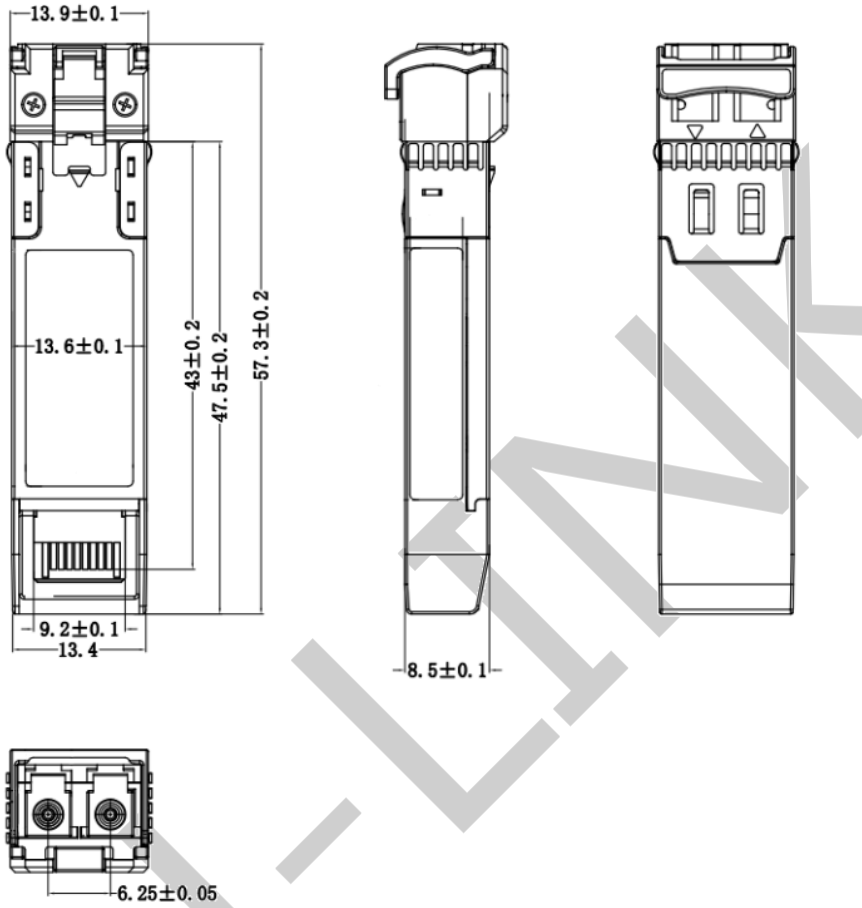
Notes:

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	April,19, 2019	Preliminary datasheet
2.0	November,8,2023	Product upgrades
2.1	Aug 20, 2024	Format change

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