# PRODUCT SPECIFICATION

| Part No.: | AC-SFBL-45G1-80/AC-SFBL-54G1-80 | |
|---|---|---|
| Description: | 1.25G SFP Transceiver, BIDI TX1490nm/RX1550nm 80km<br>1.25G SFP Transceiver, BIDI TX1550nm/RX1490nm 80km | |
| Release Date | Rev. | Revision Change Description |
| 2015/06/07 | A0 | New Release |
| 2020/12/28 | A1 | Template Update |

## Features

- Up to 1.25Gbps bi-directional data links
- 1490nm DFB laser and PIN photo detector for AC-SFBL-45G1-80
- 1550nm DFB laser and PIN photo detector for AC-SFBL-54G1-80
- Up to 80km for SMF transmission
- Compliant with SFP MSA and SFF-8472 with single LC receptacle
- Digital Diagnostic Monitoring: Internal Calibration or External Calibration
- Hot-pluggable SFP footprint
- Metal enclosure, for lower EMI
- Compatible with RoHS
- +3.3V single power supply
- Operating case temperature:
  Standard : 0 to +70° C
  Industrial : -40 to +85° C

## Application

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

## Standard

- Gigabit Ethernet
- Compliant with SFF-8472
- Switched Backplane Applications
- Router/Server Interface

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# Specification

## Absolute Maximum Ratings

| Parameter | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| Supply Voltage | Vcc | -0.5 | 4 | V |
| Storage Temperature | Ts | -40 | +85 | °C |
| Signal Input Voltage | | -0.3 | Vcc+0.3 | |
| Operating Humidity | - | 5 | 95 | % |
| Receiver Damage Threshold | | 5 | | dBm |

## Recommended Operating Conditions

| Parameter | | Symbol | Min | Typical | Max | Unit |
|---|---|---|---|---|---|---|
| Operating Case Temperature | Standard | Tc | 0 | | +70 | °C |
| | Industrial | | -40 | | +85 | °C |
| Power Supply Voltage | | Vcc | 3.13 | 3.3 | 3.47 | V |
| Power Supply Current | | Icc | | | 280 | mA |
| Power Supply Noise Rejection | | | | | 100 | mVp-p |
| Transmission Distance | | | | | 80 | KM |
| Data Rate | | | | 1.25 | | Gbps |
| Coupled Fiber | | Single mode fiber | | | | 9/125um SMF |

## Optical and Electrical Characteristics

| Parameter | | Symbol | Min | Typical | Max | Unit | Notes |
|---|---|---|---|---|---|---|---|
| **Transmitter** | | | | | | | |
| Total Supply Current | | Icc | | | A | mA | 1 |
| TX Disable | Disable | | 2.0 | | Vcc+0.3 | V | |
| | Enable | | 0 | | 0.8 | V | |
| TX Fault | Fault | | 2.0 | | Vcc+0.3 | V | |
| | Normal | | 0 | | 0.8 | V | |
| **Receiver** | | | | | | | |
| LOS Output Voltage- | | High | 2.0 | | Vcc+0.3 | V | |
| | | Low | 0 | | 0.8 | V | |
| Total Supply Current | | Icc | | | B | mA | 1 |

**Note:**

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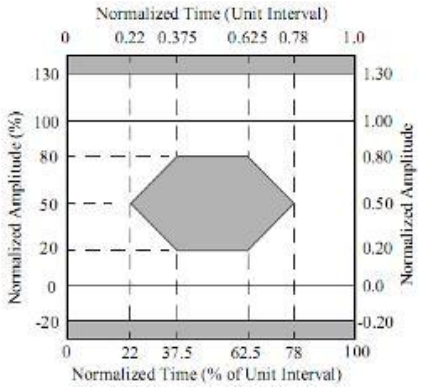
1. A (TX) + B (RX) = 280mA (Not include termination circuit) .

| Optical transmitter Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Min** | **Typical** | **Max** | **Unit** | **Notes** |
| Launched Power (avg.) | Pout | 0 | | 5 | dBm | |
| Center Wavelength | λc | 1470 | 1490 | 1510 | nm | AC-SFBL-45G1-80 |
| | | 1530 | 1550 | 1570 | nm | AC-SFBL-54G1-80 |
| Side Mode Suppression Ratio | SMSR | 30 | | | dB | |
| Extinction Ratio | ER | 9 | | | dB | |
| Spectrum Bandwidth(-20dB) | σ | | | 1 | nm | |
| Jitter P-P | $t_J$ | | | 0.1 | UI | 1 |
| Relative Intensity Noise | RIN | 90 | 100 | 110 | ohm | |
| Optical Tx Output disable | $P_{dis}$ | | | -45 | dBm | |
| Output Eye Diagram | Complies with IEEE802.3z eye masks when filtered | | | | | |
| **Optical receiver Characteristics** | | | | | | |
| **Parameter** | **Symbol** | **Min** | **Typical** | **Max** | **Unit** | **Notes** |
| Receiver Sensitivity | S | | | -26 | dBm | 2 |
| Wavelength Range | λc | 1530 | 1550 | 1570 | nm | AC-SFBL-45G1-80 |
| | | 1470 | 1490 | 1510 | nm | AC-SFBL-54G1-80 |
| Optical Power Input Overload | $P_{in-max}$ | -3 | | | dBm | |
| LOS Optical De-assert | Pd | | | -27 | dBm | 3 |
| LOS Optical Assert | Pa | -40 | | | | |
| LOS hysteresis | | 0.5 | 2 | 6 | dB | |

**Notes:**

1. Measure at 2^7-1 NRZ PRBS pattern.
2. Measured with Light source 1550nm(1490nm), ER=9dB; BER =<10^-12 @PRBS=2^7-1 NRZ.
3. When LOS de-asserted, the RX data+/- output is signal output.



## Pin Descriptions

| Pin | Signal Name | Description | Notes |
|---|---|---|---|
| 1 | $V_{EET}$ | Transmitter Ground | Note 1 |
| 2 | TX FAULT | Transmitter Fault Indication | |
| 3 | TX DISABLE | Transmitter Disable | Note 2 |
| 4 | MOD_DEF(2) | SDA Serial Data Signal | Note 3 |
| 5 | MOD_DEF(1) | SCL Serial Clock Signal | Note 3 |
| 6 | MOD_DEF(0) | Module Definition 0. Grounded within the module | Note 3 |
| 7 | Rate Select | Not Connected | Note 4 |
| 8 | LOS | Loss of Signal | Note 5 |
| 9 | $V_{EER}$ | Receiver ground | Note 1 |
| 10 | $V_{EER}$ | Receiver ground | Note 1 |
| 11 | $V_{EER}$ | Receiver ground | Note 1 |
| 12 | RD- | Receiver Inverted DATA out. AC Coupled | |
| 13 | RD+ | Receiver Non-inverted DATA out. AC Coupled | |
| 14 | $V_{EER}$ | Receiver ground | Note 1 |
| 15 | $V_{CCR}$ | Receiver Power Supply | |
| 16 | $V_{CCT}$ | Transmitter Power Supply | |
| 17 | $V_{EET}$ | Transmitter Ground | Note 1 |
| 18 | TD+ | Transmitter Non-Inverted DATA in. AC Coupled | |
| 19 | TD- | Transmitter Inverted DATA in. AC Coupled. | |
| 20 | $V_{EET}$ | Transmitter Ground | Note 1 |

**Notes:**

1) Circuit ground is internally isolated from chassis ground.

2) Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.

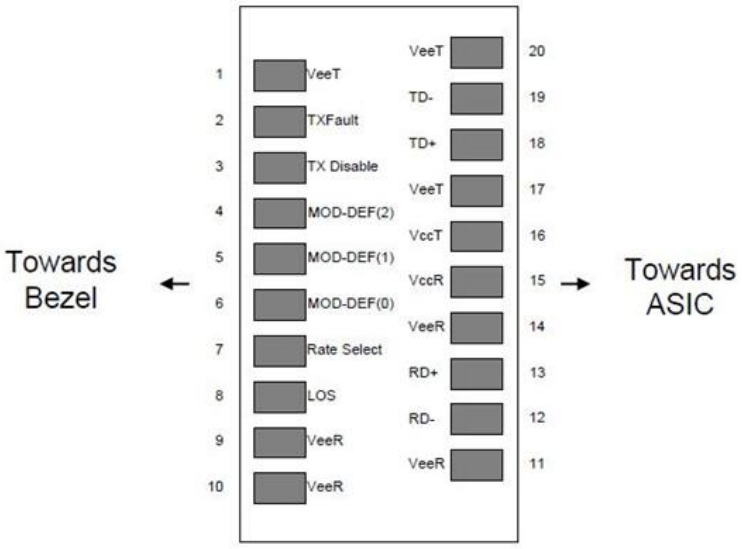
3) Should be pulled up with 4.7k - 10kohms on host board to a voltage between 2.0V and 3.6V.MOD_DEF(0) pulls line low to indicate module is plugged in.

4) This is an optional input used to control the receiver bandwidth for compatibility with multiple data rates (most likely Fiber Channel 1x and 2x Rates). If implemented, the input will be internally pulled down with > 30kΩ resistor. The input states are:

- Low (0 – 0.8V): Reduced Bandwidth
- (>0.8V, < 2.0V): Undefined
- High (2.0 – 3.465V): Full Bandwidth

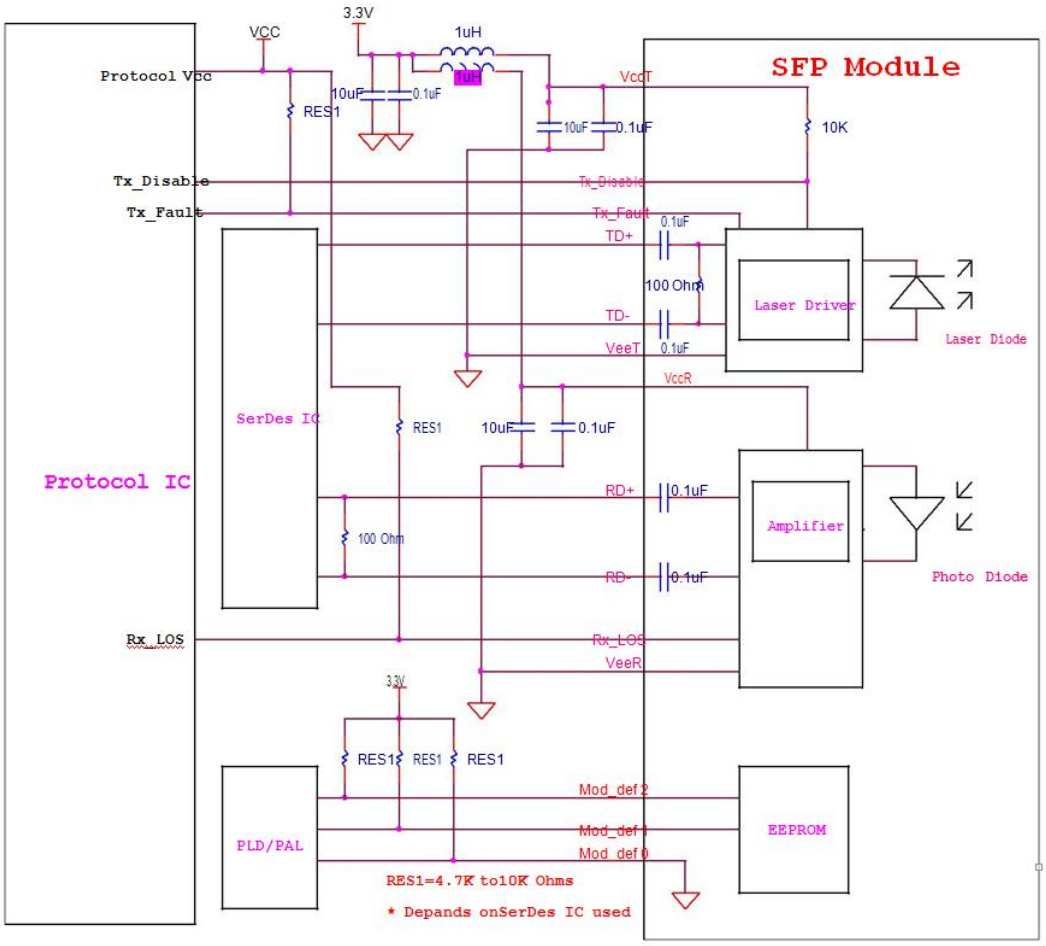
5) LOS is open collector output. Should be pulled up with 4.7k - 10kohms on host board to a voltage

a) between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.



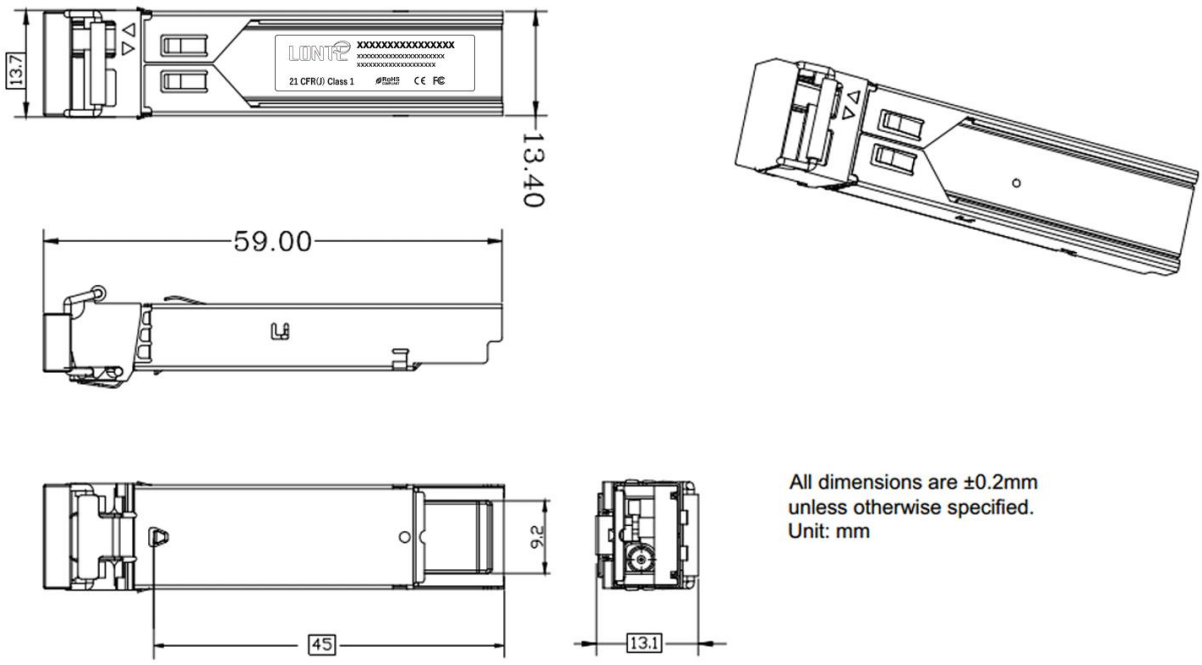

Pin-out of Connector Block on Host Board

## Recommend Circuit Schematic



## Package Outline

Dimensions are in millimeters. All dimensions are ±0.2mm unless otherwise specified. (Unit: mm)




## Regulatory Compliance

| Feature | Test | Method |
|---|---|---|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD-883E 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 |
| EMC | EN61000-3 | Comply with standard |

## Ordering information

| Part. No | Specifications | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Pack | Rate (Gbps) | Tx (nm) | Po (dBm) | RX | Sen (dBm) | Temp (℃) | Reach (km) | DDM |
| AC-SFBL-45G1-80 | SFP | 1.25 | 1490 | 0~5 | PIN | ＜-26 | 0~70 | 80 | Y |
| AC-SFBL-54G1-80 | SFP | 1.25 | 1550 | 0~5 | PIN | ＜-26 | 0~70 | 80 | Y |
| AC-SFBL-45G1-80F | SFP | 1.25 | 1490 | 0~5 | PIN | ＜-26 | -40~85 | 80 | Y |
| AC-SFBL-54G1-80F | SFP | 1.25 | 1550 | 0~5 | PIN | ＜-26 | -40~85 | 80 | Y |