



**1.25G 1X9-1000BASE-SX Transceiver**  
**Duplex SC, 850nm VCSEL, MMF OM2 550M, C-Temp**  
**LVTTL Signal Detection**

**Part Number: F1X9-C1-M85-X5T**



### Overview

F1X9-C1-M85-X5T 1X9 SIP package style transceivers are compliant with the industrial standard specification. The high performance uncooled 850nm VCSEL transmitter and high sensitivity PIN receiver provide superior performance for Gigabit Ethernet 1000BASE-SX and Fiber Channel 1GFC applications up to MMF OM2 550m optical links.

### Applications

- Gigabit Ethernet 1000BASE-SX @1.25G
- Fiber Channel 1GFC @1.0625G

### Features

- Compliant with IEEE802.3z 1000BASE-SX
- Compliant with Fiber Channel 100-M5-SN-I
- Industry Standard 1X9 Footprint
- 850nm VCSEL transmitter & PIN receiver
- Duplex SC connector
- Single 3.3V Power Supply
- AC-coupled Differential LVPECL inputs and outputs
- LVTTL Signal Detection Output
- Wave Solderable and Aqueous Washable
- Link distance 275m over MM OM1 fiber and 550m over MM OM2 fiber
- Operating Temperature 0~+70°C
- RoHS Compliant

### Laser Safety

- This is a Class 1 Laser Product complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.
- Caution: Use of control or adjustments or performance of procedure other than those specified herein may result in hazardous radiation exposure.



## Absolute Maximum Ratings

| Parameters                | Symbol          | Min. | Max. | Unit |
|---------------------------|-----------------|------|------|------|
| Storage Temperature       | T <sub>ST</sub> | -40  | +85  | °C   |
| Storage Relative Humidity | RH              | 5    | 95   | %    |
| Supply Voltage            | V <sub>CC</sub> | 0    | +4.5 | V    |

## Recommended Operating Conditions

| Parameters                 | Symbol            | Min.  | Typ. | Max.   | Unit   |
|----------------------------|-------------------|-------|------|--------|--------|
| Case Operating Temperature | T <sub>OP</sub>   | 0     |      | +70    | °C     |
| Supply Voltage             | V <sub>CC</sub>   | +3.13 | +3.3 | +3.47  | V      |
| Supply Current             | I <sub>CC</sub>   |       |      | 240    | mA     |
| Power Consumption          | P                 |       |      | 0.8    | W      |
| Lead Soldering Limits      | T <sub>sold</sub> |       |      | 260/10 | °C/Sec |

## Transmitter Electro-optical Characteristics

V<sub>CC</sub> = 3.13V to 3.47V, T<sub>OP</sub> = 0 °C to 70 °C

| Parameters                    | Symbol                          | Min.       | Typ. | Max. | Unit | Note |
|-------------------------------|---------------------------------|------------|------|------|------|------|
| Operating Data Rate           | DR                              | 1.0625     | 1.25 |      | Gb/s |      |
| Optical Launch Power          | P <sub>o</sub>                  | -9         |      | -3   | dBm  | 1    |
| Optical Center Wavelength     | λ <sub>c</sub>                  | 830        | 850  | 870  | nm   |      |
| Spectral Width (RMS)          | Δλ                              |            |      | 0.85 | nm   |      |
| Optical Extinction Ratio      | ER                              | 9          |      |      | dB   |      |
| Optical Eye Mask              |                                 | IEEE802.3z |      |      |      |      |
| Rise / Fall Time (20%~80%)    | T <sub>r</sub> / T <sub>f</sub> |            |      | 0.26 | ns   |      |
| Differential Data Input Swing | V <sub>IN</sub>                 | 400        | 800  | 1800 | mV   |      |

**Note1:** The optical power is launched into a 62.5/125μm multi-mode fiber.



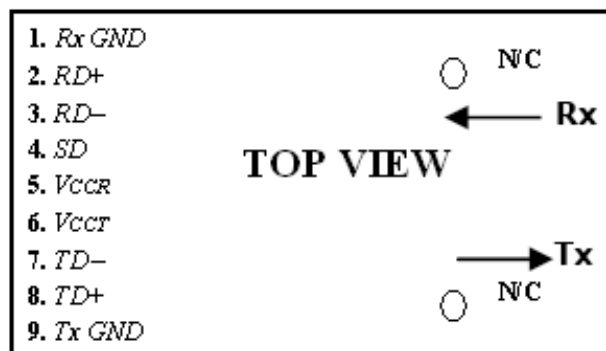
## Receiver Electro-optical Characteristics

**V<sub>CC</sub> = 3.13V to 3.47V, T<sub>OP</sub> = 0 °C to 70 °C**

| Parameters                     | Symbol              | Min.                 | Typ. | Max.            | Unit | Note |
|--------------------------------|---------------------|----------------------|------|-----------------|------|------|
| Operating Data Rate            | DR                  | 1.0625               | 1.25 |                 | Gb/s |      |
| Receiver Sensitivity           | SEN                 |                      |      | -18             | dBm  | 1    |
| Maximum Receive Power          | P <sub>Rx-MAX</sub> | -3                   |      |                 | dBm  | 1    |
| Optical Center Wavelength      | $\lambda_c$         | 830                  | 850  | 870             | nm   |      |
| Signal Detect Assert           | SD <sub>A</sub>     |                      |      | -22             | dBm  |      |
| Signal Detect De-Assert        | SD <sub>D</sub>     | -35                  |      |                 | dBm  |      |
| Signal Detect Hysteresis       | SD <sub>HY</sub>    | 0.5                  |      | 5               | dB   |      |
| Differential Data Output Swing | V <sub>OUT</sub>    | 500                  |      | 1200            | mV   |      |
| Signal Detect O/P Voltage Low  | V <sub>SDL</sub>    | 0                    |      | 0.8             | V    |      |
| Signal Detect O/P Voltage High | V <sub>SDH</sub>    | V <sub>CC</sub> -0.8 |      | V <sub>CC</sub> | V    |      |

**Note1:** Measured with a PRBS 2<sup>7</sup>-1 test pattern @1.25Gbps BER<10<sup>-12</sup>.

## Pin Assignment



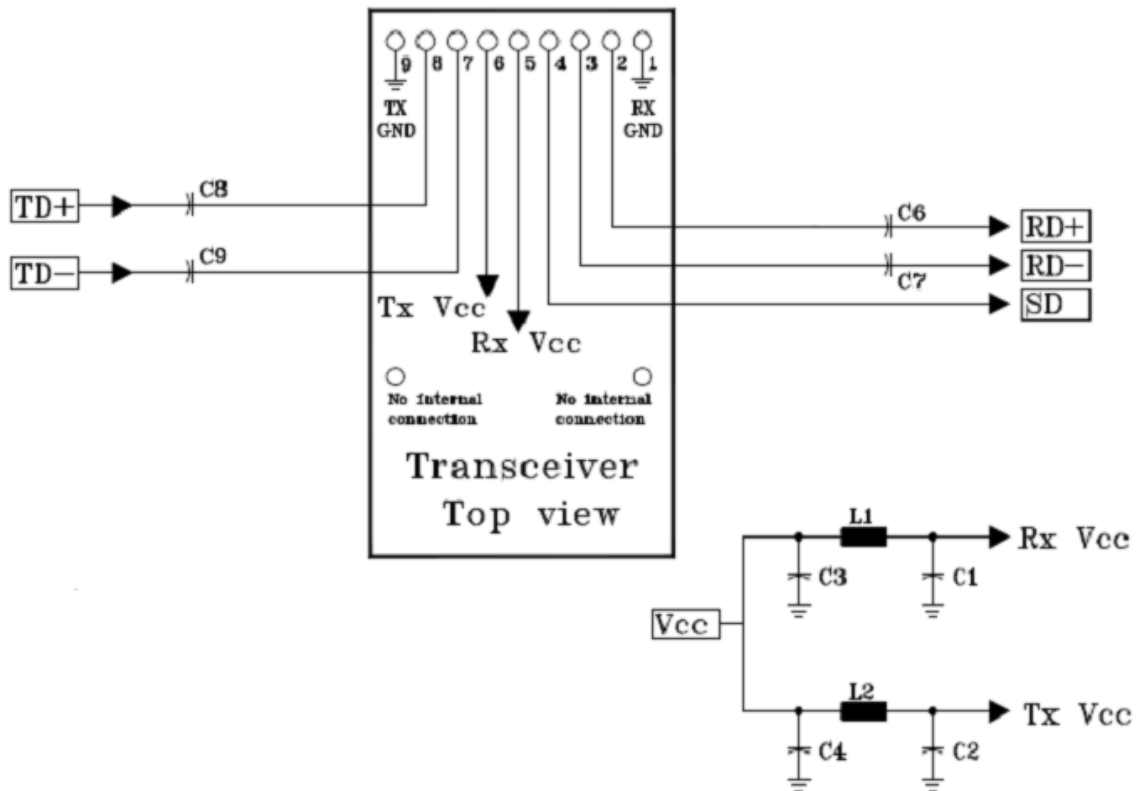
## Pin Description

| Pin | Name   | Function / Description    |
|-----|--------|---------------------------|
| 1   | Rx GND | Receiver Signal Ground    |
| 2   | RD+    | Receiver Data Out         |
| 3   | RD-    | Receiver Data Out Bar     |
| 4   | SD     | Signal Detect (1)         |
| 5   | VccR   | Receiver Power Supply     |
| 6   | VccT   | Transmitter Power Supply  |
| 7   | TD-    | Transmitter Data In Bar   |
| 8   | TD+    | Transmitter Data In       |
| 9   | Tx GND | Transmitter Signal Ground |

**Note1:** Signal Detect is a basic fiber failure indicator. This is a single-ended LVTTTL output. As the input optical power is decreased, Signal Detect will switch from high to low (de-assert point) somewhere between sensitivity and the no light input level. As the input optical power is increased from very low levels, Signal Detect will switch back from low to high (assert point).



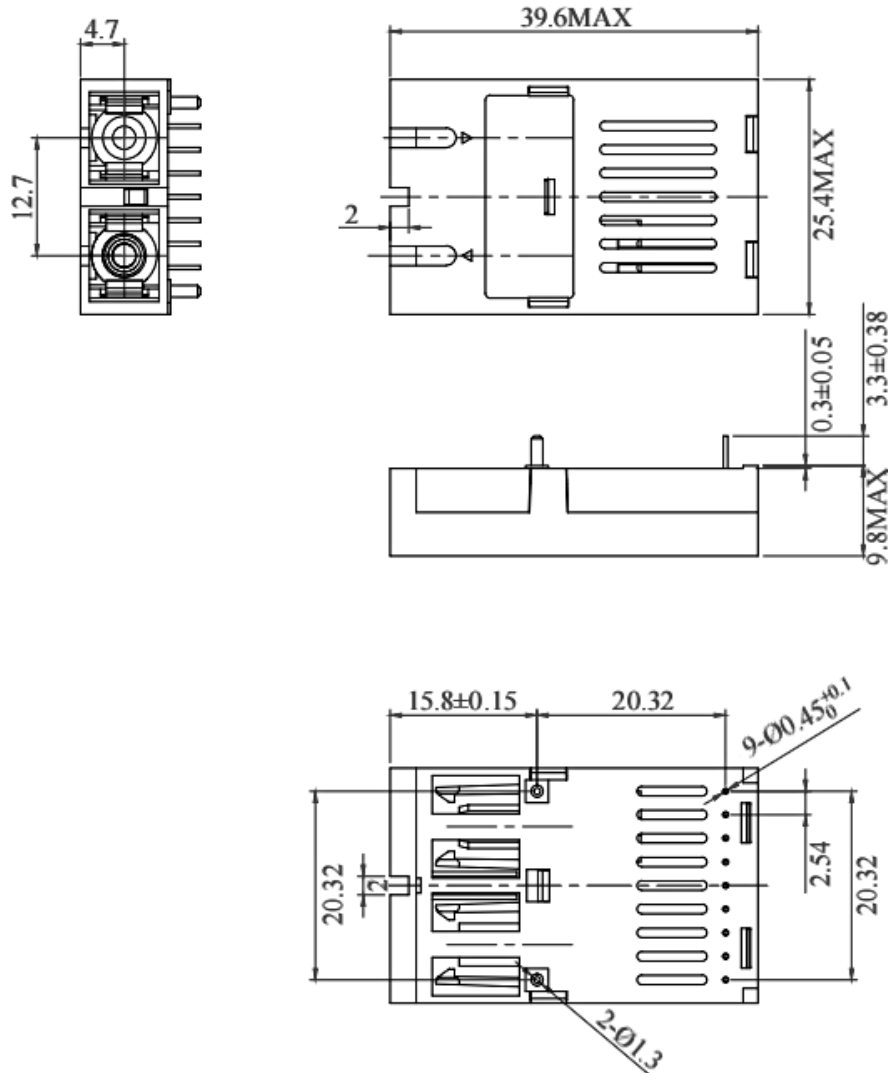
## Recommended Circuit



$C1=C2=C3=C5=C6=C7=C8=C9=0.1\mu F$   
 $C4=10\mu F$   $L1=L2=1\mu H$



## Mechanical Dimensions



(All Dimensions are  $\pm 0.20\text{mm}$  Unless Otherwise Specified, Unit: mm)

## Ordering Information

| Part No.        | Tx    | Rx    | Conn.        | I/O   | SD    | Link               | Voltage | Temp.  |
|-----------------|-------|-------|--------------|-------|-------|--------------------|---------|--------|
| F1X9-C1-M85-X5T | 850nm | 850nm | Duplex<br>SC | AC/AC | LVTTL | MMF<br>OM2<br>550m | 3.3V    | 0~70°C |

**Note:** Distances are indicative only. To calculate a more precise link budget based on specific conditions in your application, please refer to the optical characteristics.