

# PRODUCT SPECIFICATION

|                     |                                                                                                      |                                    |
|---------------------|------------------------------------------------------------------------------------------------------|------------------------------------|
| <b>Part No.:</b>    | <b>AC-XFBL-23G10-20/AC-XFBL-32G10-20</b>                                                             |                                    |
| <b>Description:</b> | 10G XFP Transceiver, BIDI TX1270nm/RX1330nm 20km<br>10G XFP Transceiver, BIDI TX1330nm/RX1270nm 20km |                                    |
| <b>Release Date</b> | <b>Rev.</b>                                                                                          | <b>Revision Change Description</b> |
| <b>2016/07/16</b>   | <b>A0</b>                                                                                            | New Release                        |
| <b>2020/12/28</b>   | <b>A1</b>                                                                                            | Template Update                    |

## Features

- ✧ Up to 9.95 Gbps to 10.5Gbps
- ✧ Supports 9.95Gbps to 11.3Gbps bit rates
- ✧ Hot-pluggable XFP footprint
- ✧ XFI Loopback Mode
- ✧ 1270nm DFB laser and PIN receiver for AC-XFBL-23G10-20
- ✧ 1330nm DFB laser and PIN receiver for AC-XFBL-32G10-20
- ✧ Up to 20km for SMF transmission
- ✧ Compliant with SFP+ MSA and SFF-8472 with single LC receptacle
- ✧ Compatible with RoHS
- ✧ Single +3.3V power supply
- ✧ Power dissipation<2.0W
- ✧ 2-wire interface with integrated Digital Diagnostic monitoring
- ✧ EEPROM with Serial ID Functionality
- ✧ Operating case temperature:
  - ✧ Standard: 0 to +70°C
  - ✧ Industrial: -40 to +85°C

## Application

- ✧ 10GBASE-BX 10.3125Gb/s Ethernet
- ✧ 10GBASE-BX 9.953Gb/s Ethernet
- ✧ SONET OC-192 SR-1 SDH STM I-64.1

## Standard

- ✧ Compliant with SFF-8472
- ✧ Compliant with XFP MSA

## Specification:

### Absolute Maximum Ratings

| Parameter            | Symbol | Min     | Max     | Unit |
|----------------------|--------|---------|---------|------|
| Supply Voltage       | Vcc    | 0       | 4       | V    |
| Storage Temperature  | Ts     | -40     | +85     | °C   |
| Operating Humidity   | -      | 5       | 95      | %    |
| Signal Input Voltage |        | Vcc-0.3 | Vcc+0.3 | V    |

### Recommended Operating Conditions

| Parameter                     | Symbol     | Min   | Typical | Max   | Unit |
|-------------------------------|------------|-------|---------|-------|------|
| Operating Case Temperature    | Standard   | 0     |         | +70   | °C   |
|                               | Industrial | -40   |         | +85   | °C   |
| Power Supply Voltage          | Vcc        | 3.135 | 3.30    | 3.465 | V    |
| Power Supply Current          | Icc        |       |         | 600   | mA   |
| Data Rate                     |            |       | 10.3    | 11.3  | Gbps |
| Fiber Length 9/125μm core SMF |            | -     | 20      | -     | km   |

### Optical and Electrical Characteristics

| Parameter                     | Symbol           | Min  | Typical | Max     | Unit | Notes            |
|-------------------------------|------------------|------|---------|---------|------|------------------|
| <b>Transmitter</b>            |                  |      |         |         |      |                  |
| Centre Wavelength             | $\lambda_c$      | 1260 | 1270    | 1280    | nm   | AC-XFBL-23G10-20 |
|                               |                  | 1320 | 1330    | 1340    | nm   | AC-XFBL-32G10-20 |
| Spectral Width (-20dB)        | $\Delta\lambda$  |      |         | 1       | nm   |                  |
| Side-Mode Suppression Ratio   | SMSR             | 30   | -       |         | dB   |                  |
| Average Output Power          | P <sub>out</sub> | -5   |         | 0       | dBm  | 1                |
| Extinction Ratio              | ER               | 3.5  |         |         | dB   |                  |
| Data Input Swing Differential | V <sub>IN</sub>  | 120  |         | 820     | mV   | 2                |
| Input Differential Impedance  | Z <sub>IN</sub>  | 85   | 100     | 115     | Ω    |                  |
| TX Disable                    | Disable          | 2.4  |         | Vcc     | V    |                  |
|                               | Enable           | -0.3 |         | 0.8     | V    |                  |
| TX Fault                      | Fault            | 2.0  |         | Vcc+0.3 | V    |                  |
|                               | Normal           | -0.3 |         | 0.8     | V    |                  |
| <b>Receiver</b>               |                  |      |         |         |      |                  |

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| Centre Wavelength             | $\lambda_c$      | 1320 | 1330 | 1340            | nm   | AC-XFBL-23G10-20 |
|-------------------------------|------------------|------|------|-----------------|------|------------------|
|                               |                  | 1260 | 1270 | 1280            | nm   | AC-XFBL-32G10-20 |
| Receiver Sensitivity          |                  |      |      | -15             | dBm  | 3                |
| Receiver Overload             |                  | 0.5  |      |                 | dBm  | 3                |
| LOS De-Assert                 | LOS <sub>D</sub> |      |      | -17             | dBm  |                  |
| LOS Assert                    | LOS <sub>A</sub> | -32  |      |                 | dBm  |                  |
| LOS Hysteresis                |                  | 0.5  |      | 4               | dB   |                  |
| Data Output Rise/Fall time    | tr/tf            |      | 20   |                 | ps   |                  |
| LOS Output Voltage-High       | VLOSH            | 2    |      | V <sub>cc</sub> | V    |                  |
| LOS Output Voltage-Low        | VLOSL            | -0.3 |      | 0.4             | V    |                  |
| Receiver LOS Pull up Resistor | RLOS             | 4.7  |      | 10              | KOhm |                  |

#### Notes:

1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS<sub>2</sub><sup>31</sup>-1 test pattern @10312Mbps, BER  $\leq 1 \times 10^{-12}$ .

## Digital Diagnostic Memory Map

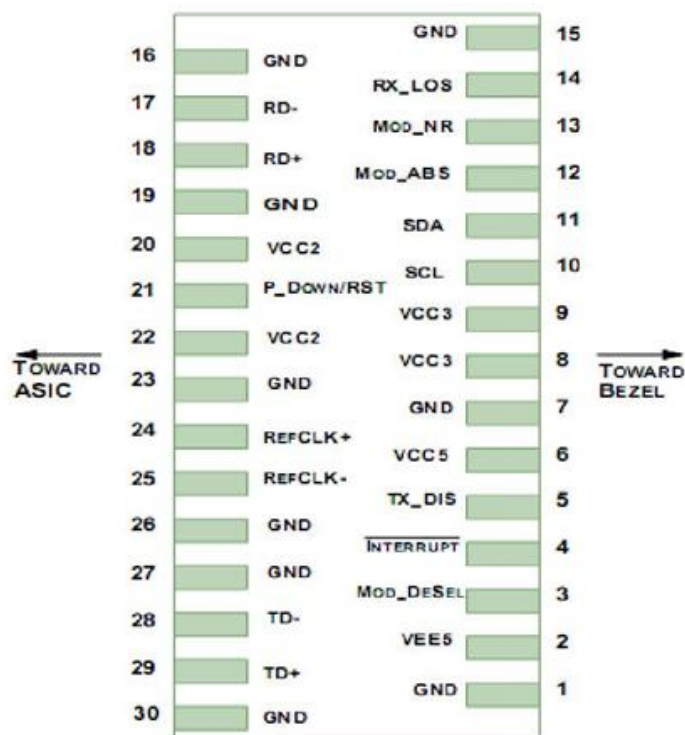
AC-XFBL-23/32G10-20 As defined by the XFP MSA, XFP transceivers provide digital diagnostic functions via a 2-wire serial interface, which allows real-time access to the following operating parameters:

- Transceiver temperature
- Laser bias current
- Transmitted optical power
- Received optical power
- Transceiver supply voltage

It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range.

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through the 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL pin) is generated by the host. The positive edge clocks data into the XFP transceiver into those segments of its memory map that are not write-protected. The negative edge clocks data from the XFP transceiver. The serial data signal (SDA pin) 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. The 2-wire serial interface provides sequential or random access to the 8 bit parameters, addressed from 000h to the maximum address of the memory. For more detailed information including memory map definitions, please see the XFP MSA Specification.

## Pin Descriptions



## Pin Assignment

| Pin | Signal Name | Description                                                                                                      | Plug Seq. | Notes |
|-----|-------------|------------------------------------------------------------------------------------------------------------------|-----------|-------|
| 1   | GND         | Module Ground                                                                                                    |           | 1     |
| 2   | VEE5        | Optional -5.2 Power Supply – Not required                                                                        |           |       |
| 3   | Mod-Desel   | Module De-select; When held low allows the module to respond to 2-wire serial interface commands                 | LVTTL-I   |       |
| 4   | Interrupt   | Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire interface | LVTTL-O   | 2     |
| 5   | TX_DIS      | Transmitter Disable; Transmitter laser source turned off                                                         | LVTTL-I   |       |
| 6   | VCC5        | +5 Power Supply                                                                                                  |           |       |
| 7   | GND         | Module Ground                                                                                                    |           | 1     |
| 8   | VCC3        | +3.3V Power Supply                                                                                               |           |       |
| 9   | VCC3        | +3.3V Power Supply                                                                                               |           |       |
| 10  | SCL         | Serial 2-wire interface clock                                                                                    | LVTTL-I   | 2     |
| 11  | SDA         | Serial 2-wire interface data line                                                                                | LVTTL-I/O | 2     |
| 12  | Mod_Abs     | Module Absent; Indicates module is not present. Grounded in the module.                                          | LVTTL-I   | 2     |

|    |            |                                                                                                                                                                                                        |          |   |
|----|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---|
| 13 | Mod_NR     | Module Not Ready; XGIGA defines it as a logical OR between RX_LOS and Loss of Lock in TX/RX.                                                                                                           | LVTTTL-I | 2 |
| 14 | RX_LOS     | Receiver Loss of Signal indicator                                                                                                                                                                      | LVTTTL-I | 2 |
| 15 | GND        | Module Ground                                                                                                                                                                                          |          | 1 |
| 16 | GND        | Module Ground                                                                                                                                                                                          |          | 1 |
| 17 | RD-        | Receiver inverted data output                                                                                                                                                                          | CML-O    |   |
| 18 | RD+        | Receiver non-inverted data output                                                                                                                                                                      | CML-O    |   |
| 19 | GND        | Module Ground                                                                                                                                                                                          |          | 1 |
| 20 | VCC2       | +1.8V Power Supply – Not required                                                                                                                                                                      |          |   |
| 21 | P_Down/RST | Power Down; When high, places the module in the low power stand-by mode and on the falling edge of P_Down initiates a module reset<br>Reset; The falling edge initiates a complete reset of the module | LVTTTL-I |   |
| 22 | VCC2       | including the 2-wire serial interface, equivalent to a power cycle.<br>+1.8V Power Supply – Not required                                                                                               |          |   |
| 23 | GND        | Module Ground                                                                                                                                                                                          |          | 1 |
| 24 | RefCLK+    | Reference Clock non-inverted input, AC coupled on the host board – Not required                                                                                                                        | PECL-I   | 3 |
| 25 | RefCLK-    | Reference Clock inverted input, AC coupled on the host board – Not required                                                                                                                            | PECL-I   | 3 |
| 26 | GND        | Module Ground                                                                                                                                                                                          |          | 1 |
| 27 | GND        | Module Ground                                                                                                                                                                                          |          | 1 |
| 28 | TD-        | Transmitter inverted data input                                                                                                                                                                        | CML-I    |   |
| 29 | TD+        | Transmitter non-inverted data input                                                                                                                                                                    | CML-I    |   |
| 30 | GND        | Module Ground                                                                                                                                                                                          |          | 1 |

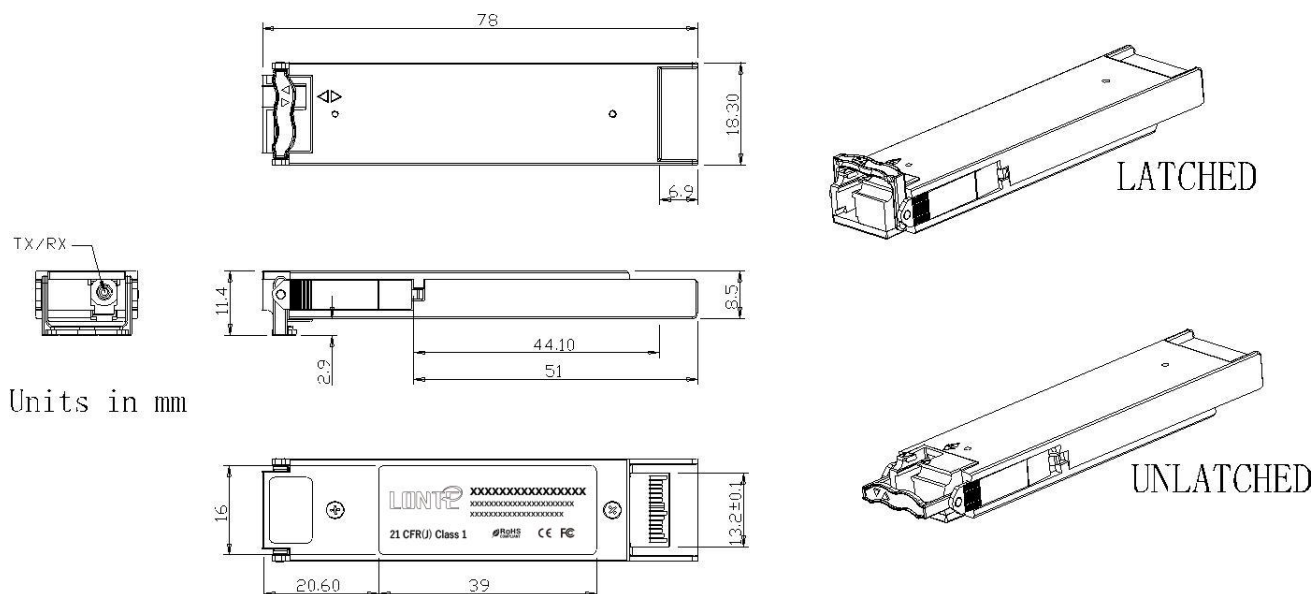
#### Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

- 1) Module circuit ground is isolated from module chassis ground within the module.
- 2) Open collector; should be pulled up with 4.7k – 10kohms on host board to a voltage between 3.15V and 3.6V.
- 3) A Reference Clock input is not required by the AC-XFBL-23/32G10-20. If present, it will be ignored.

## Package Outline

Dimensions are in millimeters. All dimensions are  $\pm 0.2\text{mm}$  unless otherwise specified. (Unit: mm)



## Regulatory Compliance

| Feature                                              | Test                                                                  | Method                                               |
|------------------------------------------------------|-----------------------------------------------------------------------|------------------------------------------------------|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD-883E<br>Method 3015.7                                         | Class 1(>1000V for SFI pins, >2000V for other pins.) |
| Electrostatic Discharge (ESD) Immunity               | IEC61000-4-2                                                          | Class 2(>4.0kV)                                      |
| Electromagnetic Interference (EMI)                   | CISPR22 ITE Class B<br>FCC Class B<br>CENELEC EN55022<br>VCCI Class 1 | Comply with standard                                 |
| Immunity                                             | IEC61000-4-3                                                          | Comply with standard                                 |
| Eye Safety                                           | FDA 21CFR 1040.10 and 1040.11<br>EN (IEC) 60825-1,2                   | Compatible with Class I laser Product                |

**Ordering information**

| Part. No          | Specifications |                |            |             |            |              |             |                   |     |
|-------------------|----------------|----------------|------------|-------------|------------|--------------|-------------|-------------------|-----|
|                   | Pack           | Rate<br>(Gbps) | Tx<br>(nm) | Po<br>(dBm) | RX<br>(nm) | Sen<br>(dBm) | Temp<br>(℃) | Rea<br>ch<br>(km) | DDM |
| AC-XFBL-23G10-20  | XFP            | 10.3125        | 1270       | -5~0        | 1330       | <-15         | 0~70        | 20                | Y   |
| AC-XFBL-32G10-20  | XFP            | 10.3125        | 1330       | -5~0        | 1270       | <-15         | 0~70        | 20                | Y   |
| AC-XFBL-23G10-20F | XFP            | 10.3125        | 1270       | -5~0        | 1330       | <-15         | -40~85      | 20                | Y   |
| AC-XFBL-32G10-20F | XFP            | 10.3125        | 1330       | -5~0        | 1270       | <-15         | -40~85      | 20                | Y   |