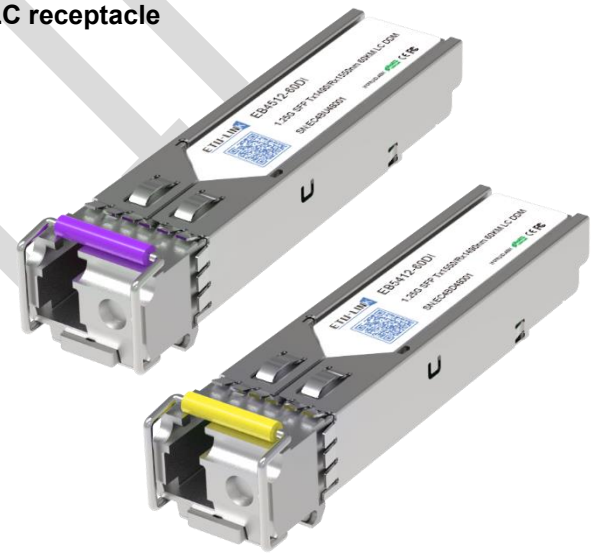
EB45(54)12-40D(I)

1.25Gbps SFP Bi-Directional 40km SFP Transceiver

PRODUCT FEATURES



- Dual data-rate of 1.25Gbps/1.063Gbps operation
- 1490nm DFB laser and PIN photodetector for 40KM transmission
- 1550nm DFB laser and PIN photodetector for 40KM transmission
- Compliant with SFP MSA and SFF-8472 with simplex LC receptacle
- Digital Diagnostic Monitoring:

  Internal Calibration or External Calibration
- Compatible with SONET OC-24-LR-1
- Compatible with RoHS
- +3.3V single power supply
- Operating case temperature range:

  0 ° C to +70 ° C (Commercial)

  -40 ° C to +85 ° C (Industrial)

APPLICATIONS

- Gigabit Ethernet
- Fiber Channel
- Switch to Switch interface
- Switched backplane applications
- Router/Server interface
- Other optical transmission systems

ETU-LINK

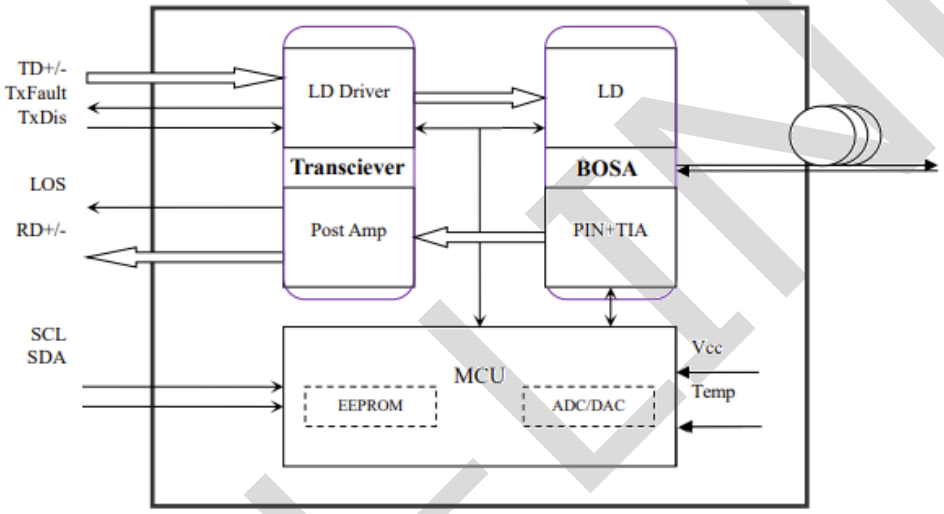
DESCRIPTIONS

The SFP-BIDI transceivers are high performance, cost effective modules supporting dual data-rate of 1.25Gbps/1.0625Gbps and 40KM 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(optical)	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI	Latch Color
EB4512-40D	1.25G	DFB	SMF	40KM	LC	0~70℃	Y	Purple
EB5412-40D	1.25G	DFB	SMF	40KM	LC	0~70℃	Y	Yellow
EB4512-40DE	1.25G	DFB	SMF	40KM	LC	-20~85℃	Y	Purple
EB5412-40DE	1.25G	DFB	SMF	40KM	LC	-20~85℃	Y	Yellow
EB4512-40DI	1.25G	DFB	SMF	40KM	LC	-40~85℃	Y	Purple
EB5412-40DI	1.25G	DFB	SMF	40KM	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	°C	

Case Operating Temperature	TOP	0		70	°C	(Commercial)
Case Operating Temperature	TOP	-40		85	°C	(Industrial)

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Case Operating Temperature	Top	0	-	70	℃	Commercial
		-40		85		Industrial
Power Supply Voltage	Vcc	3.13	3.3	3.47	V	
Transmission Distance	TD	-	-	40	km	Over SMF

Electrical Characteristics(TOP = 0 to 70℃, VCC = 3.15 to 3.60Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Supply Voltage	Vcc	3.15	3.3	3.6	V	
Supply Current	Icc		185	280	mA	
Transmitter (Module Input)						
Input differential impedance	Rin		100		Ω	1
Single ended data input swing	Vin,pp	250		1200	mV	
Transmit Disable Voltage	VD	Vcc–1.3		Vcc	V	
Transmit Enable Voltage	VEN	Vee		Vee+ 0.8	V	2
Transmit Disable Assert Time				10	us	
Receiver (Module Output)						
Single ended data output swing	Vout,pp	250		800	mV	3
Data output rise time	tr		100	175	ps	4
Data output fall time	tf		100	175	ps	4
LOS Fault	VLOS fault	Vcc–0.5		VccHOST	V	5
LOS Normal	VLOS norm	Vee		Vee+0.5	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 LVTTL. 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	λC	1470 1530	1490 1550	1510 1570	nm	EB4512-40D(I) EB5412-40D(I)
Ave. output power (Enabled)	Po	-5		0	dBm	1
Extinction Ratio	ER	9			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		1530 1470		1570 1490	nm	EB4512-40D(I) EB5412-40D(I)
Sensitivity	Psen			-24	dBm	3
Min. overload	Pimax	-3			dBm	
LOS Assert	Pa	-36			dBm	
LOS De-assert	Pd			-26	dBm	4
LOS Hysteresis	Pd-Pa	0.5		6	dB	

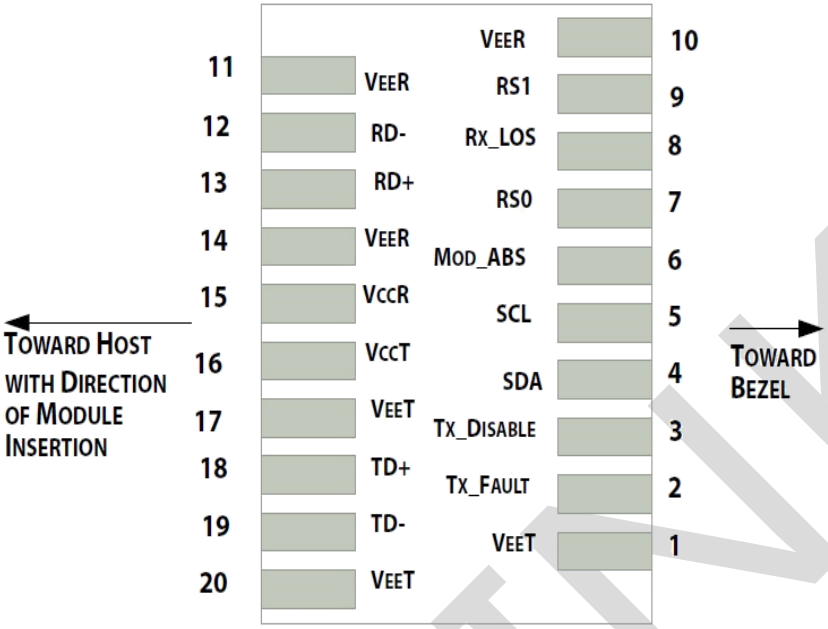
Notes:

1. Measure at 2^7-1 NRZ PRBS pattern
2. Transmitter eye mask definition
3. Measured with Light source 1490nm (1550nm), ER=10dB; BER =<10^-12 @PRBS=2^7-1 NRZ.
4. When LOS de-asserted, the RX data+/- output is signal output.

Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	-40 to 85	±3	℃	Internal
Voltage	0 to 3.6	±3%	V	Internal
Tx Bias Current	0 to 100	±10%	mA	Internal
Tx Output Power	-5 to 0	±3	dB	Internal
Rx Input Power	-24 to -3	±3	dB	Internal

Pin Diagram



Pin Definitions

PIN #	Name	Function	Notes
1	VeeT	Tx ground	
2	Tx Fault	Tx fault indication, Open Collector Output, active “H”	1
3	Tx Disable	LVTTL 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 should be pulled up with a 4.7 – 10KΩ 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 – 10KΩ resistor. Its states are:

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

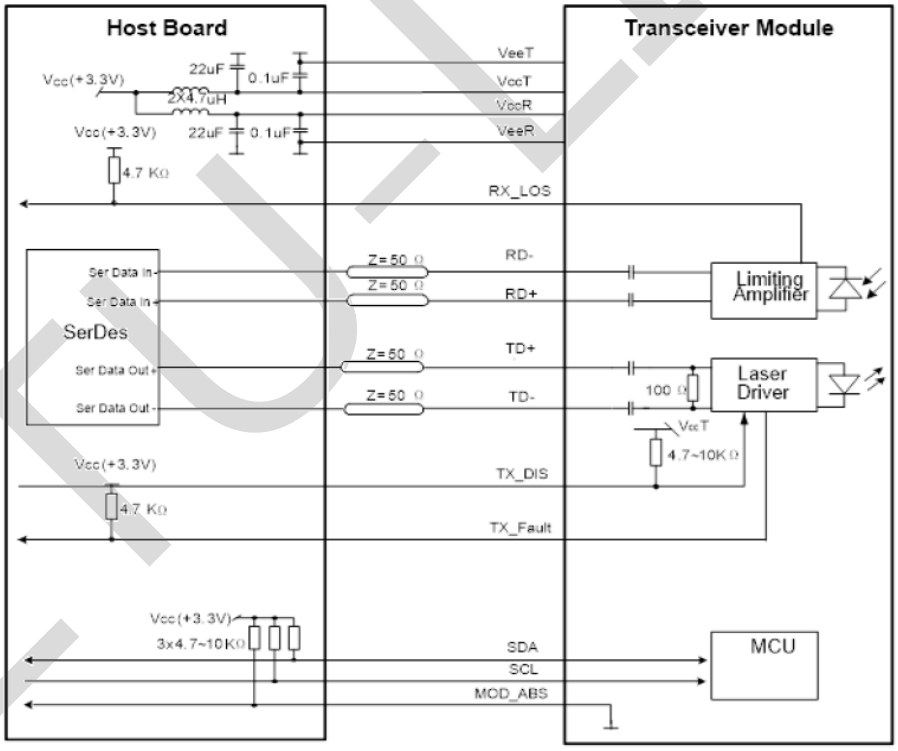
   High (2.0V~Vcc+0.3V): Transmitter Disabled Open: Transmitter Disabled
3. Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7K – 10KΩ resistor on the host board. The pull-up voltage shall be VccT or VccR.

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

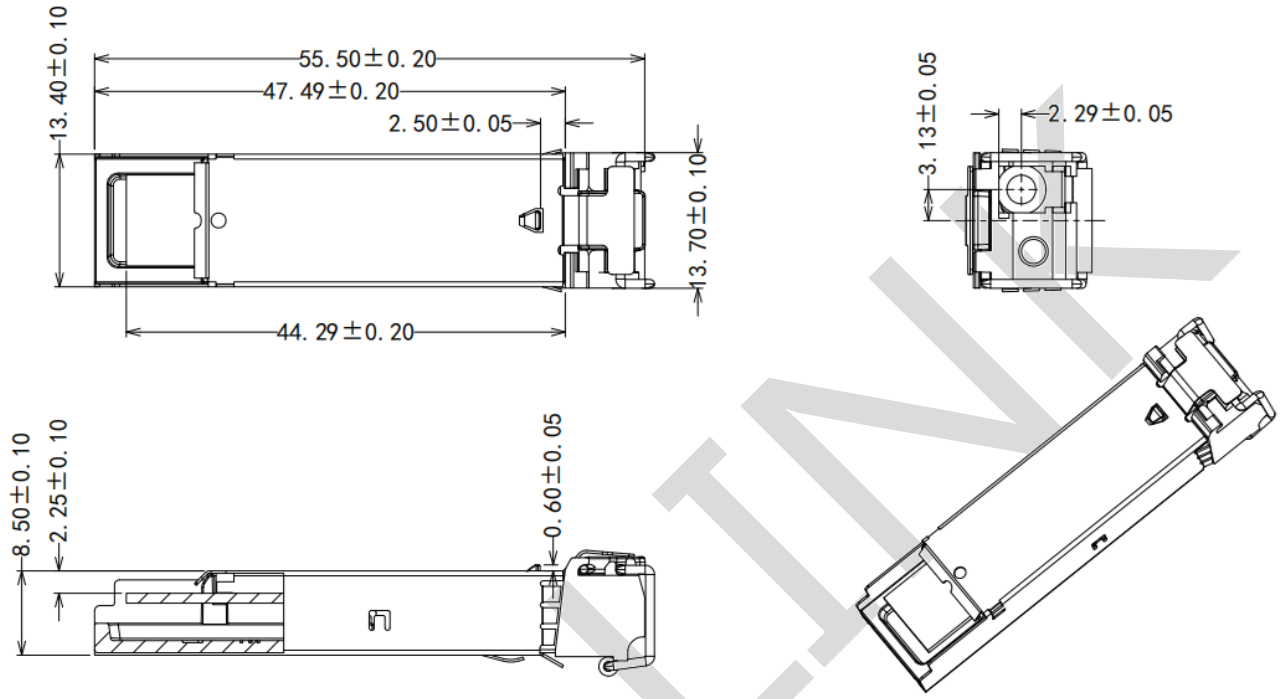
   Mod-Def 1 is the clock line of two wire serial interface for serial ID

   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 100Ω differential lines which should be terminated with 100Ω (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 100Ω 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	January 21st, 2026	Preliminary datasheet

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