

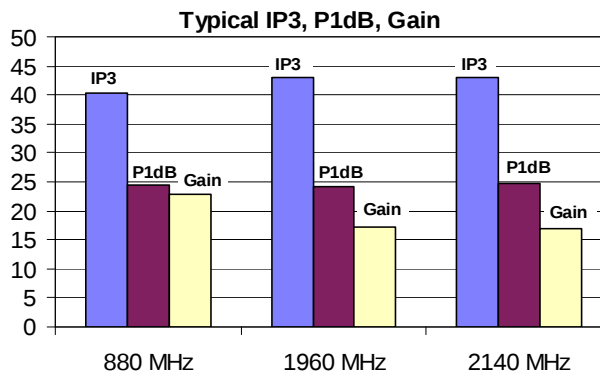


### Product Description

RFMD's SXB2089Z amplifier is a high linearity InGaP/GaAs Heterojunction Bipolar Transistor (HBT) MMIC housed in a low-cost, surface-mountable plastic package. These amplifiers are specially designed for use as driver devices for infrastructure equipment in the 5MHz to 2500MHz Cellular, ISM, WLL, PCS, and W-CDMA applications. It's high linearity makes it an ideal choice for multi-carrier as well as digital applications.

#### Optimum Technology Matching® Applied

- ☒ GaAs HBT
- ☐ GaAs MESFET
- ☒ InGaP HBT
- ☐ SiGe BiCMOS
- ☐ Si BiCMOS
- ☐ SiGe HBT
- ☐ GaAs pHEMT
- ☐ Si CMOS
- ☐ Si BJT
- ☐ GaN HEMT
- ☐ RF MEMS



### Features

- High OIP<sub>3</sub>: +43 dBm at 1960MHz
- P<sub>1dB</sub>: 24 dBm
- High Linearity/ACP Performance
- Robust 2000V ESD, Class 2
- SOT-89 Package

### Applications

- PA Driver Amplifier
- IF Amplifier
- Cellular, PCS, ISM, WLL, W-CDMA

| Parameter                       | Specification |      |      | Unit | Condition                                                             |
|---------------------------------|---------------|------|------|------|-----------------------------------------------------------------------|
|                                 | Min.          | Typ. | Max. |      |                                                                       |
| Small Signal Gain               |               | 25.0 |      | dBm  | 450MHz                                                                |
|                                 | 21.5          | 23.0 | 24.5 | dBm  | 880MHz                                                                |
|                                 | 15.5          | 17.0 | 21.5 | dBm  | 1960MHz                                                               |
|                                 |               | 17.0 |      | dBm  | 2140MHz                                                               |
| Input VSWR                      |               | 1.1  |      |      | 450MHz                                                                |
|                                 |               | 1.4  | 2.5  |      | 880MHz                                                                |
|                                 |               | 1.6  |      |      | 1960MHz                                                               |
|                                 |               | 1.3  |      |      | 2140MHz                                                               |
| Output Power at 1dB Compression |               | 24.0 |      | dBm  | 450MHz                                                                |
|                                 | 23.0          | 24.5 |      | dBm  | 880MHz and 1960MHz                                                    |
|                                 |               | 24.5 |      | dBm  | 2140MHz                                                               |
| Third Order Intercept Point     |               | 40.0 |      | dBm  | 450MHz                                                                |
|                                 | 38.0          | 41.0 |      | dBm  | 880MHz                                                                |
|                                 | 40.0          | 43.0 |      | dBm  | 1960MHz                                                               |
|                                 |               | 43.0 |      | dBm  | 2140MHz                                                               |
| Noise Figure                    |               | 4.9  |      | dB   | 450MHz                                                                |
|                                 |               | 4.5  | 6.0  | dB   | 880MHz                                                                |
|                                 |               | 4.7  |      | dB   | 1960MHz                                                               |
|                                 |               | 4.2  |      | dB   | 2140MHz                                                               |
| Channel Power IS-95             |               | 16.0 |      | dBm  | 450MHz, IS-95, -55dBc ACP                                             |
|                                 |               | 16.3 |      | dBm  | 880MHz, IS-95, -55dBc ACP                                             |
|                                 |               | 15.5 |      | dBm  | 1960MHz, IS-95, -55dBc ACP                                            |
|                                 |               | 15.6 |      | dBm  | 2140MHz, WCDMA, -50dBc ACP                                            |
| Thermal Resistance              |               | 51.3 |      | °C/W | junction - lead                                                       |
| Device Operating Current        | 120           | 135  | 150  | mA   | V <sub>S</sub> =8v, R <sub>BIAS</sub> =20Ω, V <sub>DEVICE</sub> =5.2V |

Test Conditions: T<sub>A</sub>=25°C, Z<sub>0</sub>=50Ω, P<sub>OUT</sub> per tone=+11dBm, ToneSpacing=1MHz

## Absolute Maximum Ratings

| Parameter                              | Rating     | Unit |
|----------------------------------------|------------|------|
| Device Current ( $I_{DQ}$ )            | 190        | mA   |
| Device Voltage ( $V_D$ )               | 6          | V    |
| RF Input Power                         | 20         | dBm  |
| Junction Temp ( $T_J$ )                | +150       | °C   |
| Operating Temp Range ( $T_L$ )         | -40 to +85 | °C   |
| Storage Temp                           | +150       | °C   |
| Operating Dissipated Power (quiescent) | 1.0        | W    |
| ESD Rating - Human Body Model (HBM)    | Class 2    |      |
| Moisture Sensitivity Level             | MSL 2      |      |

Operation of this device beyond any one of these limits may cause permanent damage. For reliable continuous operation, the device voltage and current must not exceed the maximum operating values specified in the table on page one.

Bias Conditions should also satisfy the following expression:

$$I_D V_D < (T_J - T_L) / R_{TH}, \quad J-I \text{ and } T_L = T_{LEAD}$$



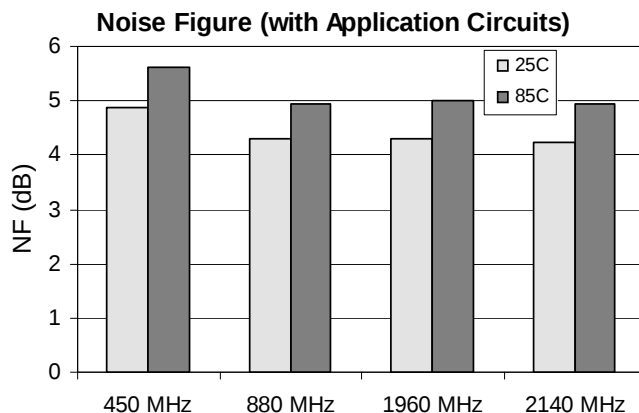
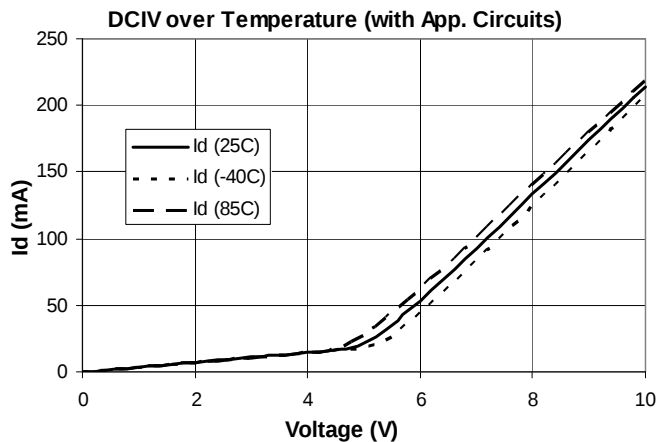
**Caution!** ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

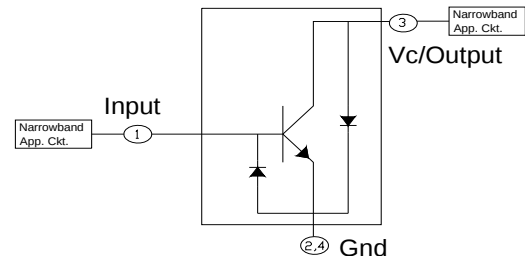
The information in this publication is believed to be accurate and reliable. However, no responsibility is assumed by RF Micro Devices, Inc. ("RFMD") for its use, nor for any infringement of patents, or other rights of third parties, resulting from its use. No license is granted by implication or otherwise under any patent or patent rights of RFMD. RFMD reserves the right to change component circuitry, recommended application circuitry and specifications at any time without prior notice.



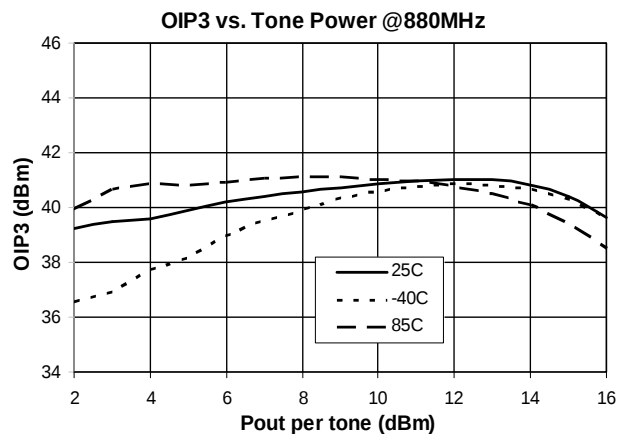
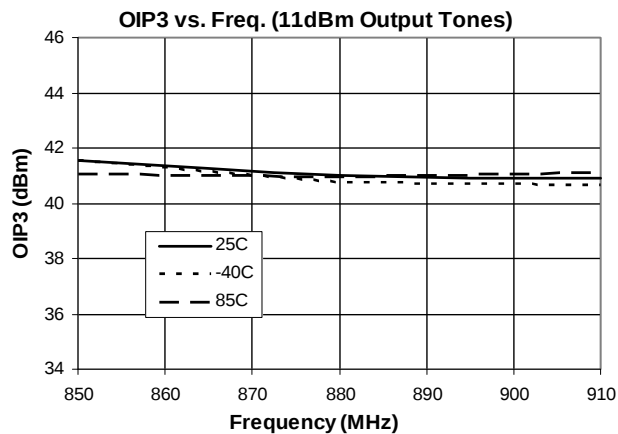
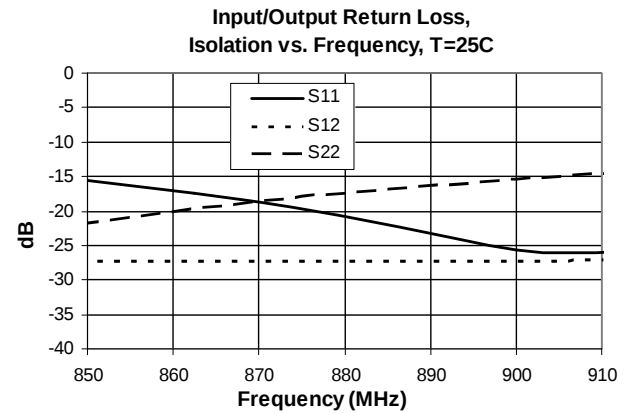
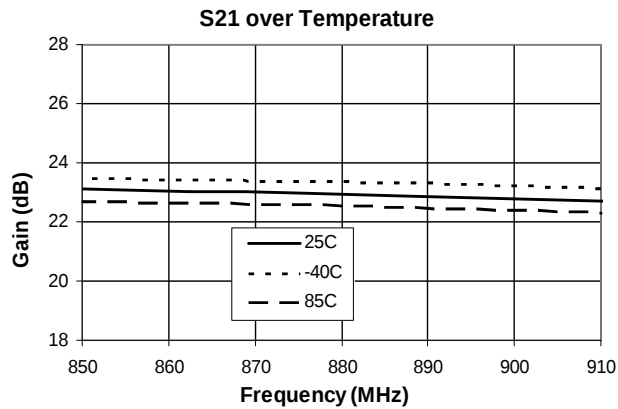
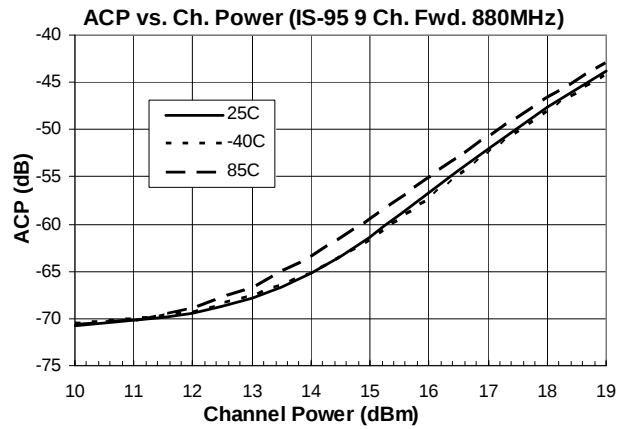
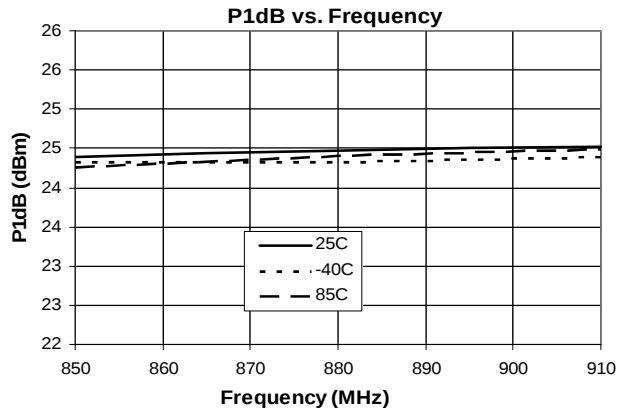
RFMD Green: RoHS compliant per EU Directive 2002/95/EC, halogen free per IEC 61249-2-21, < 1000ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.



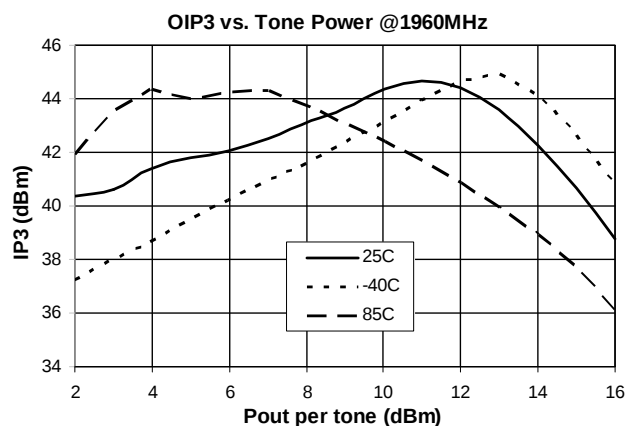
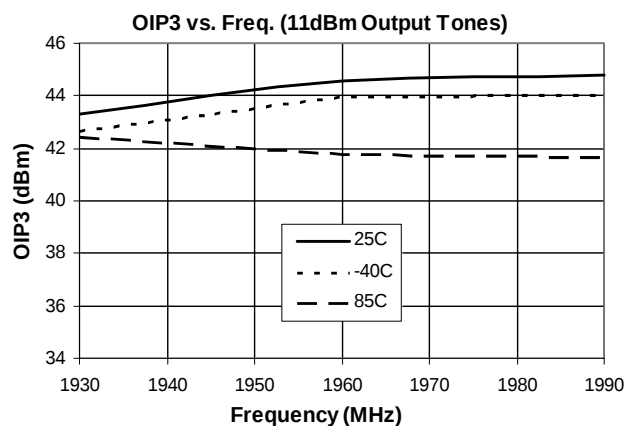
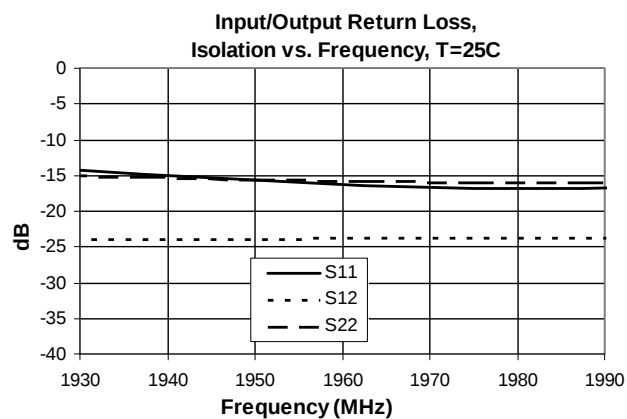
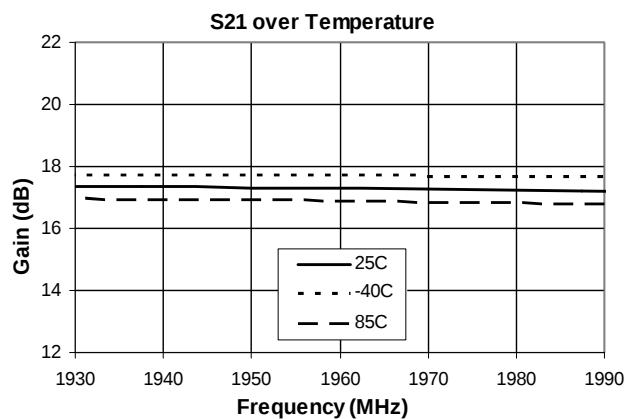
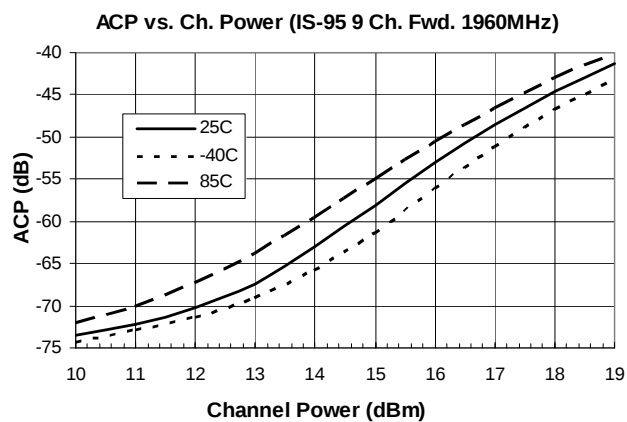
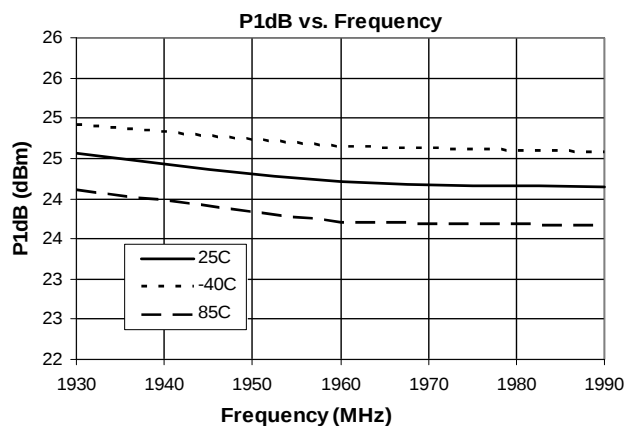
Simplified Device Schematic with ESD diodes



880 MHz Application Circuit Data,  $I_D=135\text{mA}$ ,  $T=+25\text{C}$ ,  $R_{\text{Bias}}=20\text{ Ohm}$ ,  $V_S=8\text{V}$

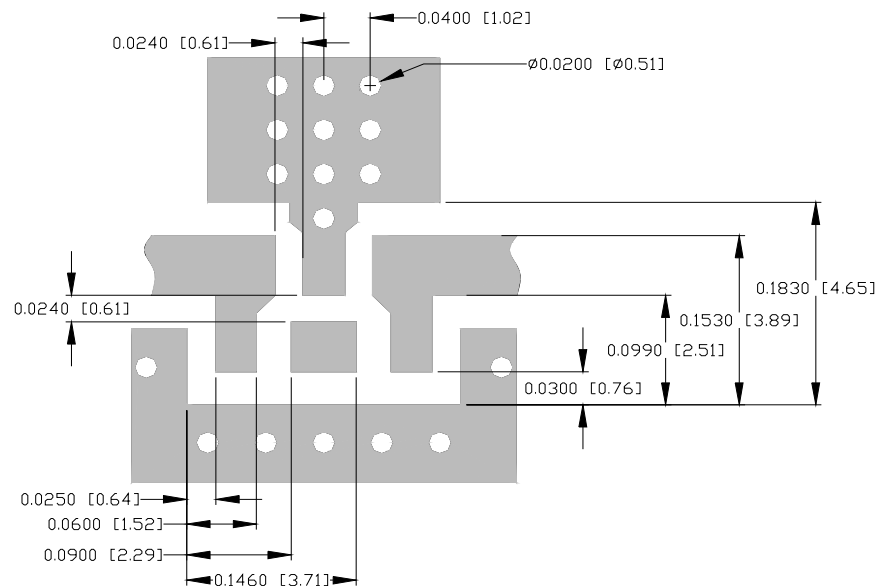


1960 MHz Application Circuit Data,  $I_D=135\text{mA}$ ,  $T=+25\text{C}$ ,  $R_{\text{Bias}}=20\text{ Ohm}$ ,  $V_S=8\text{V}$

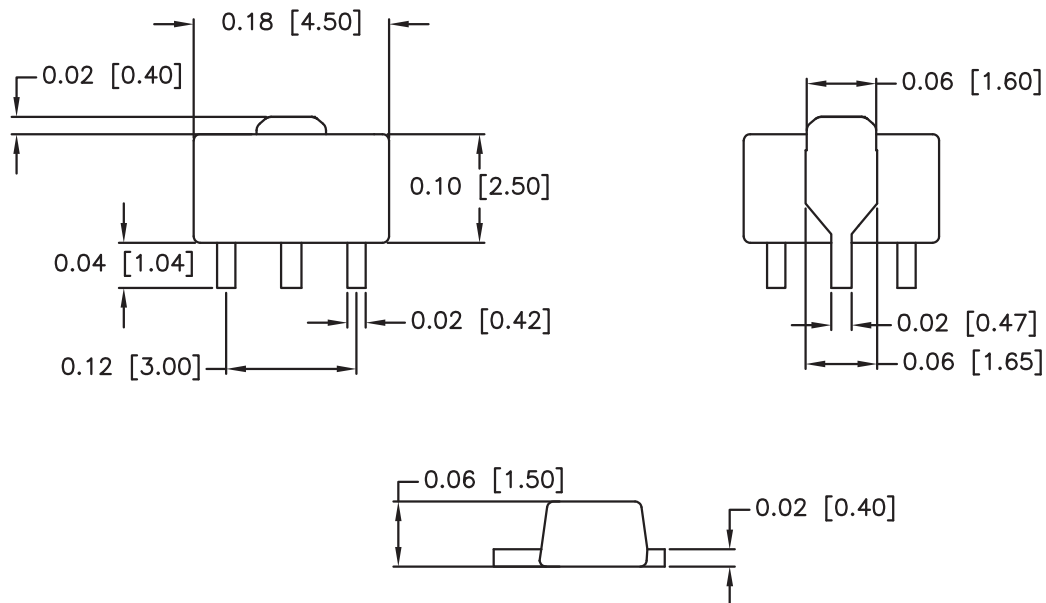


| Pin  | Function    | Description                                                                                                                                          |
|------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | RF IN       | RF input pin. This pin requires the use of an external DC blocking capacitor and matching components chosen for the frequency of operation.          |
| 2, 4 | GND         | Connection to ground. Use via holes for best performance to reduce lead inductance as close to ground leads as possible.                             |
| 3    | RF OUT/BIAS | RF output pin. This pin requires the use of an external DC blocking capacitor, choke, and matching components as shown in the Application Schematic. |

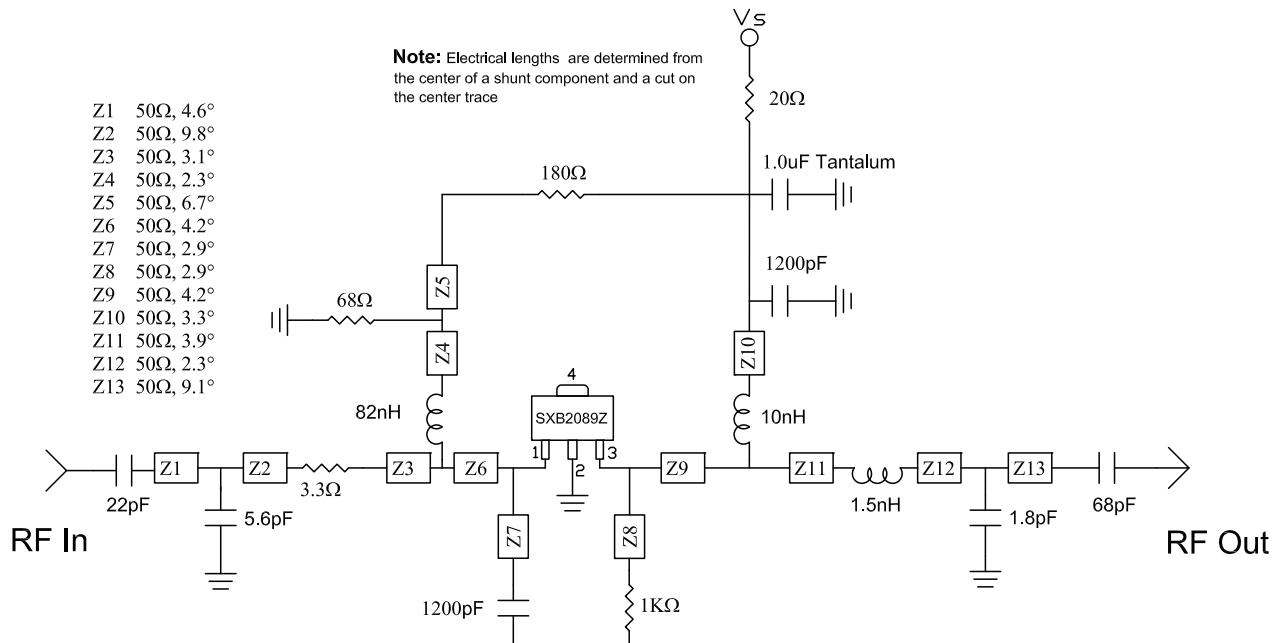
### Suggested Pad Layout



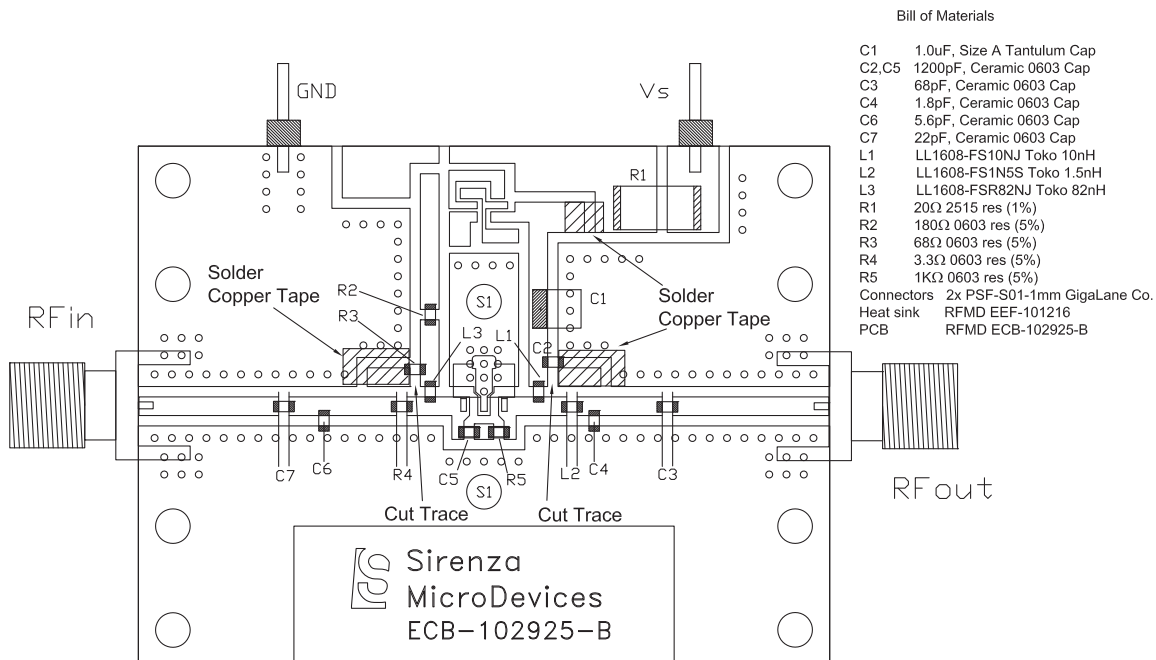
### Package Drawing



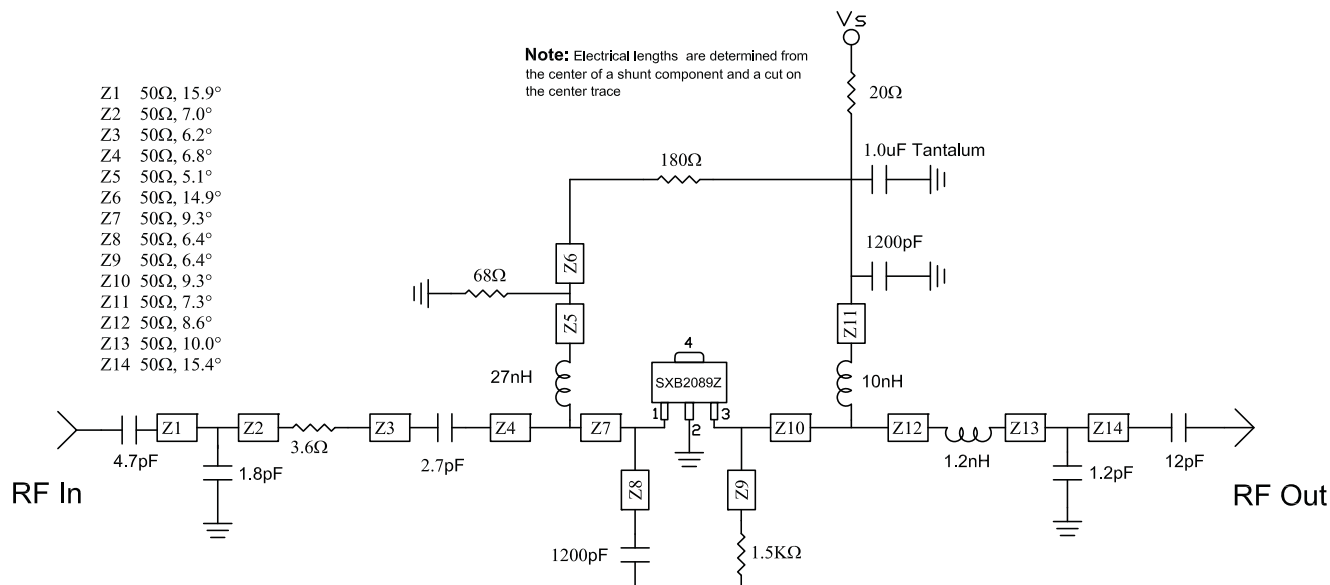
## 880MHz Application Schematic



## Evaluation Board Layout and Bill of Materials

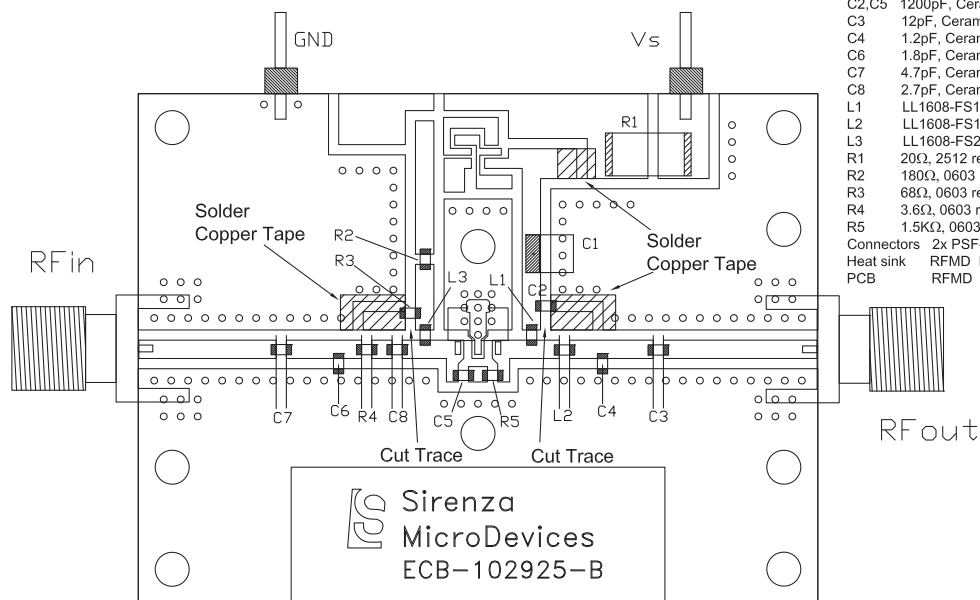


## 1960MHz Application Schematic

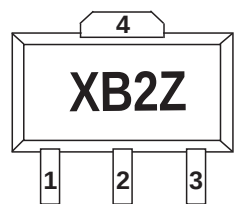


## Evaluation Board Layout and Bill of Materials

### Bill of Materials



Part Identification



Alternate marking: “SXB2089Z” on line 1 with Trace Code on line 2.

Ordering Information

| Ordering Code | Description                |
|---------------|----------------------------|
| SXB2089Z      | 7” Reel with 1000 pieces   |
| SXB2089ZSQ    | Sample Bag with 25 pieces  |
| SXB2089ZSR    | 7” Reel with 100 pieces    |
| SXB2089Z-EVB1 | 880MHz, 8V Operation PCBA  |
| SXB2089Z-EVB2 | 1960MHz, 8V Operation PCBA |