

EB35(53)24-20D(I)

2.488Gbps SFP Bi-Directional 20km SFP Transceiver

PRODUCT FEATURES

- Dual data-rate of 2.488Gbps/2.125Gbps operation
- 1310nm DFB laser and 1550nm PIN photodetector for 20km transmission
- 1550nm DFB laser and 1310nm PIN photodetector for 20km transmission
- Compliant with SFP MSA and SFF-8472 with simplex LC receptacle
- Digital Diagnostic Monitoring:
Internal Calibration or External Calibration
- Compatible with RoHS
- +3.3V single power supply
- Operating case temperature:
Standard : 0 to +70°C
Industrial : -40 to +85°C



APPLICATIONS

- SDH STM-16 and SONET OC-48 system
- Fiber Channel
- Switch to Switch interface
- Switched backplane applications
- Router/Server interface
- Other optical transmission systems

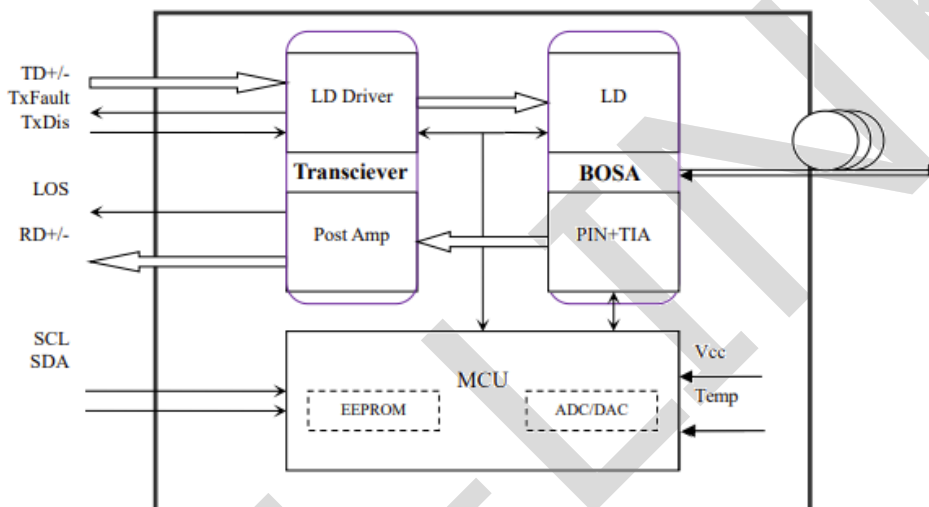
DESCRIPTIONS

The SFP-BIDI transceivers are high performance, cost effective modules supporting dual data-rate of 2.488Gbps/2.125Gbps and 20km transmission distance with SMF.

The transceiver consists of three sections: a DFB 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 (MSA) and SFF-8472. For further information, please refer to SFP MSA.

Module Block Diagram



Ordering Information

Part No.	Data Rate(opti cal)	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI	Latch Color
EB3524-20D	.2.488G	DFB	SMF	20KM	LC	0~70℃	Y	Blue
EB5324-20D	.2.488G	DFB	SMF	20KM	LC	0~70℃	Y	Yellow
EB3524-20DI	.2.488G	DFB	SMF	20KM	LC	-40~85℃	Y	Blue
EB5324-20DI	.2.488G	DFB	SMF	20KM	LC	-40~85℃	Y	Yellow

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Maximum Supply Voltage	Vcc	-0.5		4.7	V	
Storage Temperature	TS	-40		85	℃	
Case Operating Temperature	TOP	0		70	℃	Commercial
Case Operating Temperature	TOP	-40		85	℃	Industrial

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 _{CC}	3.13	3.3	3.47	V	
Transmission Distance	TD	-	-	20	km	Over SMF

Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Supply Voltage	V _{CC}	3.15	3.3	3.6	V	
Supply Current	I _{CC}		185	280	mA	
Transmitter (Module Input)						
Input differential impedance	R _{in}		100		Ω	1
Single ended data input swing	V _{in,pp}	250		1200	mV	
Transmit Disable Voltage	VD	V _{CC} -1.3		V _{CC}	V	
Transmit Enable Voltage	VEN	V _{EE}		V _{EE} + 0.8	V	2
Transmit Disable Assert Time				10	us	
Receiver (Module Output)						
Single ended data output swing	V _{out,pp}	250		800	mV	3
Data output rise time	t _r		100	175	ps	4
Data output fall time	t _f		100	175	ps	4
LOS Fault	V _{LOS} fault	V _{CC} -0.5		V _{CC} HOST	V	5

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.
6. 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.	Typical	Max.	Unit	Notes
Transmitter						
Operating Wavelength		1260 1530	1310 1550	1360 1570	nm	EB3524-20D(I) EB5324-20D(I)
Ave. output power (Enabled)	P _o	-5		0	dBm	1
Extinction Ratio	ER	10			dB	1
RMS spectral width	Δλ			4	nm	
Rise/Fall time (20%~80%)	Tr/Tf			0.26	ps	2

Output Eye Mask	Telcordia GR-253-CORE and ITU-T G.957 compatible					
Receiver						
Operating Wavelength		1480 1260		1580 1360	nm	EB3524-20D(I) EB5324-20D(I)
Sensitivity	Psen			-18	dBm	3
Min. overload	Pimax	-3			dBm	
LOS Assert	Pa	-30			dBm	
LOS De-assert	Pd			-22	dBm	4
LOS Hysteresis	Pd-Pa	0.5		6	dB	

Notes:

Note

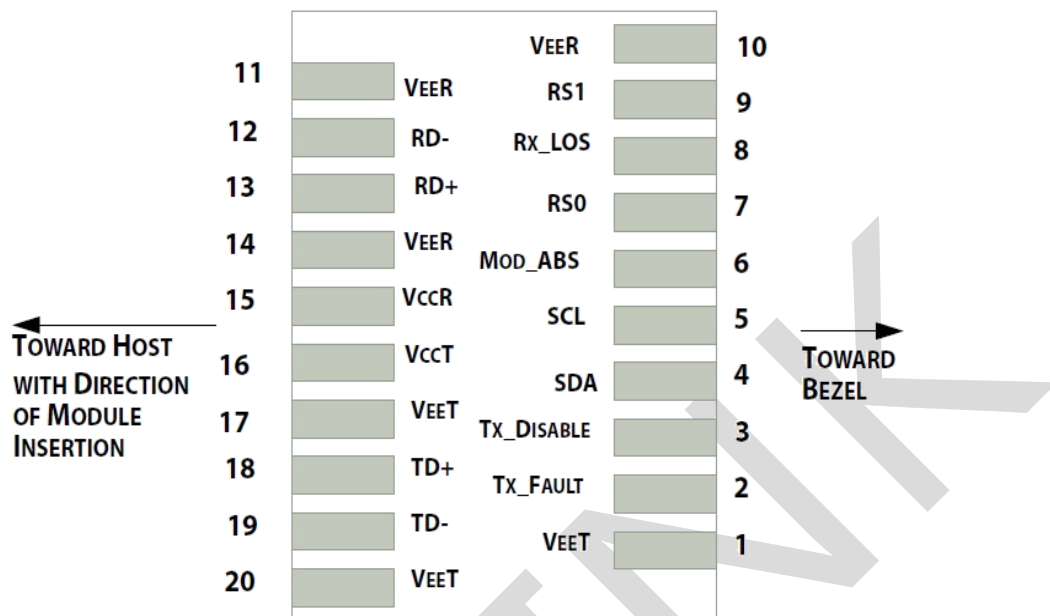
1. Measure at 2^{-23} -1 NRZ PRBS pattern
2. Transmitter eye mask definition
3. Measured with Light source 1550nm (1310nm), ER=10dB; BER $\leq 10^{-12}$ @PRBS= 2^{-23} -1 NRZ.
4. When LOS de-asserted, the RX data+/- output is signal output.

Digital Diagnostics

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF-8472 Rev10.2 with internal calibration mode. For external calibration mode please contact our sales staff.

Parameter	Symbol	Min.	Max	Unit	Notes
Temperature monitor absolute error	DMI_Temp	-3	3	°C	Over operating temp
Supply voltage monitor absolute error	DMI_VCC	-0.15	0.15	V	Full operating range
RX power monitor absolute error	DMI_RX	-3	3	dB	
Bias current monitor	DMI_bias	-10%	10%	mA	
TX power monitor absolute error	DMI_TX	-3	3	dB	

Pin Diagram



Definitions

PIN #	Name	Function	Notes
1	VeeT	Tx ground	
2	Tx Fault	Tx fault indication, Open Collector Output, active “H”	1
3	Tx Disable	LVTTTL Input, internal pull-up, Tx disabled on “H”	2
4	MOD-DEF2	2 wire serial interface data input/output (SDA)	3
5	MOD-DEF1	2 wire serial interface clock input (SCL)	3
6	MOD-DEF0	Model present indication	3
7	Rate select	No connection	
8	LOS	Rx loss of signal, Open Collector Output, active “H”	4
9	VeeR	Rx ground	
10	VeeR	Rx ground	
11	VeeR	Rx ground	
12	RD-	Inverse received data out	5
13	RD+	Received data out	5
14	VeeR	Rx ground	
15	VccR	Rx power supply	
16	VccT	Tx power supply	
17	VeeT	Tx ground	
18	TD+	Transmit data in	6
19	TD-	Inverse transmit data in	6
20	VeeT	Tx ground	

Notes:

- 1) When high, this output indicates a laser fault of some kind. Low indicates normal operation. And it should be pulled up with a

4.7 – 10K Ω resistor on the host board.

2) TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7 – 10K Ω resistor. Its states are:

Low (0 – 0.8V): Transmitter on ($>0.8, < 2.0V$): Undefined

High (2.0V–V_{cc}+0.3V): Transmitter Disabled Open: Transmitter Disabled

3) Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7K – 10K Ω resistor on the host board. The pull-up voltage shall be V_{cc}T or V_{cc}R.

Mod-Def 0 has been grounded by the module to indicate that the module is present

Mod-Def 1 is the clock line of two wire serial interface for serial ID

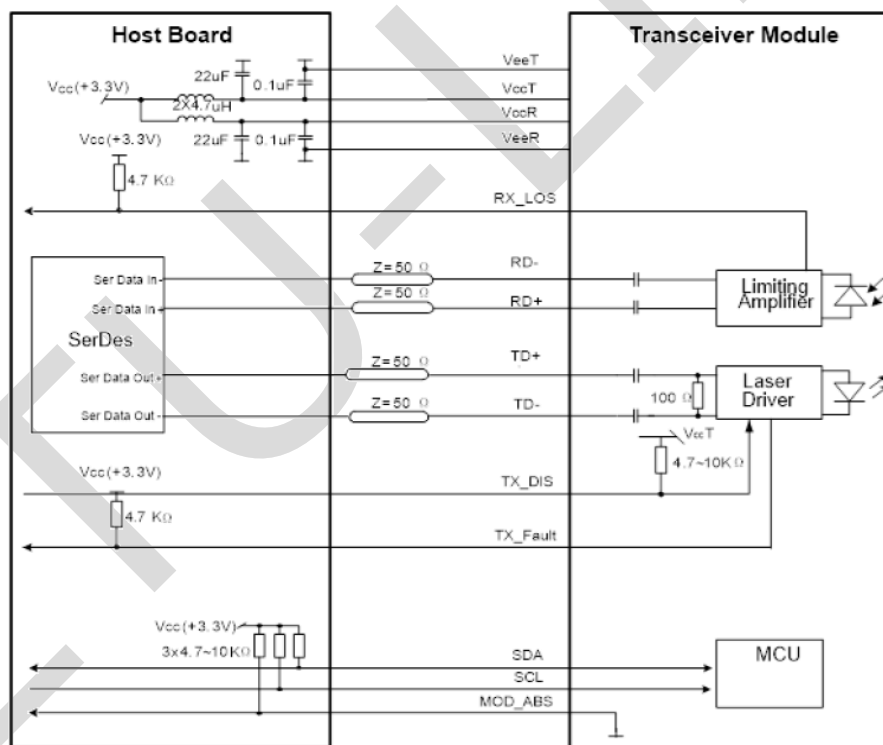
Mod-Def 2 is the data line of two wire serial interface for serial ID

4) When high, this output indicates loss of signal (LOS). Low indicates normal operation.

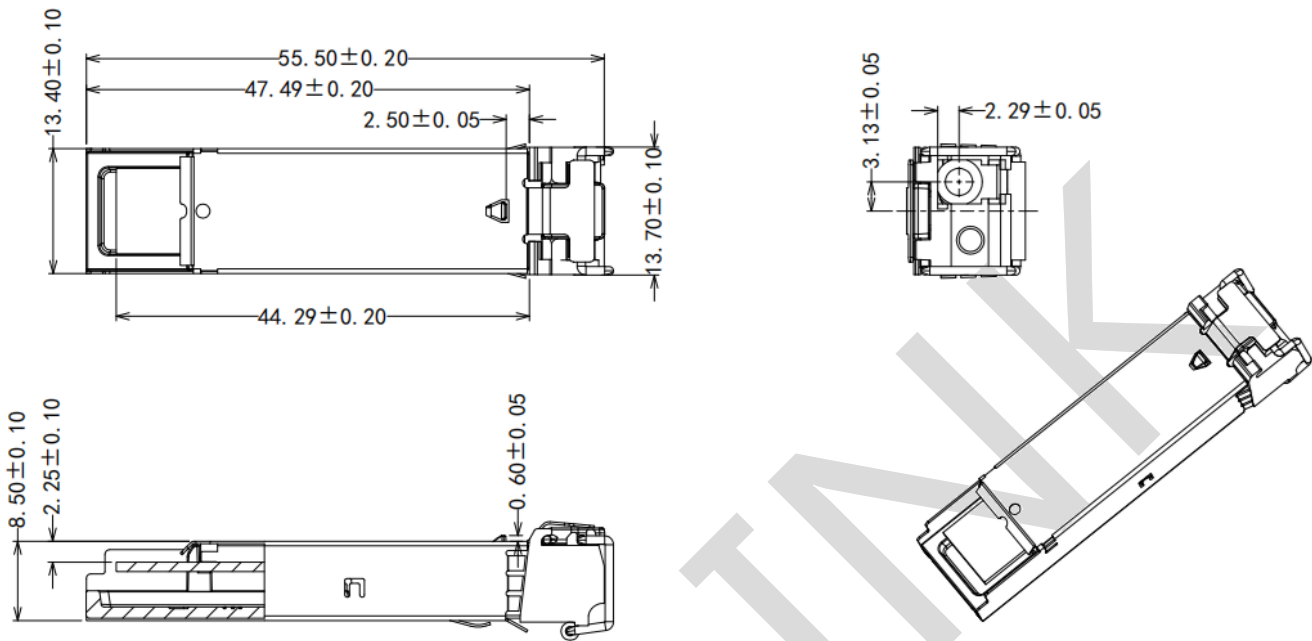
5) RD+/-: These are the differential receiver outputs. They are AC coupled 100 Ω differential lines which should be terminated with 100 Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.

6) TD+/-: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100 Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board

Recommended Interface Circuit



Mechanical Diagram



Revision History

Version No.	Date	Description
1.0	February 8, 2015	Preliminary datasheet
2.0	October 11,2023	Product upgrades
3.0	July 22, 2024	Format change

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