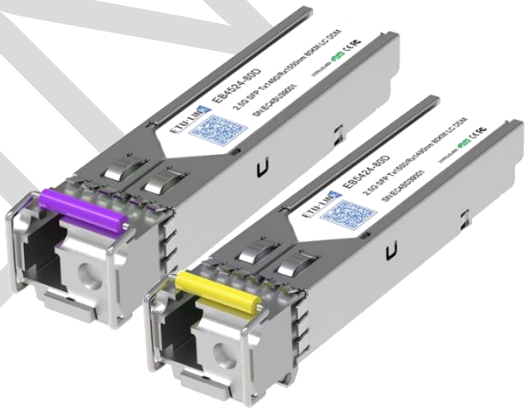
EB45(54)24-C0D(I)

2.488Gbps SFP Bi-Directional 120km SFP Transceiver

PRODUCT FEATURES



- Up to 2.5Gb/s data links
- 1490nm DFB laser and 1550nm APD photodetector for 20km transmission
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- Up to 120km on 9/125um SMF
- Hot-pluggable SFP footprint
- Duplex LC/UPC type pluggable optical interface
- Low power dissipation
- RoHS-10 compliant and lead-free
- Support Digital Monitoring interface
- Single +3.3V power supply
- Compliant with SFF-8472
- Metal enclosure, for lower EMI
- Meet ESD requirements, resist 8KV direct contact voltage
- Support STM-1, STM-4, 1GE, OTU-1. I find only STM-16
- Case operating temperature

  Commercial: 0 ~ +70℃

  Industrial: -40 ~ +85℃

APPLICATIONS

- Switch to Switch Interface
- Gigabit Ethernet
- Switched Backplane Applications
- Router/Server Interface
- Other Optical Links

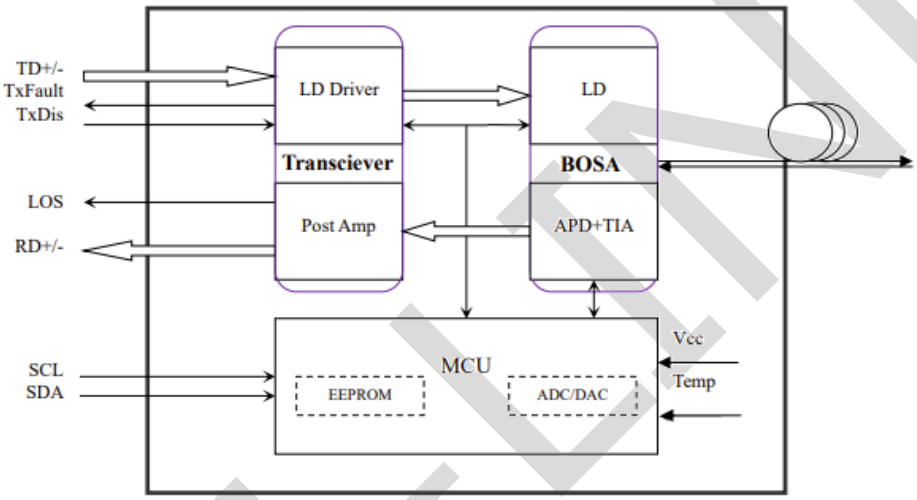
DESCRIPTIONS

The SFP-BIDI transceivers are high performance, cost effective modules supporting dual data-rate of 2.488Gbps/2.125Gbps and 120km transmission distance with SMF.

The transceiver consists of three sections: a DFB laser transmitter, a APD 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(optical)	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI	Latch Color
EB4524-C0D	.2.488G	DFB	SMF	120KM	LC	0~70℃	Y	Purple
EB5424-C0D	.2.488G	DFB	SMF	120KM	LC	0~70℃	Y	Yellow
EB4524-C0DI	.2.488G	DFB	SMF	120KM	LC	-40~85℃	Y	Purple
EB5424-C0DI	.2.488G	DFB	SMF	120KM	LC	-40~85℃	Y	Yellow

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage Temperature	TS	-40		85	□	
Power Supply Voltage	VCC	-0.5		3.6	V	
Relative Humidity (non-condensation)	RH	5		95	%	
Damage Threshold	THd	0			dBm	

Recommended Operating Conditions

Operating Case Temperature	TOP	0		70	°C	commercial
		-40		85		Industrial
Power Supply Voltage	VCC	3.135	3.3	3.465	V	
Data Rate			2.5		Gb/s	
Control Input Voltage High		2		Vcc	V	
Control Input Voltage Low		0		0.8	V	
Link Distance (SMF)	D			120	km	9/125um

Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Power Consumption	P			0.95	W	commercial
				1.00		Industrial
Supply Current	Icc			280	mA	commercial
				300		Industrial
Transmitter (Module Input)						
Single-ended Input Voltage Tolerance	VCC	-0.3		4.0	V	
Differential Input Voltage Swing	Vin,pp	200		2400	mV pp	
Differential Input Impedance	Zin	90	100	110	Ohm	
Transmit Disable Assert Time				5	us	
Transmit Disable Voltage	Vdis	Vcc-1.3		Vcc	V	
Transmit Enable Voltage	Ven	Vee-0.3		0.8	V	
Receiver (Module Output)						
Differential Output Voltage Swing	Vout,pp	500		900	mV pp	
Differential Output Impedance	Zout	90	100	110	Ohm	
Data output rise/fall time	Tr/Tf		100		ps	20% to 80%
LOS Assert Voltage	VlosH	Vcc-1.3		Vcc	V	
LOS De-assert Voltage	VlosL	Vee-0.3		0.8	V	

Optical and Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter						
Center Wavelength	λC	1470	1490	1510	nm	EB4524-C0D(I)
		1530	1550	1570	nm	EB5424-C0D(I)
Spectrum Bandwidth (RMS)	σ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Optical Power	PAVG	1		6	dBm	1
Extinction Ratio	ER	8.2			dB	
Transmitter OFF Output Power	Poff			-45	dBm	
Transmitter Eye Mask	Compliant with G.957(class 1 laser safety)					2
Receiver						
Center Wavelength	λC	1530	1550	1570	nm	EB4524-C0D(I)
		1470	1490	1510	nm	EB5424-C0D(I)
Sensitivity (Average Power)	Sen.			-31	dBm	3
Input Saturation Power(overload)	Psat	-10			dBm	
LOS Assert	LOSA	-41			dBm	4
LOS De-assert	LOSD			-32	dBm	4
LOS Hysteresis	LOSH	0.5			dB	

Notes:

1.Measure at 2^{23}-1 NRZ PRBS pattern.

2.Transmitter eye mask definition.

3.Measured with Light source 1490nm/1550nm, ER=8.2dB; BER≤1E-12 @PRBS=2^{23} -1 NRZ.

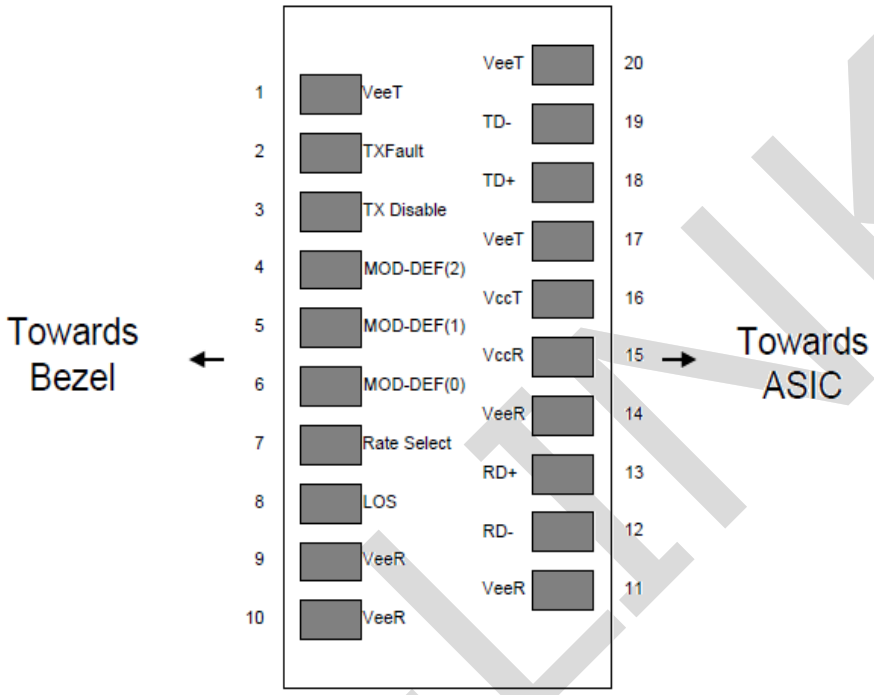
4.When LOS de-asserted, the RX data+/- output is High-level (fixed).

Digital Diagnostics

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	

Parameter	Symbol	Min.	Max.	Unit	Notes
TX power monitor absolute error	DMI_TX	-3	3	dB	

Pin Diagram



Pin Definitions

PIN #	Name	Function	Notes
1	VEET	Transmitter Ground (Common with Receiver Ground)	1
2	TXFAULT	Transmitter Fault.	
3	TXDIS	Transmitter Disable. Laser output disabled on high or open.	2
4	MOD_DEF (2)	Module Definition 2. Data line for Serial ID.	3
5	MOD_DEF (1)	Module Definition 1. Clock line for Serial ID.	3
6	MOD_DEF (0)	Module Definition 0. Grounded within the module.	3
7	Rate Select	No connection required	4
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	5
9	VEER	Receiver Ground (Common with Transmitter Ground)	1
10	VEER	Receiver Ground (Common with Transmitter Ground)	1
11	VEER	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	VEER	Receiver Ground (Common with Transmitter Ground)	1
15	VCCR	Receiver Power Supply	
16	VCCT	Transmitter Power Supply	
17	VEET	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	VEET	Transmitter Ground (Common with Receiver Ground)	1

Notes:

1.Circuit ground is internally isolated from chassis ground.

2.Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.

3.Should be pulled up with 4.7k-10k ohms on host board to a voltage between 2.0V and 3.6V.MOD_DEF (0) pulls line low to indicate module is plugged in.

4.This is an optional input used to control the receiver bandwidth for compatibility with multiple data rates (most likely Fiber Channel 1x and 2x Rates). If implemented, the input will be internally pulled down with > 30kΩ resistor. The input states are:

1)Low (0 – 0.8V): Reduced Bandwidth

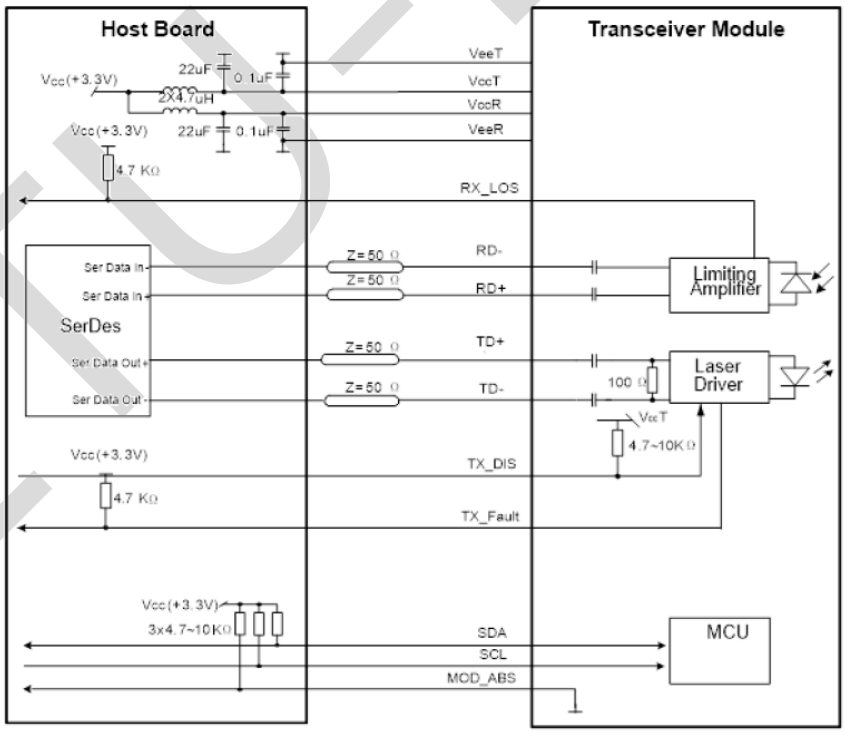
2)(>0.8, < 2.0): Undefined

3)High (2.0 – 3.465V): Full Bandwidth

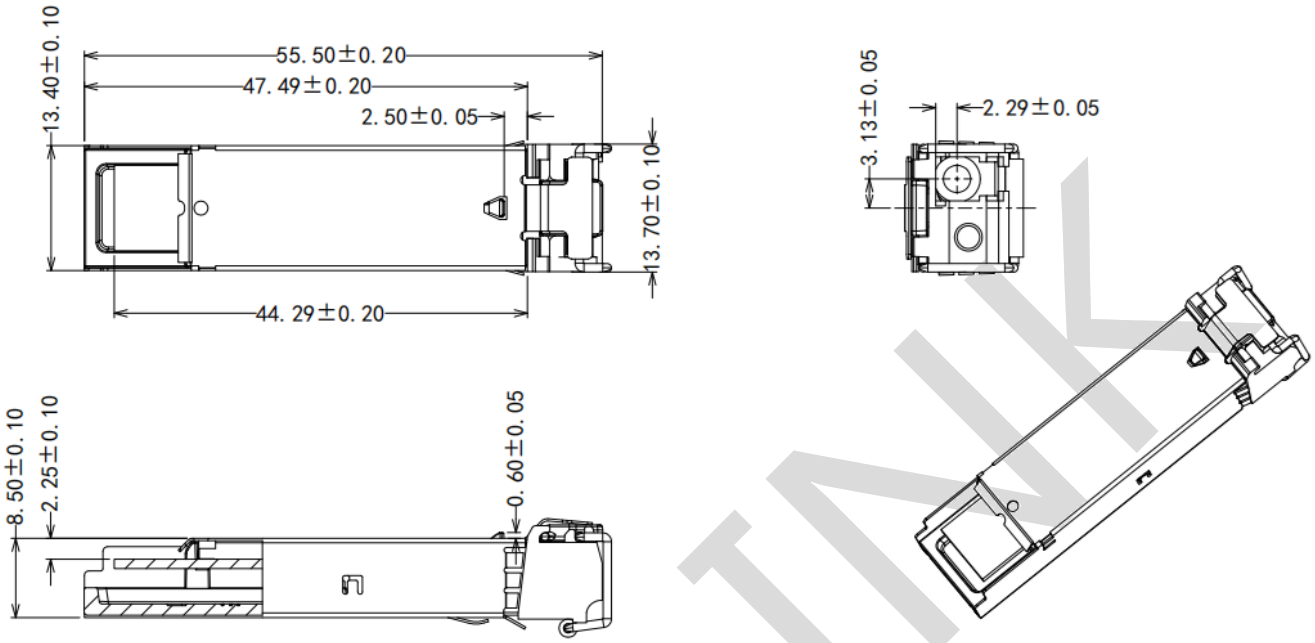
4)Open: Reduced Bandwidth

5.LOS is open collector output should be pulled up with 4.7k-10k ohms 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	February 8, 2015	Preliminary datasheet
2.0	October 11,2023	Product upgrades
3.0	July 22, 2024	Format change

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