



**125M / 155M 1X9-100BX-D Transceiver**  
**BiDi SC, Tx1550nm FP / Rx1310nm, SMF 20KM,**  
**LVTTTL / TTL Signal Detection**

**Part Number: F1X9-A2-S53-20B**



### Overview

F1X9-A2-S53-20B 1X9 SIP package style transceivers are compliant with the industrial standard specification. The high performance uncooled 1550nm FP transmitter and high sensitivity PIN receiver provide superior performance for Fast Ethernet and SONET OC-3 / SDH STM-1 applications up to SMF 20km optical links.

### Applications

- Fast Ethernet 100BASE-BX10 @125M
- SDH STM-1 / SONET OC-3 @155M

### Features

- Compliant with IEEE802.3ah 100BASE-BX10
- Compliant with SONET OC-3 IR-2 and SDH STM-1 S1.2
- Industry Standard 1x9 Footprint
- 1550nm FP transmitter & 1310nm PIN receiver
- Simplex BiDi SC connector
- Single 3.3V or 5V Power Supply
- DC-coupled Differential LVPECL inputs and outputs
- LVTTTL / TTL Signal Detection Output
- Wave Solderable and Aqueous Washable
- Link distance 20km over SM fiber
- 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 (F1X9-A2-S53-20B)  | V <sub>CC</sub> | 0    | +4.5 | V    |
| Supply Voltage (F1X9-A2-S53-20B5) | V <sub>CC</sub> | 0    | +6.0 | V    |

## Recommended Operating Conditions

| Parameters                              | Symbol            | Min.  | Typ. | Max.   | Unit   |
|-----------------------------------------|-------------------|-------|------|--------|--------|
| Case Operating Temp. (F1X9-A2-S53-20B)  | T <sub>OP</sub>   | 0     | -    | +70    | °C     |
| Case Operating Temp. (F1X9-A2-S53-20Bi) | T <sub>OP</sub>   | -40   |      | +85    | °C     |
| Supply Voltage (F1X9-A2-S53-20B)        | V <sub>CC</sub>   | +3.13 | +3.3 | +3.47  | V      |
| Supply Voltage (F1X9-A2-S53-20B5)       | V <sub>CC</sub>   | +4.75 | +5.0 | +5.25  | V      |
| Supply Current                          | I <sub>CC</sub>   |       |      | 300    | mA     |
| Power Consumption                       | P                 |       |      | 1      | W      |
| Lead Soldering Limits                   | T <sub>sold</sub> |       |      | 260/10 | °C/Sec |

## Transmitter Electro-optical Characteristics

T<sub>OP</sub> = 0 °C to 70 °C (F1X9-A2-S53-20B); T<sub>OP</sub> = -40 °C to 85 °C (F1X9-A2-S53-20Bi)

| Parameters                    | Symbol                          | Min.                        | Typ.    | Max. | Unit | Note |
|-------------------------------|---------------------------------|-----------------------------|---------|------|------|------|
| Operating Data Rate           | DR                              | 50                          | 125/155 | 200  | Mb/s |      |
| Optical Launch Power          | P <sub>o</sub>                  | -14                         |         | -8   | dBm  | 1    |
| Optical Center Wavelength     | λ <sub>c</sub>                  | 1510                        | 1550    | 1570 | nm   |      |
| Spectral Width (RMS)          | Δλ                              |                             |         | 4    | nm   |      |
| Optical Extinction Ratio      | ER                              | 9                           |         |      | dB   |      |
| Optical Eye Mask              |                                 | IEEE802.3ah and ITU-T G.957 |         |      |      |      |
| Rise/Fall Time                | T <sub>r</sub> / T <sub>f</sub> |                             |         | 2    | ns   |      |
| Differential Data Input Swing | V <sub>IN</sub>                 | 400                         |         | 2000 | mV   |      |

**Note1:** The optical power is launched into a 9/125μm single mode fiber.



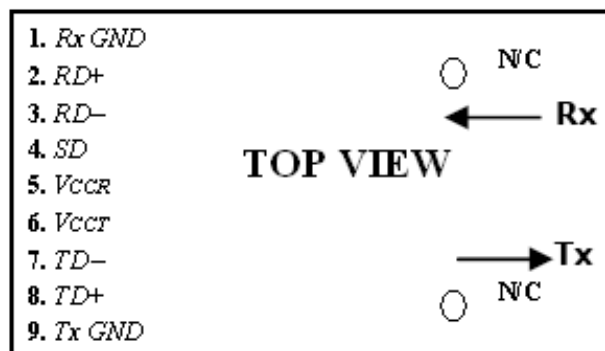
## Receiver Electro-optical Characteristics

$T_{OP} = 0^{\circ}\text{C to } 70^{\circ}\text{C}$  (F1X9-A2-S53-20B);  $T_{OP} = -40^{\circ}\text{C to } 85^{\circ}\text{C}$  (F1X9-A2-S53-20Bi)

| Parameters                     | Symbol              | Min. | Typ.    | Max.            | Unit | Note |
|--------------------------------|---------------------|------|---------|-----------------|------|------|
| Operating Data Rate            | DR                  | 50   | 125/155 | 200             | Mb/s |      |
| Receiver Sensitivity           | SEN                 |      |         | -32             | dBm  | 1    |
| Maximum Receive Power          | P <sub>Rx-MAX</sub> | -3   |         |                 | dBm  | 1    |
| Optical Center Wavelength      | $\lambda_c$         | 1280 |         | 1340            | nm   |      |
| Signal Detect Assert           | SD <sub>A</sub>     |      |         | -32             | dBm  |      |
| Signal Detect De-Assert        | SD <sub>D</sub>     | -46  |         |                 | dBm  |      |
| Signal Detect Hysteresis       | SD <sub>HY</sub>    | 0.5  |         |                 | dB   |      |
| Differential Data Output Swing | V <sub>OUT</sub>    | 500  |         | 1200            | mV   |      |
| Signal Detect O/P Voltage Low  | V <sub>SDL</sub>    | GND  |         | 0.8             | V    |      |
| Signal Detect O/P Voltage High | V <sub>SDH</sub>    | 2.0  |         | V <sub>CC</sub> | V    |      |

**Note1:** Measured with a PRBS 2<sup>23</sup>-1 test pattern @155Mbps BER<10<sup>-12</sup>.

## Pin Assignment



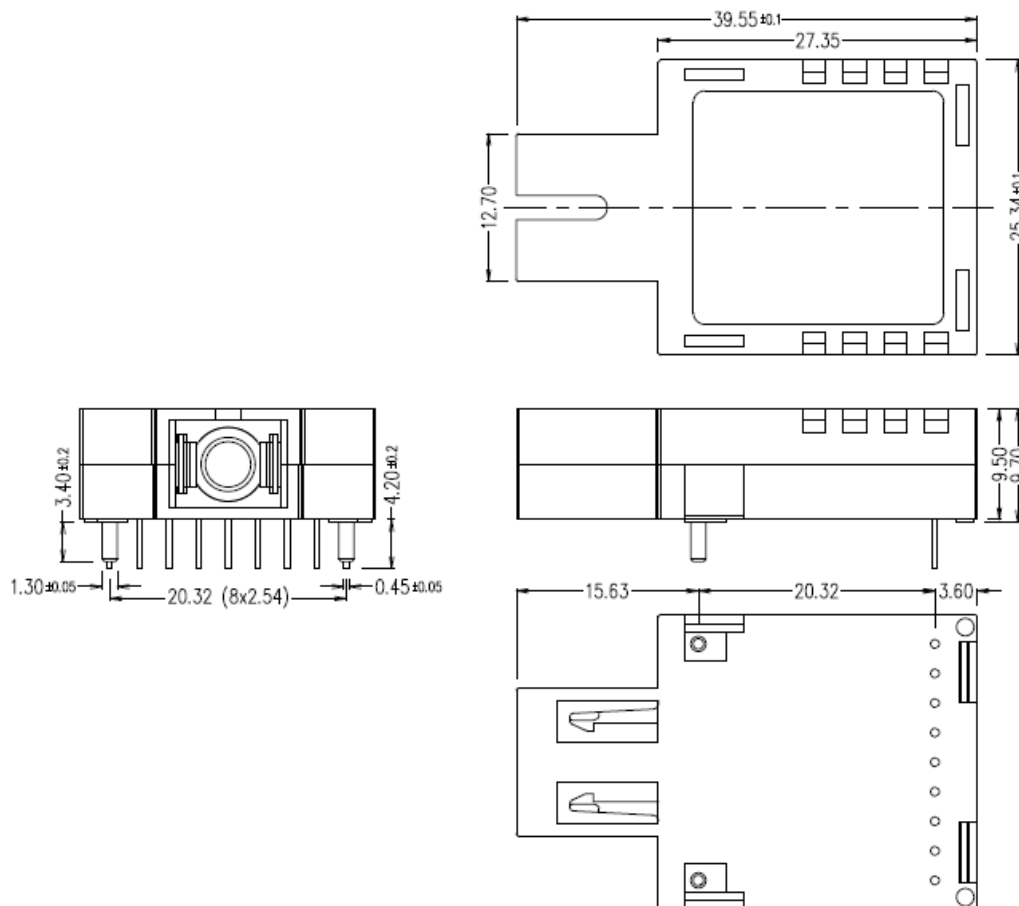
## Pin Description

| 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/TTL 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).



## Mechanical Dimensions



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

## Ordering Information

| Part No.          | Tx     | Rx                    | Conn.      | I/O   | SD    | Link        | Voltage | Temp.    |
|-------------------|--------|-----------------------|------------|-------|-------|-------------|---------|----------|
| F1X9-A2-S53-20B   | 1550nm | 1280nm<br>~<br>1340nm | BiDi<br>SC | DC/DC | LVTTL | SMF<br>20km | 3.3V    | 0~70°C   |
| F1X9-A2-S53-20Bi  |        |                       |            |       | LVTTL |             | 3.3V    | -40~85°C |
| F1X9-A2-S53-20B5  |        |                       |            |       | TTL   |             | 5V      | 0~70°C   |
| F1X9-A2-S53-20B5i |        |                       |            |       | TTL   |             | 5V      | -40~85°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.