

EB21(12)2X-40D(I)

25Gb/s SFP28 BIDI 40km DDM Transceiver

PRODUCT FEATURES

- Support 25GE and CPRI, data rate up to 25.78125Gbps
- Hot-Pluggable SFP Footprint and Single LC Connector
- Up to 40km reach for G.652 SMF
- 1270nm EML Transmitter and 1310 APD receiver for EB212X-40D(I)
- 1310nm EML Transmitter and 1270 APD receiver for EB122X-40D(I)
- Temperature Range:
 - Commercial: 0°C ~70°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 IEEE802.3cc
- RoHS 6 compliance
- Complies with EU Directive 2015/863/EU



APPLICATIONS

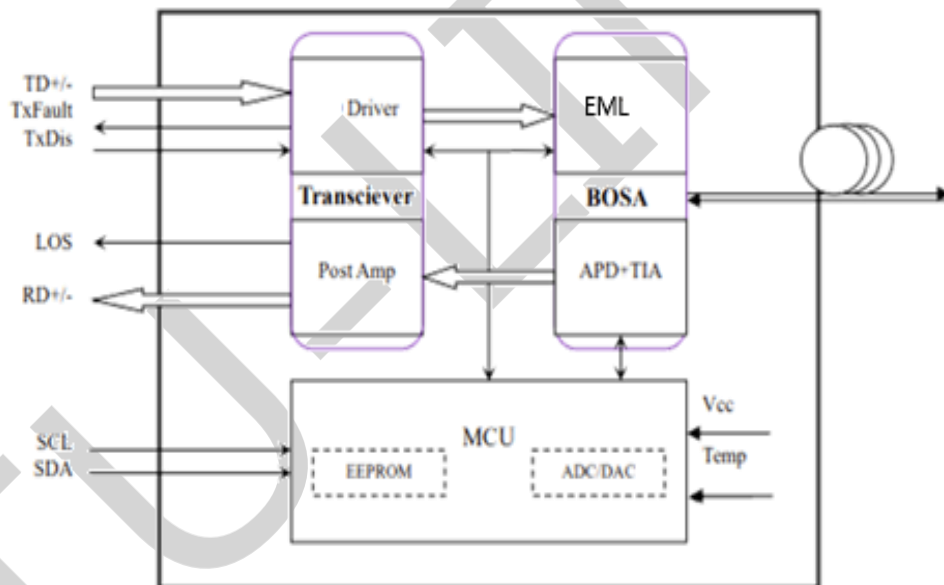
- 25GBASE-BR40 Ethernet

DESCRIPTIONS

The EB21(12)2X-40D(I) series single mode transceivers are high performance, cost effective modules supporting data rate of 25.78Gbps and 40km transmission distance with SMF. The EB21(12)2X-40D(I) module is designed for single mode fiber and operates at a nominal wavelength of 1270nm or 1310nm; the transmitter section uses a multiple quantum well EML, which is class 1 laser compliant according to International Safety Standard IEC-60825.

The SFP28 40km module electrical interface is compliant to SFI electrical specifications. The transmitter input and receiver output impedance is 100 Ohms differential. Data lines are internally AC coupled. The module provides differential termination and reduce differential to common mode conversion for quality signal termination and low EMI.

Module Block Diagram



Ordering Information

Part No.	Data Rate(optical)	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI	Latch Color
EB212X-40D	25.78Gbps	EML	SMF	40km	LC	0~70℃	Y	Red
EB212X-40DI	25.78Gbps	EML	SMF	40km	LC	-40~85℃	Y	Red
EB122X-40D	25.78Gbps	EML	SMF	40km	LC	0~70℃	Y	white
EB122X-40DI	25.78Gbps	EML	SMF	40km	LC	-40~85℃	Y	white

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
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Storage Temperature	T _{stg}	-40		+85	°C	1
Case Operating Temperature (Commercial)	T _o	0		+70	°C	
Case Operating Temperature (Industrial)	T _o	-40		+85	°C	
Relative Humidity - Storage	RH _s	5		95	%	
Relative Humidity - Operating	RH _o	5		85	%	1
DC Supply Voltage	VCC	0		3.6	V	2

Notes:

- Exceeding the Absolute Maximum Ratings may cause irreversible damage to the device.
- The device is not intended to be operated under the condition of simultaneous Absolute Maximum Ratings, a condition which may cause irreversible damage to the device.

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	Top	0		+70	°C	Commercial
		-40		+85		Industrial
Power Supply Voltage	VCC	3.13	3.3	3.47	V	
Power Supply Current	ICC			450	mA	
Maximum Power Dissipation	PD			1.5	W	
Lane Bit Rate	BRLANE		25.78125		Gb/s	
Transmission Distance	TD			40	km	
Coupled fiber	Single mode fiber					9/125um SMF

Electrical Characteristics

High-Speed Signal: Compliant to CEI-28G-VSR

Low-Speed Signal: Compliant to SFF-8419

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Supply Voltage	V _{cc}	3.135		3.465	V	
Transmitter (Module Input)						
Differential Data Input Amplitude	V _{IN,P-P}	-	-	900	mV _{pp}	
Differential Impedance		90	100	110	Ω	
Tx_Disable	Normal Operation	V _{IL}	-0.3	-	0.8	V
	Laser Disable	V _{IH}	2.0	-	VCC+0.3	V
Receiver (Module Output)						
Differential Data Output Amplitude	V _{OUT,P-P}	-	-	900	mV _{pp}	
Differential Termination Mismatch (1MHZ)		-	-	10	%	
Differential Impedance		90	100	110	Ω	
Rx_LOS	Normal Operation	V _{OL}	-0.3	-	0.4	V

	Loss Signal	VOH	2	-	VCCHOST	V	
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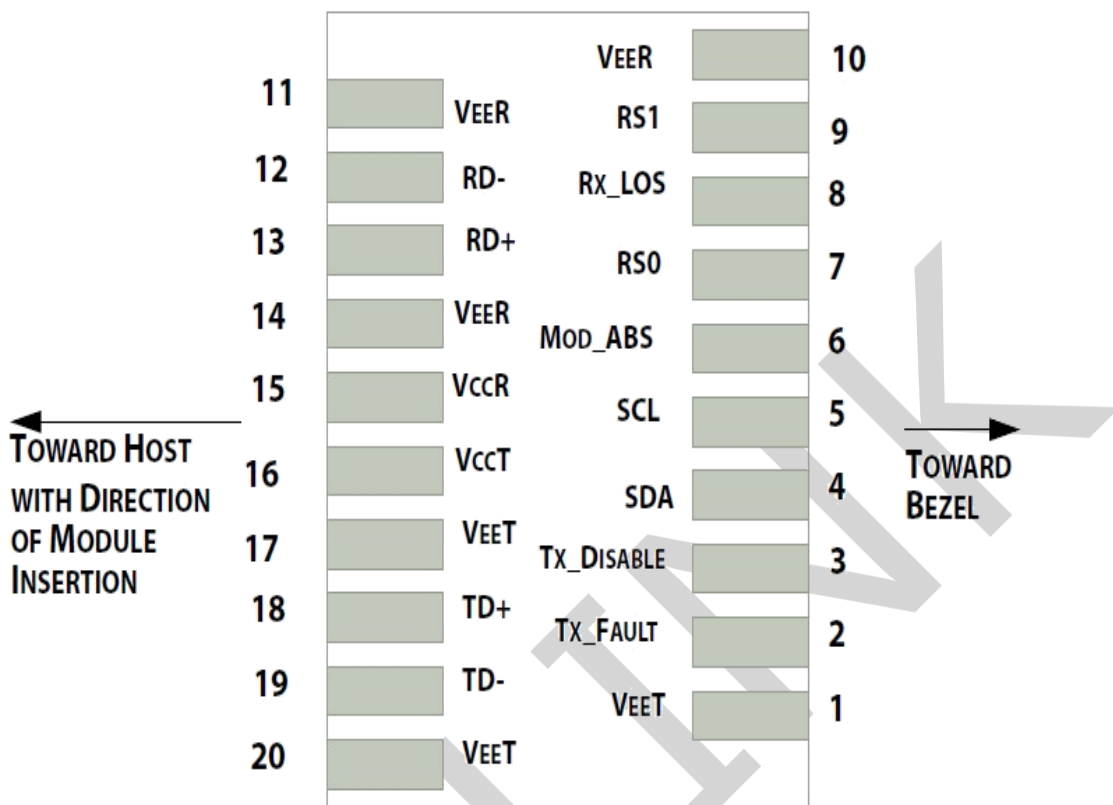
Optical and Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter						
Optical Modulation Amplitude (OMA)	POMA	0	-	6	dBm	
Average Output Power	POUT	-3	-	6	dBm	
Average Output Power (Laser Off)	POFF	-	-	-30	dBm	
Wavelength	λ	1260		1280	nm	EB212X-40D(I)
		1300		1320		EB122X-40D(I)
Spectrum Bandwidth @ -20dB	$\Delta\lambda$	-	-	1	nm	
Side mode suppression ratio (SMSR)	SMSR	30	-	-	dB	
Extinction ratio	ER	4	-	-	dB	
Transmitter and dispersion penalty (TDP)				2.7	dB	
RIN20OMA	RIN	-	-	-130	dB/Hz	
Transmitter Reflectance (max)	TFL			-26	dB	
Receiver						
Wavelength	λ	1300		1320	nm	EB212X-40D(I)
		1260		1280		EB122X-40D(I)
Received Sensitivity (OMA)	P_{IN} (OMA)	-	-	-19	dBm	BER<5E-10 ⁵ PRBS2 ³¹ -1;
Optical Power Overload	P_{IN} (SAT)	-4	-	-	dBm	
Receiver Reflectance	RFL	-	-	-26	dB	
Rx_LOS of Signal Assert	P_A	-35	-	-	dBm	
Rx_LOS of Signal De-assert	P_D	-	-	-21	dBm	
Rx_LOS of Signal Hysteresis	P_{Hy}	0.5	-	5	dB	

Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	-40 to 85	±3	°C	Internal
Voltage	3.13 to 3.47	±3%	V	Internal
Tx Bias Current Per Lane	0 to 100	±10%	mA	Internal
Tx Output Power Per Lane	-3 to 6	±3	dBm	Internal
Rx Power	-21 to -4	±3	dBm	Internal

Pin Diagram



Pin Definitions

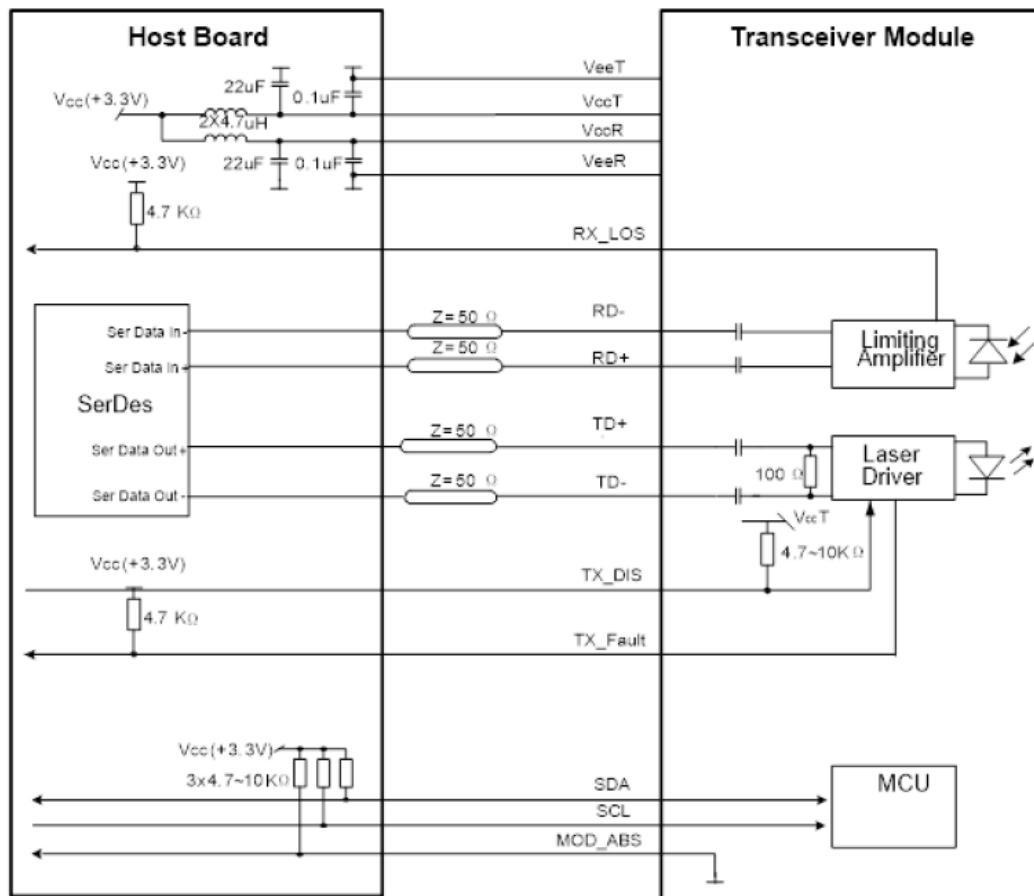
PIN #	Name	Function	Notes
1	VeeT	Transmitter Ground	1
2	Tx_Fault	Transmitter Fault - High indicates a fault condition	2
3	Tx_Disable	Transmitter Disable – High or open disables the transmitter	
4	SDA	2-wire Serial Interface Data Line (MOD-DEF2)	3
5	SCL	2-wire Serial Interface Clock (MOD-DEF1)	3
6	MOD_ABS	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	5
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

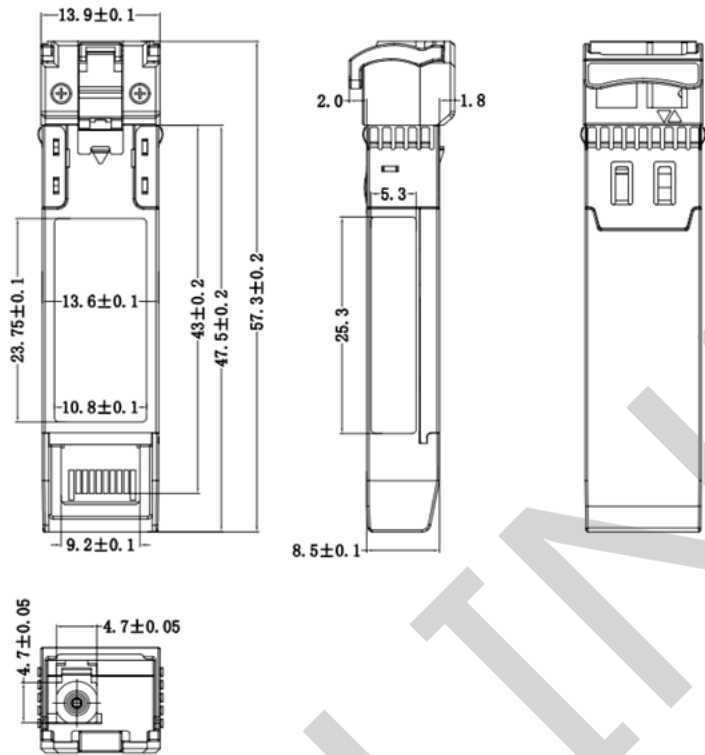
Notes:

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	June 28, 2022	Preliminary datasheet
2.0	Aug 21, 2024	Format change

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