# PRODUCT SPECIFICATION

| Part No.: | AC-SF-Q1G1-100 | |
|---|---|---|
| **Description:** | 1.25G SFP Transceiver,CWDM 1270-1610nm 100km | |
| **Release Date** | **Rev.** | **Revision Change Description** |
| **2015/06/07** | **A0** | New Release |
| **2020/12/28** | **A1** | Template Update |

## Features

- ✧ Up to 1.25Gbps Data Links
- ✧ DFB laser transmitter and PIN receiver
- ✧ Metal enclosure, for lower EMI
- ✧ Single +3.3V power supply
- ✧ Hot-pluggable
- ✧ Duplex LC/UPC type pluggable optical interface
- ✧ Operating temperature range:
- ✧ Commercial: 0℃~+70℃
- ✧ Industrial: -40~+85℃
- ✧ RoHS Compliant
- ✧ 2-wire interface with integrated Digital Diagnostic monitoring
- ✧ Up to 100km transmission distance over Single Mode Fiber(SMF)
- ✧ Low power dissipation

## Application

- ✧ Switch to Switch Interface
- ✧ Gigabit Ethernet
- ✧ Switched Backplane Applications
- ✧ Router/Server Interface
- ✧ Other Optical Links

## Standard

- ✧ Compliant with SFF-8472
- ✧ Compliant with SFP MSA
- ✧ Compliant to IEEE 802.3ae

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## Wavelength selection

| Wavelength | xx | Clasp Color Code | Wavelength | xx | Clasp Color Code |
|---|---|---|---|---|---|
| 1270 nm | 27 | Gray | 1370 nm | 37 | Green |
| 1290 nm | 29 | Gray | 1390 nm | 39 | Yellow |
| 1310 nm | 31 | Gray | 1410 nm | 41 | Orange |
| 1330 nm | 33 | Purple | 1430 nm | 43 | Red |
| 1350 nm | 35 | Blue | 1450 nm | 45 | Brown |
| 1470 nm | 47 | Gray | 1550 nm | 55 | Yellow |
| 1490 nm | 49 | Purple | 1570 nm | 57 | Orange |
| 1510 nm | 51 | Blue | 1590 nm | 59 | Red |
| 1530 nm | 53 | Green | 1610 nm | 61 | Brown |

## Specification

| Absolute Maximum Ratings | | | | |
|---|---|---|---|---|
| **Parameter** | **Symbol** | **Min** | **Max** | **Unit** |
| Storage temperature | TS | -40 | 85 | ℃ |
| Power Supply Voltage | Vcc3 | -0.5 | +4 | V |
| Relative Humidity | RH | 5 | 95 | % |
| Signal Input Voltage | | -0.3 | Vcc+0.3 | V |

| Recommended Operating Conditions | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Min** | **Typical** | **Max** | **Unit** |
| Operating Case Temperature (Commercial) | Tc | 0 | | 70 | ℃ |
| Operating Case Temperature (Industrial) | Tc | -40 | | 85 | |
| Power Supply Voltage | Vcc3 | 3.13 | 3.3 | 3.47 | V |
| Supply Current | Icc3 | | | 300 | mA |
| Power Supply Noise Rejection | | | | 100 | 100 mVp-p |
| Data Rate | | | 1.25 | | Gbps |
| Fiber Length 9/125μm core SMF | | - | 100 | - | km |

| Electrical Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Min** | **Typical** | **Max** | **Unit** | **Notes** |
| Transmit Total Supply Current | Icc | | | A | mA | |
| Transmit disable voltage | VIH | 2 | | Vcc+0.3 | V | 1 |
| Transmit enable voltage | VIL | 0 | | 0.8 | V | 1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Transmitter Fault Input-High | VDISL | 2 | | Vcc+0.3 | V | |
| Transmitter Fault Input-Low | VTxFH | 0 | | 0.8 | V | |
| Receiver Total Supply Current | Icc | | | 300-A | mA | |
| LOS output high level | VLOS-H | 2.0 | | Vcc+0.3 | V | 2 |
| LOS output low level | VLOS-L | 0 | | 0.8 | V | 2 |

**Notes:**

1) Connected directly to TX data input pins. AC coupled thereafter.
2) Loss Of Signal is LVTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

| **Optical transmitter Characteristics** | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Min** | **Typical** | **Max** | **Unit** | **Notes** |
| Launched Power (avg.) | Pout | 0 | | 5 | dBm | 3 |
| Operating Wavelength Range | λc | λ-10 | λ | λ+10 | nm | 4 |
| Spectral Width(-20dB) | Δλ | | | 1 | nm | |
| Side Mode Suppression Ratio | SMSR | 30 | | | dB | |
| Extinction Ratio | ER | 9 | | | dB | |
| Transmitter OFF Output Power | POff | | | -45 | dBm | |
| Differential Line Input Impedance | RIN | 90 | 100 | 110 | Ohm | |
| Jitter P-P | tJ | | | 0.1 | UI | |
| Output Eye Diagram | Compliant with IEEE802.3ae eye mask | | | | | |
| **Optical receiver Characteristics** | | | | | | |
| **Parameter** | **Symbol** | **Min** | **Typical** | **Max** | **Unit** | **Notes** |
| Receiver Sensitivity | S | | | -28 | dBm | 5 |
| Wavelength Range | λc | 1270 | | 1610 | nm | |
| Optical Power Input Overload | $P_{in-max}$ | -10 | | | dBm | |
| Receiver Damage Threshold | | | | 5 | dBm | |
| LOS Optical De-assert | Pd | | | -32 | dBm | |
| LOS Optical Assert | Pa | -38 | | | | |
| LOS hysteresis | | 0.5 | 2 | 6 | dB | |

**Notes:**

3) Class 1 Laser Safety per FDA/CDRH and IEC-825-1 regulations.
4) "λ" is: 1270,1290,1310,1330,1350,1370,1390,1410,1430,1450,1470,1490,1510,1530,1550,1570,1590,1610， please the "product selection".
5) Receiver Reflectance Measured with a PRBS $2^7$-1 test pattern, @1250Mbps, ER=9dB, BER<$10^{-12}$.

## Pin Descriptions

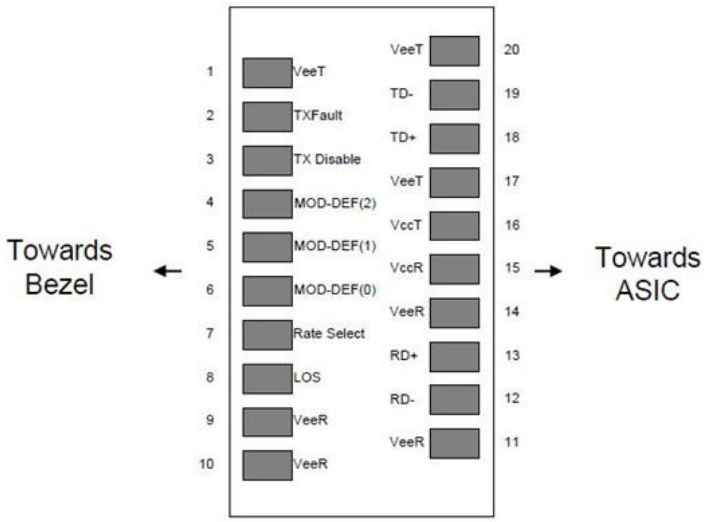



**Diagram of Host Board Connector Block Pin Numbers and Name**

## Pin Assignment

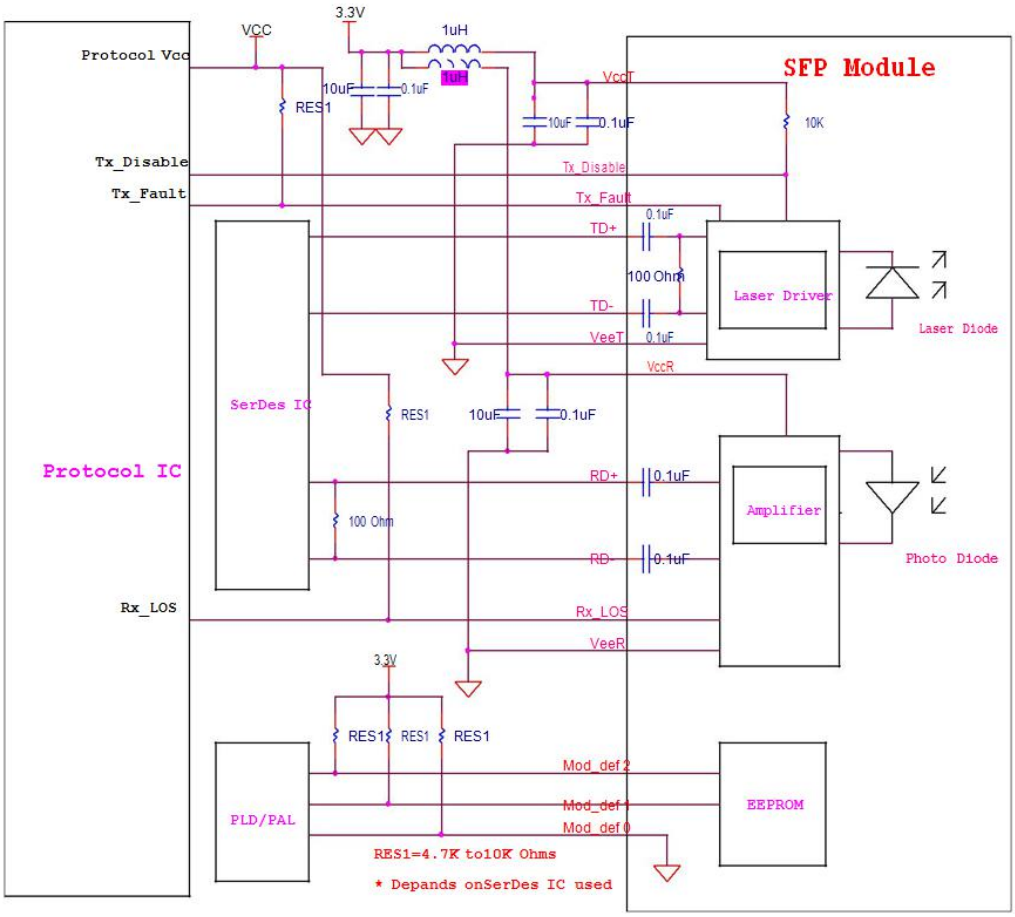
| Pin | Symbol | Description | Notes |
|---|---|---|---|
| 1 | VeeT | Transmitter Ground (Common with Receiver Ground) | 1 |
| 2 | TX_Fault | Transmitter Fault, Low: normal; High: abnormal | 2 |
| 3 | TX_Disable | Transmitter Disable<br>High: Transmitter off<br>Low: Transmitter on | 3 |
| 4 | MOD_DEF(2) | Module Definition 2. Data line for Serial ID. | 3 |
| 5 | MOD_DEF(1) | Module Definition 1. Clock line for Serial ID. | 3 |
| 6 | MOD_DEF(0) | Module Definition 0. Grounded within the module. | 3 |
| 7 | Rate Select | No connection required | 4 |
| 8 | LOS | Loss of Signal indication. Logic 0 indicates normal operation. | 5 |
| 9 | VEER | Receiver Ground(Common with Transmitter Ground) | 1 |
| 10 | VEER | Receiver Ground(Common with Transmitter Ground) | 1 |
| 11 | VEER | Receiver Ground(Common with Transmitter Ground) | 1 |
| 12 | RD- | Receiver Inverted DATA out. AC Coupled. CML-O | |
| 13 | RD+ | Receiver Non-inverted DATA out. AC Coupled. CML-O | |
| 14 | VeeR | Receiver Ground | 1 |
| 15 | VccR | Receiver Power Supply | |
| 16 | VccT | Transmitter Power Supply | |
| 17 | VeeT | Transmitter Ground | 1 |
| 18 | TD+ | Transmitter Non-Inverted DATA in. AC Coupled. CML-I | |

| | | | |
|---|---|---|---|
| 19 | TD- | Transmitter Inverted DATA in. AC Coupled. CML-I | |
| 20 | VeeT | Transmitter Ground (Common with Receiver Ground) | 1 |

**Notes:**

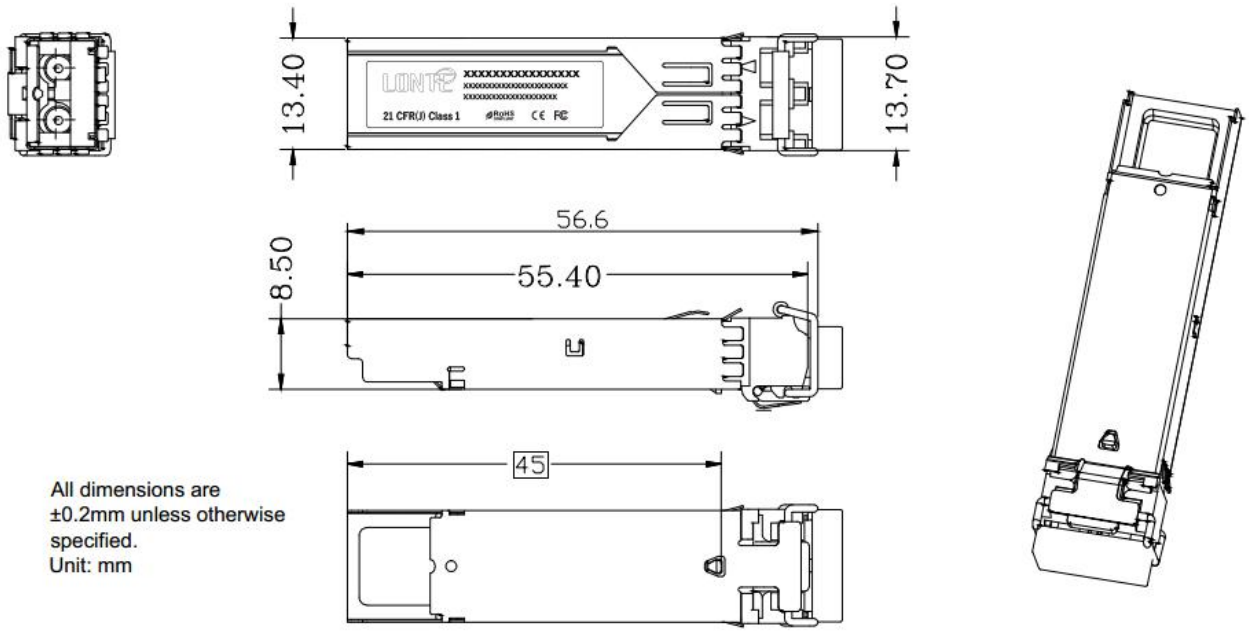
1) Circuit ground is internally isolated from chassis ground.
2) TFAULT is an open collector/drain output, which should be pulled up with a 4.7k – 10k Ohms resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc + 0.3V.A high output indicates a transmitter fault 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 TDIS >2.0V or open, enabled on TDIS <0.8V.
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
   - (>0.8, < 2.0V): Undefined
   - High (2.0 – 3.465V): Full Bandwidth
5) LOS is open collector output. It should be pulled up with 4.7kΩ – 10kΩ on host board to a typical 3.3V voltage. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

## Block Diagram



## 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, >2000Vfor 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 (Gbps) | Tx (nm) | Po (dBm) | RX | Sen (dBm) | Temp (℃) | Reach (km) | DDM |
| AC-SF-Q1G1-100 | SFP | 1.25 | DFB CWDM | 0~5 | PIN | ＜-28 | 0~70 | 100 | Y |
| AC-SF-Q1G1-100F | SFP | 1.25 | DFB CWDM | 0~5 | PIN | ＜-28 | -40~85 | 100 | Y |

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