

### 10G SFP+ BIDI Optical Transceiver 20km

#### Features:

- Up to 11.3Gbps Data Links
- Up to 20km transmission on SMF Power dissipation<1.0W
- 1270nm DFB laser and PIN receiver for ESFPB-8823-20DL 1330nm DFB laser and PIN receiver for ESFPB-8832-20DL 2-wire interface with integrated Digital Diagnostic monitoring EEPROM with Serial ID Functionality
- Compliant with SFP+ MSA with LC connector Single + 3.3V Power Supply
- Case operating temperature Commercial: 0°C to +70°C Industrial: -40°C to +85°C

#### Applications:

- 10GBASE-BX & 10GBASE-LR/LW
- 10G SONET/SDH, OTU2/2e

#### Standard:

- Compliant with SFF-8472 Compliant to SFF-8431
- Compliant to 802.3ae 10GBASE-LR/LW RoHS Compliant.

#### Product Description:

ESFPB-88XX-20DL is hot pluggable 3.3V Small-Form-Factor transceiver module. It designed expressly for high-speed communication applications that require rates up to 11.3Gbps, it designed to be compliant with SFF-8472 and SFP+ MSA. The module data link up to 20km in 9/125um single mode fiber.

#### Absolute Maximum Ratings:

| Parameter            | Symbol | Min  | Typica | Max | Uni | Note |
|----------------------|--------|------|--------|-----|-----|------|
| Storage Temperature  | Ts     | -40  | -      | 85  | °C  |      |
| Relative Humidity    | RH     | 5    | -      | 95  | %   |      |
| Power Supply Voltage | VCC    | -0.3 | -      | 4   | V   |      |

#### Recommended Operating Conditions:

| Parameter                  | Symbol | Min               | Typ.   | Max. | Unit | Note       |             |
|----------------------------|--------|-------------------|--------|------|------|------------|-------------|
| Case Operating Temperature | Tcase  | 0                 | -      | 70   | °C   | Commercial |             |
|                            |        | -40               | -      | 85   | °C   | Industrial |             |
| Power Supply Voltage       | VCC    | 3.14              | 3.3    | 3.47 | V    |            |             |
| Power Supply Current       | ICC    | -                 |        | 300  | mA   |            |             |
| Data Rate                  | BR     |                   | 10.312 | 11.3 | Gbps |            |             |
| Transmission Distance      | TD     |                   | -      | 20   | km   |            |             |
| Coupled fiber              |        | Single mode fiber |        |      |      |            | 9/125um SMF |

#### Electrical Characteristics:

| Parameter                          | Symbol      | Min. | Type | Max. | Un | Note             |
|------------------------------------|-------------|------|------|------|----|------------------|
| <b>Transmitter</b>                 |             |      |      |      |    |                  |
| Average Launched Power             | POut        | -6   | -    | -1   | dB |                  |
| Average Launched Power (Laser Off) | Poff        | -    | -    | -30  | dB | Note (1)         |
| Center Wavelength Range            | $\lambda_C$ | 1260 | 12   | 1280 | nm | ESFPB-8823- 20DL |
|                                    |             | 1320 | 13   | 1340 | nm | ESFPB-8832-20DL  |
| Side mode suppression ratio        | SMSR        | 30   | -    | -    | dB |                  |



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|                                   |                             |      |    |       |    |                  |
|-----------------------------------|-----------------------------|------|----|-------|----|------------------|
| Spectrum Bandwidth(-20dB)         | $\sigma$                    | -    | -  | 1     | nm |                  |
| Extinction Ratio                  | ER                          | 3.5  |    | -     | dB | Note (2)         |
| Output Eye Mask                   | Compliant with IEEE 802.3ae |      |    |       |    | Note (2)         |
| <b>Receiver</b>                   |                             |      |    |       |    |                  |
| Input Optical Wavelength          | $\lambda$ IN                | 1320 | 13 | 1340  | nm | ESFPB-8832- 20DL |
|                                   |                             | 1260 | 12 | 1280  | nm | ESFPB-8823-20DL  |
| Receiver Sensitivity              | Psen                        | -    | -  | -14.4 | dB | Note (3)         |
| Input Saturation Power (Overload) | PSAT                        | 0.5  | -  | -     | dB | Note (3)         |
| LOS Assert                        | LOSA                        | -30  | -  | -     | dB |                  |
| LOS De-assert                     | LOSD                        | -    | -  | -17   | dB |                  |
| LOS -Hysteresis                   | PHys                        | 0.5  | -  | 5     | dB |                  |

Note:

1. The optical power is launched into SMF
2. Measured with RPBS 2^31-1 test pattern @10.3125Gbs
3. Measured with RPBS 2^31-1 test pattern @10.3125Gbs BER= $\leq 10^{-12}$

### Electrical Interface Characteristics:

| Parameter                          | Symbol  | Min. | Type | Max.    | Unit  | Note |
|------------------------------------|---------|------|------|---------|-------|------|
| Total power supply current         | Icc     | -    |      | 300     | mA    |      |
| <b>Transmitter</b>                 |         |      |      |         |       |      |
| Differential Data Input Voltage    | VDT     | 180  | -    | 700     | mVp-p |      |
| Differential line input Impedance  | RIN     | 85   | 100  | 115     | Ohm   |      |
| Transmitter Fault Output-High      | VFaultH | 2.4  | -    | Vcc     | V     |      |
| Transmitter Fault Output-Low       | VFaultL | -0.3 | -    | 0.8     | V     |      |
| Transmitter Disable Voltage- High  | VDisH   | 2    | -    | Vcc+0.3 | V     |      |
| Transmitter Disable Voltage- low   | VDisL   | -0.3 | -    | 0.8     | V     |      |
| <b>Receiver</b>                    |         |      |      |         |       |      |
| Differential Data Output Voltage   | VDR     | 300  | -    | 850     | mVp-p |      |
| Differential line Output Impedance | ROUT    | 80   | 100  | 120     | Ohm   |      |
| Receiver LOS Pull up Resistor      | RLOS    | 4.7  | -    | 10      | KOhm  |      |
| Data Output Rise/Fall time         | tr/tf   |      | -    | 38      | ps    |      |
| LOS Fault                          | VLOS fa | Vcc  |      | VccHOST | V     |      |
| LOS Normal                         | VLOS no | Vee  |      | Vee+0.8 | V     |      |

### Pin Description:

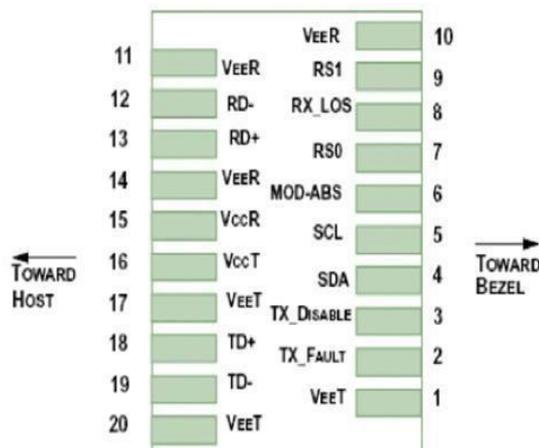


Diagram of Host Board Connector Block Pin Numbers and Name



| Pin | Symbol | Name/Description  | NO T |
|-----|--------|---|------|
| 1   | VEET   | Transmitter Ground(Common with Receiver Ground)             | 1    |
| 2   | TFAULT | Transmitter Fault.  | 2    |
| 3   | TDIS   | 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_AB | Module Absent. Grounded within the module                   | 4    |
| 7   | RS0    | Rate Select 0   | 5    |
| 8   | LOS    | Loss ofSignal indication.Logic 0 indicates normaloperation. | 6    |
| 9   | RS1    | No connection required                                      | 1    |
| 10  | VEER   | Receiver Ground (Common with Transmitter Ground)            | 1    |
| 11  | VEER   | Receiver Ground (Common with Transmitter Ground)            | 1    |
| 12  | RD-    | Receiver InvertedDATAout. AC Coupled                        |      |
| 13  | RD+    | Receiver Non-invertedDATAout. 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 InvertedDATA in. AC Coupled.                    |      |
| 20  | VEET   | 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 Ohm’s resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc + 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 TDIS <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. 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. Logic0 indicates normal operation; logic 1 indicates loss of signal.

### Digital Diagnostic Functions:

ESFPB88XX-20DL transceivers support the 2-wire serial communication protocol as defined in the SFP+MSA. The standard SFP serial ID provides access to identification information that describes the transceiver’s capabilities, standard interfaces, manufacturer,and other information.

Additionally, SFP+ transceivers provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical powerand transceiver supply voltage. It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

The SFP MSA defines a 256-byte memory map in EEPROM that is accessible over a 2-wire serial interface at the 8-bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8-bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged.

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) insidethe transceiver, which is accessed through a 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL, Mod Def 1) is generated by the host. The positive edge clocks data into the SFP transceiver



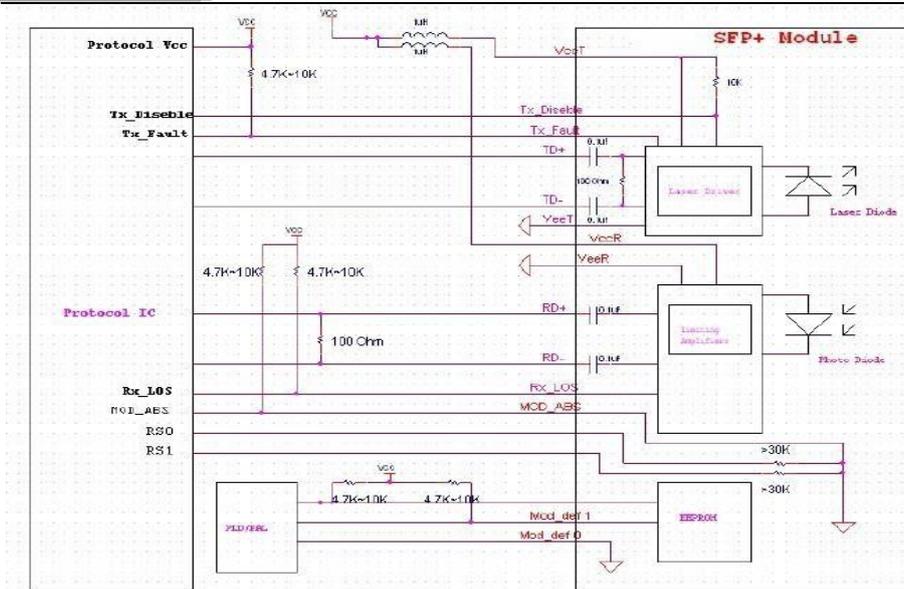
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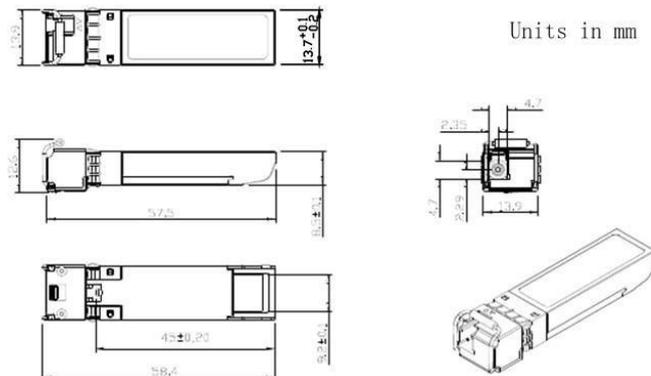
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into those segments of the E2PROM that are not write-protected. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA, Mod Def 2) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

### Recommended Interface Circuit:



### Outline Dimensions:



### Order Information:

| Part Number     | Product Description                     |
|-----------------|---|
| 10GSF1270-20LAT | BIDI SFP+ Tx1270nm/Rx1330nm 20km LC DDM |
| 10GSF1330-20LAT | BIDI SFP+ Tx1330nm/Rx1270nm 20km LC DDM |

