

**E-SFP-BD-IR-31****BIDI SFP 1310nm-TX/1550nm-RX 3KM SMF Transceiver****Features**

- Dual data-rate of 1.25Gbps/1.063Gbps operation
- 1310nm FP laser and PIN photodetector for 3km 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: Standard: 0 to +70°C, Industrial: -40 to +85°C

**Applications**

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

**1. Absolute Maximum Ratings**

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.5	4.5	V
Storage Temperature	Ts	-40	+85	°C
Operating Humidity	-	5	85	%

**2. Recommended Operating Conditions**

Parameter		Symbol	Min	Typical	Max	Unit
Operating Case	Standar	Tc	0		+70	°C
Power Supply Voltage		Vcc	3.13	3.3	3.47	V
Power Supply Current		Icc			300	mA
Data Rate	Gigabit Ethernet			1.25		Gbps
	Fiber Channel			1.063		

### 3. Optical and Electrical Characteristics

Parameter		Symbol	Min	Typical	Max	Unit	Notes
<b>Transmitter</b>							
Centre Wavelength		$\lambda_c$	1260	1310	1360	nm	
Spectral Width (RMS)		$\Delta\lambda$			4	nm	
Average Output Power		P <sub>out</sub>	-9		-3	dBm	1
Extinction Ratio		ER	6			dB	
Optical Rise/Fall Time		tr/tf			0.26	ns	
Data Input Swing Differential		V <sub>IN</sub>	400		1800	mV	2
Input Differential Impedance		Z <sub>IN</sub>	90	100	110	$\Omega$	
TX Disable	Disable		2.0		V <sub>cc</sub>	V	
	Enable		0		0.8	V	
TX Fault	Fault		2.0		V <sub>cc</sub>	V	
	Normal		0		0.8	V	
<b>Receiver</b>							
Centre Wavelength		$\lambda_c$	1530		1570	nm	
Receiver Sensitivity					-21	dBm	3
Receiver Overload			-3			dBm	3
LOS De-Assert		LOS <sub>D</sub>			-23	dBm	
LOS Assert		LOS <sub>A</sub>	-35			dBm	
LOS Hysteresis			1		4	dB	
Data Output Swing		V <sub>out</sub>	400		1800	mV	4
LOS	High		2.0		V <sub>cc</sub>	V	
	Low				0.8	V	

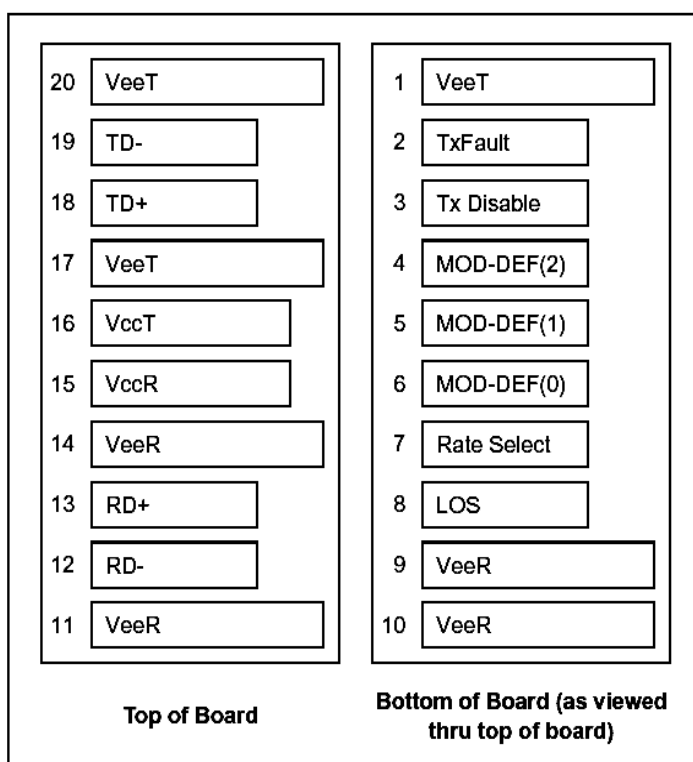
**Notes:**

1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS 27-1 test pattern @1250Mbps, BER  $\leq 1 \times 10^{-12}$ .
4. Internally AC-coupled.

### 4. Timing and Electrical

Parameter	Symbol	Min	Typical	Max	Unit
Tx Disable Negate Time	t <sub>on</sub>			1	ms
Tx Disable Assert Time	t <sub>off</sub>			10	$\mu$ s
Time To Initialize, including Reset of Tx	t <sub>init</sub>			300	ms
Tx Fault Assert Time	t <sub>fault</sub>			100	$\mu$ s
Tx Disable To Reset	t <sub>reset</sub>	10			$\mu$ s
LOS Assert Time	t <sub>loss_on</sub>			100	$\mu$ s
LOS De-assert Time	t <sub>loss_off</sub>			100	$\mu$ s
Serial ID Clock Rate	f <sub>serial_clock</sub>			400	KHz
MOD_DEF (0:2)-High	V <sub>H</sub>	2		V <sub>cc</sub>	V
MOD_DEF (0:2)-Low	V <sub>L</sub>			0.8	V

## 5. Pin Definitions



## 6. Pin Descriptions

Pin	Signal Name	Description	Plug Seq.	Notes
1	V <sub>EET</sub>	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX DISABLE	Transmitter Disable	3	Note 2
4	MOD_DEF(2)	SDA Serial Data Signal	3	Note 3
5	MOD_DEF(1)	SCL Serial Clock Signal	3	Note 3
6	MOD_DEF(0)	TTL Low	3	Note 3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note 4
9	V <sub>EER</sub>	Receiver ground	1	
10	V <sub>EER</sub>	Receiver ground	1	
11	V <sub>EER</sub>	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	V <sub>EER</sub>	Receiver ground	1	
15	V <sub>CCR</sub>	Receiver Power Supply	2	
16	V <sub>CCT</sub>	Transmitter Power Supply	2	
17	V <sub>EET</sub>	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	V <sub>EET</sub>	Transmitter Ground	1	

**Notes:**

*Plug Seq.: Pin engagement sequence during hot plugging.*

1) *TX Fault* is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and  $V_{cc}+0.3V$ . Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.

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 4.7k~10kΩ resistor. Its states are:

Low (0 to 0.8V): Transmitter on

(>0.8V, < 2.0V): Undefined

High (2.0 to 3.465V): 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  $V_{ccT}$  or  $V_{ccR}$ .

*Mod-Def 0* is 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) *LOS* is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor. Pull up voltage between 2.0V and  $V_{cc}+0.3V$ . Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low state, the output will be pulled to less than 0.8V.

5) *RD-/+*: These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.

6) *TD-/+*: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.