# 10GBASE-BX BIDI XFP 1550nm-TX/1490nm-RX 80km Transceiver
# P/N: AE-XFP-BX80-D

## Features

- Up to 10.7Gbps Data Links
- Single Mode LC Receptacle Bi-directional Transceiver
- Up to 80km transmission on SMF
- Power dissipation<3.5W
- 1550nm EML laser and 1490nm APD receiver
- 2-wire interface with integrated Digital Diagnostic monitoring
- EEPROM with Serial ID Functionality
- Compliant with FC_PI_4 REV 7.0
- Compliant with SFP+ MSA with simplex LC connector
- Single + 3.3V Power Supply and LVTTL Logic
- Operating case temperature: 0~+70ºC

## Applications

- 10GBASE-BX at 10.3125 Gb/s
- 10GBASE-BX at 9.953 Gb/s
- 1000 Base-LX Ethernet
- 8XFC at 8.5Gbps
- 4XFC at 4.25Gpbs

## I. Absolute Maximum Ratings

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Storage Temperature | Ts | -40 | - | 85 | ºC | |
| Storage Ambient Humidity | HA | 5 | - | 95 | % | |
| Operating Relative Humidity | RH | - | - | 85 | % | |
| Power Supply Voltage | VCC | -0.3 | - | 4 | V | |
| Signal Input Voltage | | Vcc-0.3 | - | Vcc+0.3 | V | |

## II. Recommended Operating Conditions

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Ambient Operating Temperature | TA | 0 | - | 70 | ºC | Without air flow |
| Power Supply Voltage | VCC | 3.14 | 3.3 | 3.47 | V | |
| Power Supply Current | ICC | - | 300 | 450 | mA | |
| Data Rate | BR | | 10.3125 | | Gbps | |
| Transmission Distance | TD | | | 80 | km | Note (1) |
| Coupled fiber | Single mode fiber | | | ITU-T G.652 | | |

*Note (1). Measured with SMF*

## III. Specification of Transmitter

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Average Launched Power | PO | 0 | - | 5 | dBm | |
| Average Launched Power(Laser Off) | POUT-OFF | - | - | -30 | dBm | Note (1) |
| Optical Modulation Amplitude | OMA | -3 | - | - | dBm | Note (1) |
| Center Wavelength Range | λC | 1530 | 1550 | 1570 | nm | |
| Side mode suppression ratio | SMSR | 30 | - | - | dB | |
| Spectrum Bandwidth(-20dB) | σ | - | - | 1 | nm | |
| Extinction Ratio | ZR | 8.2 | | - | dB | Note (2) |
| Output Eye Mask | Compliant with FC_PI_4 REV 7.0 | | | | | Note (2) |

*Note (1).The optical power is launched into SMF*
*Note (2). Measured with RPBS 2^31-1 test pattern @10.3125Gbs*

## IV. Specification of Receiver

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Input Optical Wavelength | λIN | 1470 | 1490 | 1510 | nm | |
| Receiver Sensitivity in average | PIN | - | - | -24 | dBm | Note (1) |
| Input Saturation Power (Overload) | PSAT | 0.5 | - | - | dBm | Note (1) |
| LOS -Assert Power | PA | -37 | - | - | dBm | |
| LOS -Deassert Power | PD | - | - | -27 | dBm | |
| LOS -Hysteresis | PHys | 0.5 | - | 4 | dB | |

*Note (1). Measured with RPBS 2^31-1 test pattern @10.3125Gbs BER=<10^-12*

## V. Electrical Interface Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Total power supply current | Icc | - | 300 | 800 | mA | |
| Transmitter | | | | | | |
| 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 | |
| Receiver | | | | | | |
| 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 | 20 | - | - | ps | |
| LOS Output Voltage-High | VLOSH | 2 | - | Vcc | V | |
| LOS Output Voltage-Low | VLOSL | -0.3 | - | 0.4 | V | |

## VI. Pin Descriptions
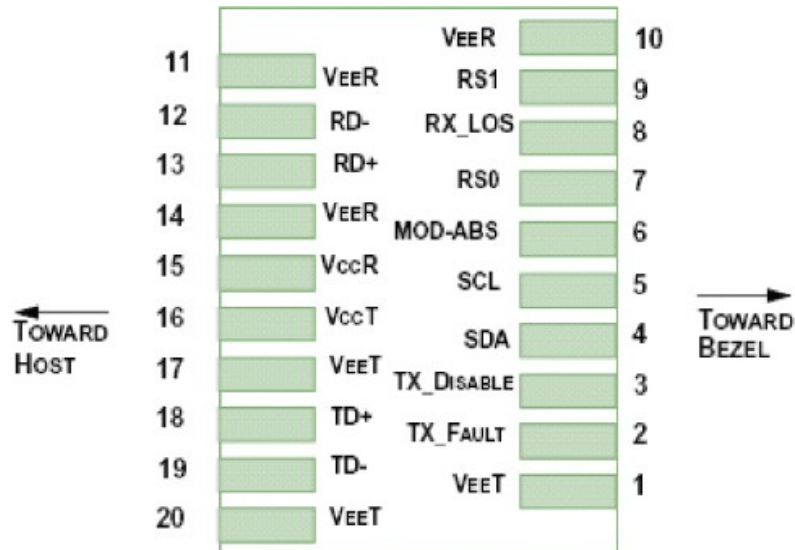


| Pin | Name | Function | Notes |
|---|---|---|---|
| 1 | VeeT | Transmitter Ground | |
| 2 | TX Fault | Module Transmitter Fault | Note 1 |
| 3 | TX Disable | Transmitter Disable; Turns off transmitter laser output | Note 2 Module disables on high or open |

| 4 | SDA | 2-wire Serial Interface Data Line (Same as MOD-DEF2 as defined in the INF-8074i) | Note 3, 2 wire serial ID interface |
|---|---|---|---|
| 5 | SCL | 2-wire Serial Interface Clock (Same as MOD-DEF1 as defined in the INF-8074i) | Note 3, 2 wire serial ID interface |
| 6 | MOD-ABS | Module Absent, connected to VeeT or VeeR in the module | Note 3, Grounded in Module |
| 7 | RS0 | Not used | Function not available |
| 8 | RX_LOS | Receiver Loss of Signal Indication (In FC designated as RX_LOS, in SONET designated as LOS, and in Ethernet designated at Signal Detect) | Note 4 |
| 9 | RS1 | Not used | Function not available |
| 10 | VeeR | Module Receiver Ground | Note 5 |
| 11 | VeeR | Module Receiver Ground | Note 5 |
| 12 | RD- | Receiver Inverted Data Output | Note 6 |
| 13 | RD+ | Receiver Non-Inverted Data Output | Note 7 |
| 14 | VeeR | Module Receiver Ground | Note 5 |
| 15 | VccR | Module Receiver 3.3 V Supply | 3.3 ± 5%, Note 7 |
| 16 | VccT | Module Transmitter 3.3 V Supply | 3.3 ± 5%, Note 7 |
| 17 | VeeT | Module Transmitter Ground | Note 5 |
| 18 | TD+ | Transmitter Non-Inverted Data Input | Note 8 |
| 19 | TD- | Transmitter Inverted Data Input | Note 8 |
| 20 | VeeT | Module Transmitter Ground | Note 5 |

*Notes:*

*1. TX Fault is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor on the host board. Pull up voltage between 2.0V and VccT, R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 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 4.7 –10 K Ω resistor. Its states are: Low (0 –0.8V): Transmitter on(>0.8, < 2.0V): Undefined High (2.0 –3.465V): Transmitter is abled Open: Transmitter Disabled.*

*3. Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7K –10KΩresistor on the host board. The pull-up voltage shall be VccT or VccR (see Section IV for further details). 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 (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K –10KΩ resistor.Pull up voltage between 2.0V and VccT, R+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.*

*5. VeeR and VeeT may be internally connected within the SFP module.*

*6. 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. The voltage swing on these lines will be between 370 and 2000 mV differential (185 –1000 mV single ended) when properly terminated.*

*7. VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±5% at the SFP connector pin. Maximum supply current is 300mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1 ohm should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot plugging of the SFP transceiver module will result in an inrush current of no more than 30mA greater than the steady state value. VccR and VccT may be internally connected within the SFP transceiver module.*

*8. 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. The inputs will accept differential swings of 500 –2400 mV (250 –1200 mV single-ended), though it is recommended that values between 500 and 1200 mV differential (250 –600 mV single-ended) be used for best EMI performance.*

## VII. Ordering information

| Part Number | Product Description |
|---|---|
| AE-XFP-BX80-D | BIDI XFP, 10Gbps, 1550nm, SMF, 80KM, DDM, LC connector, 0℃ ~ +70℃ |
| AE-XFP-BX80-U | BIDI XFP, 10Gbps, 1490nm, SMF, 80KM, DDM, LC connector, 0℃ ~ +70℃ |