

EB23(32)X-50D(I)

10Gb/s SFP+ BIDI 50km DDM Transceiver

PRODUCT FEATURES

- Supports 9.95Gb/s to 10.3Gb/s data rates
- Simplex LC Connector Bi-Directional SFP+ Optical Transceiver
- Single 3.3V Supply
- Up to 50KM on 9/125um SMF
- A:1270nm DFB Laser transmitter,1330nm APD receiver for EB23X-50D(I)
- B:1330nm DFB Laser transmitter,1270nm APD receiver for EB32X-50D(I)
- SFP+ MSA SFF-8431 Compliant
- Digital Diagnostic SFF-8472 Compliant
- RoHS compliant and Lead Free
- Operating case temperature:
 - Commercial:0°C ~70°C
 - Industrial: -40°C ~85°C



APPLICATIONS

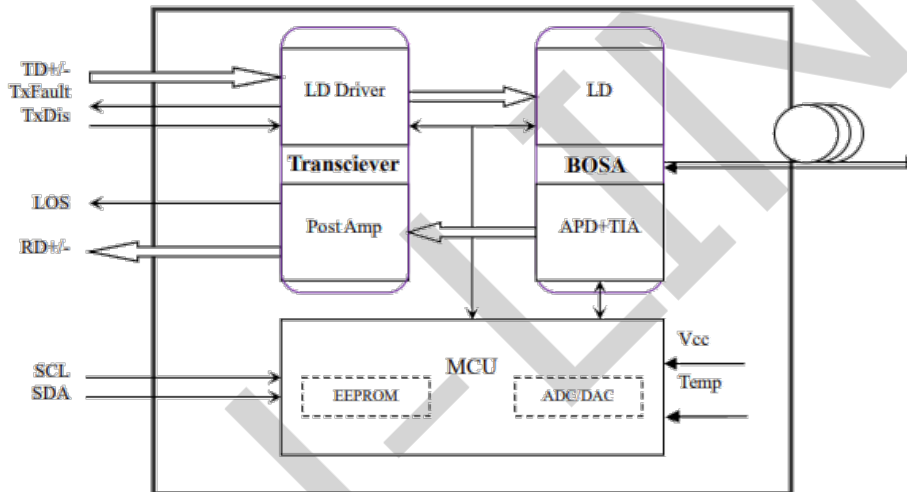
- 10GBASE-LR at 10.3125Gbps
- 10GBASE-LW at 9.953Gbps
- Other Optical Links

DESCRIPTIONS

The EB23(32)X-50D(I) series single mode transceiver is small form factor pluggable module for duplex optical data communications such as 10GBASE-ER/EW defined by IEEE 802.3ae. It is with the SFP+ 20-pin connector to allow hot plug capability.

The EB23(32)X-50D(I) module is designed for single mode fiber and operates at a nominal wavelength of 1270nm or 1330nm;.The transmitter section uses a multiple quantum well DFB, which is class 1 laser compliant according to International Safety Standard IEC-60825.The receiver section consists of a APD photodiode integrated with a TIA.

Module Block Diagram



Ordering Information

Part No.	Data Rate(optical)	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI	Latch Color
EB23X-50D	10.3125Gbps	DFB	SMF	50km	LC	0~70°C	Y	Gray
EB32X-50D	10.3125Gbps	DFB	SMF	50km	LC	0~70°C	Y	Green
EB23X-50DI	10.3125Gbps	DFB	SMF	50km	LC	-40~85°C	Y	Gray
EB32X-50DI	10.3125Gbps	DFB	SMF	50km	LC	-40~85°C	Y	Green

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	T_{op}	0	-	70	°C	Commercial
		-40		85		Industrial
Power Supply Voltage	V_{CC}	3.13	3.3	3.47	V	
Power consumption				1.2	W	
Transmission Distance	TD	-	-	50	km	Over SMF

Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Supply Voltage	V_{CC}	3.14	3.3	3.46	V	
Supply Current	I_{CC}			360	mA	
Transmitter						
Input differential impedance	R_{in}		100		Ω	1
Single ended data input swing	$V_{in,pp}$	180		700	mV	
Transmit Disable Voltage	VD	$V_{CC}-1.3$		V_{CC}	V	
Transmit Enable Voltage	VEN	Vee		$V_{ee}+0.8$	V	2
Transmit Disable Assert Time				10	us	
Receiver						
Differential data output swing	$V_{out,pp}$	300		850	mV	3
Data output rise time	t_r	28			ps	4
Data output fall time	t_f	28			ps	4
LOS Fault	VLOS fault	$V_{CC}-1.3$		$V_{CC}HOST$	V	5
LOS Normal	VLOS norm	Vee		$V_{ee}+0.8$	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.

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.
Transmitter						
Output Opt. Pwr	POUT	0		5	dBm	1
Optical Wavelength	λ		1270/1330		nm	
Wavelength Temperature Dependence			0.08	0.125	nm/°C	
Spectral Width (-20dB)	σ			1	nm	
Optical Extinction Ratio	ER	3.5			dB	
Transmitter and Dispersion Penalty	TDP			3.2	dB	
Optical Rise/Fall Time	tr/ tf		0.1	0.26	ns	
RIN	RIN			-128	dB/Hz	
Output Eye Mask	Compliant with IEEE 0802.3ae					
Receiver						
Rx Sensitivity	RSSENS			-20	dBm	2
Input Saturation Power (Overload)	Psat	-9			dBm	
Wavelength Range	λ_c		1330/1270		nm	
LOS De -Assert	LOSD			-22	dBm	
LOS Assert	LOSA	-30			dBm	
LOS Hysteresis		0.5	1.0		dB	

Note:

- 1) TD+/- are internally AC coupled with 100 Ω differential termination inside the module.
 - 2) Tx Fault and Rx LOS are open collector outputs, which should be pulled up with 4.7k to 10k Ω resistors on the host board.
Pullup voltage between 2.0V and Vcc+0.3V.
- RD+/- outputs are internally AC coupled, and should be terminated with 100 Ω (differential) at the user SERDES.

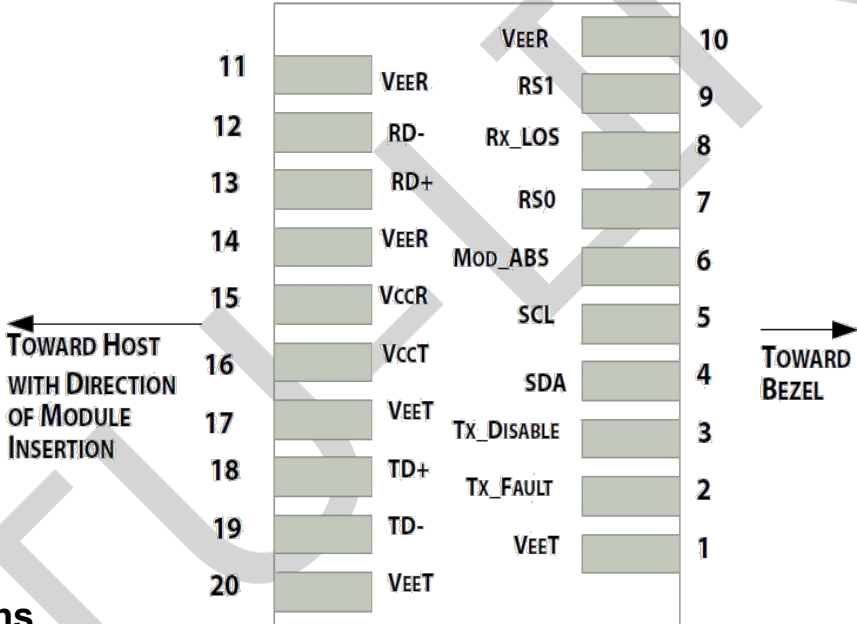
Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	-40 to 85	± 3	°C	Internal
Voltage	0 to Vcc	$\pm 3\%$	V	Internal
Tx Bias Current	0 to 100	$\pm 10\%$	mA	Internal
Tx Output Power	0 to 5	± 3	dB	Internal
Rx Input Power	-22 to 0.5	± 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

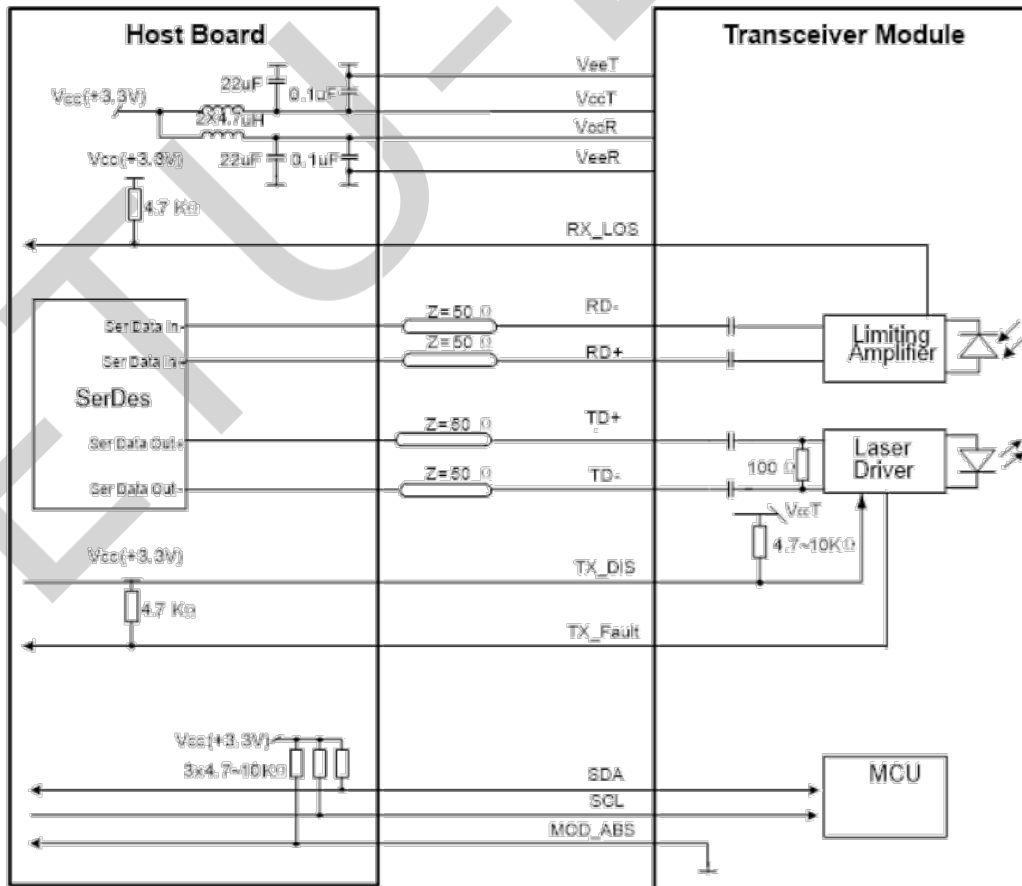
Pin	Symbol	Name/Description	Ref.
1	V _{EET}	Transmitter Ground (Common with Receiver Ground)	1
2	T _{FAULT}	Transmitter Fault.	2
3	T _{DIS}	Transmitter Disable. Laser output disabled on high or open.	3
4	SDA	2-wire Serial Interface Data Line	4
5	SCL	2-wire Serial Interface Clock Line	4
6	MOD_ABS	Module Absent. Grounded within the module	4
7	RS0	Rate Select 0	5
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	6
9	RS1	No connection required	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
15	V _{CCR}	Receiver Power Supply	
16	V _{CCT}	Transmitter Power Supply	
17	V _{EET}	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 _{EET}	Transmitter Ground (Common with Receiver Ground)	1

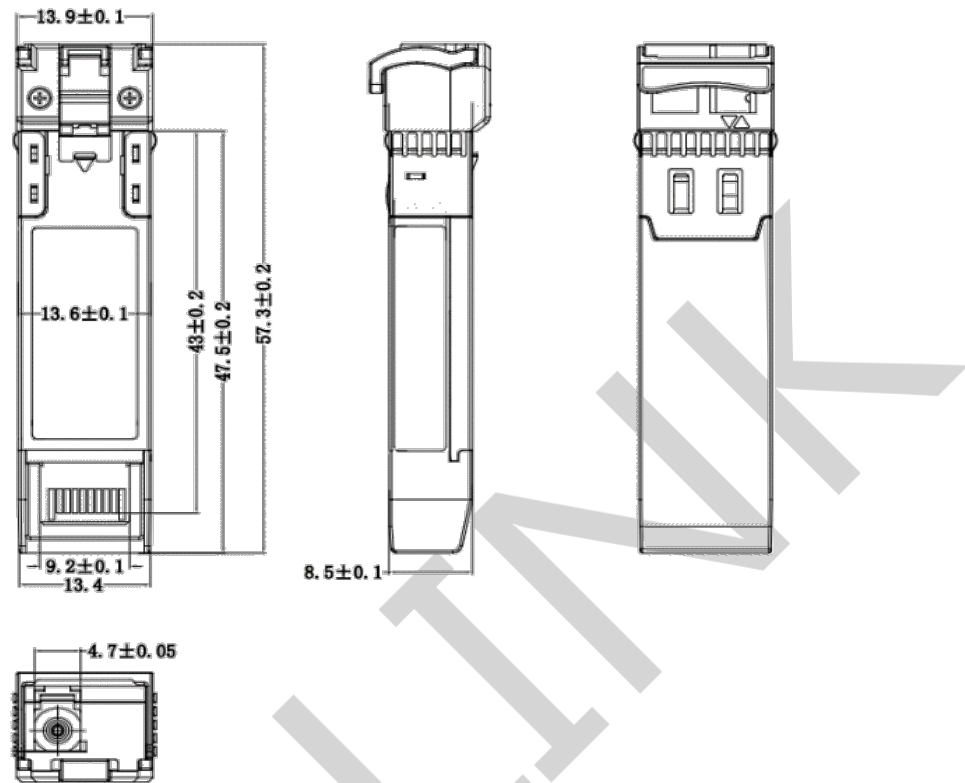
Notes:

- 1) Circuit ground is internally isolated from chassis ground.
- 2) T_{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 V_{cc} + 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_{DIS} >2.0V or open, enabled on T_{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	Sep 17, 2016	Preliminary datasheet
2.0	July 8, 2021	Product upgrades
3.0	Aug 27, 2024	Format change

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