



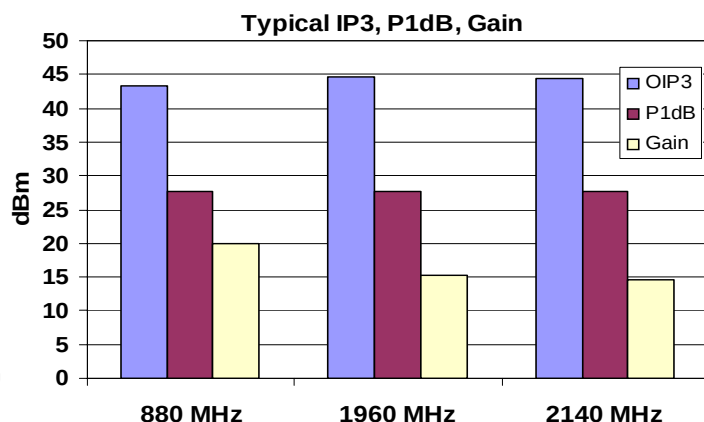
## Product Description

Sirenza Microdevices' SXB-4089 amplifier is a high efficiency InGaP/ GaAs Heterojunction Bipolar Transistor (HBT) MMIC housed in low-cost, surface-mountable plastic package.

These amplifiers are specially designed for use as driver devices for infrastructure equipment in the 400-2500 MHz cellular, ISM, WLL, PCS, W-CDMA applications.

Its high linearity makes it an ideal choice for multi-carrier as well as digital applications.

The matte tin finish on Sirenza's lead-free package utilizes a post annealing process to mitigate tin whisker formation and is RoHS compliant per EU Directive 2002/95. This package is also manufactured with green molding compounds that contain no antimony trioxide nor halogenated fire retardants.



## SXB-4089

## SXB-4089Z



## 400-2500 MHz ½ W Medium Power InGaP/GaAs HBT Amplifier with Active Bias



## Product Features

- On-chip Active Bias Control, Single 5V Supply
- High Output 3rd Order Intercept: +45 dBm typ.
- High P1dB : +28 dBm typ.
- High Gain: +20 dB at 880 MHz
- Low Rth: 25°C/W typ.
- Robust 2000V ESD, Class 2

## Applications

- W-CDMA, PCS, Cellular Systems
- Multi-Carrier Applications

| Symbol                | Parameters                                                                     | Units | Frequency                       | Min.         | Typ.                    | Max.       |
|-----------------------|--------------------------------------------------------------------------------|-------|---------------------------------|--------------|-------------------------|------------|
| P <sub>1dB</sub>      | Output Power at 1 dB Compression                                               | dBm   | 880 MHz<br>1960 MHz<br>2140 MHz | 26           | 27.5<br>27.5<br>27.5    |            |
| S <sub>21</sub>       | Small Signal Gain                                                              | dBm   | 880 MHz<br>1960 MHz<br>2140 MHz | 18<br>12.5   | 20<br>15<br>14          | 22<br>15.5 |
| S <sub>11</sub>       | Input VSWR                                                                     |       | 880 MHz<br>1960 MHz<br>2140 MHz |              | 1.3:1<br>1.3:1<br>1.3:1 | 2.0:1      |
| OIP3                  | Output Third Order Intercept Point (Pout/Tone = +11 dBm, Tone spacing = 1 MHz) | dBm   | 880 MHz<br>1960 MHz<br>2140 MHz | 41.5<br>42.5 | 43.5<br>44.5<br>44.5    |            |
| NF                    | Noise Figure                                                                   | dB    | 880 MHz<br>1960 MHz<br>2140 MHz |              | 5.6<br>3.3<br>3.3       |            |
| V <sub>CC</sub>       | Device Operating Voltage                                                       | V     |                                 | 4.75         | 5                       | 5.25       |
| I <sub>D</sub>        | Device Operating Current                                                       | mA    |                                 | 235          | 265                     | 295        |
| R <sub>TH</sub> , j-l | Thermal Resistance (junction - lead)                                           | °C/W  |                                 |              | 25.3                    |            |

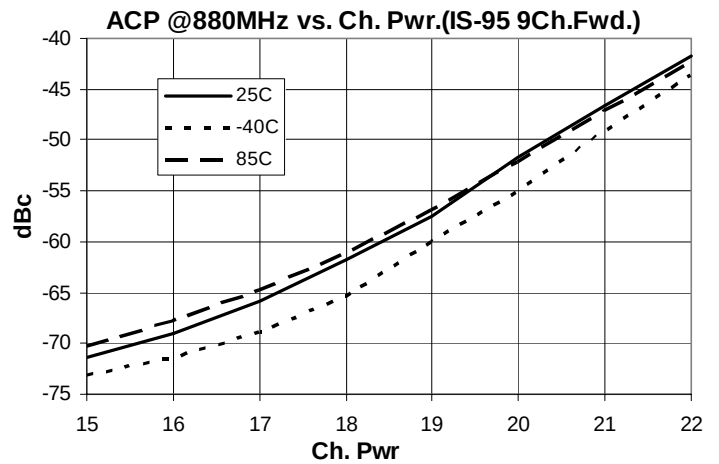
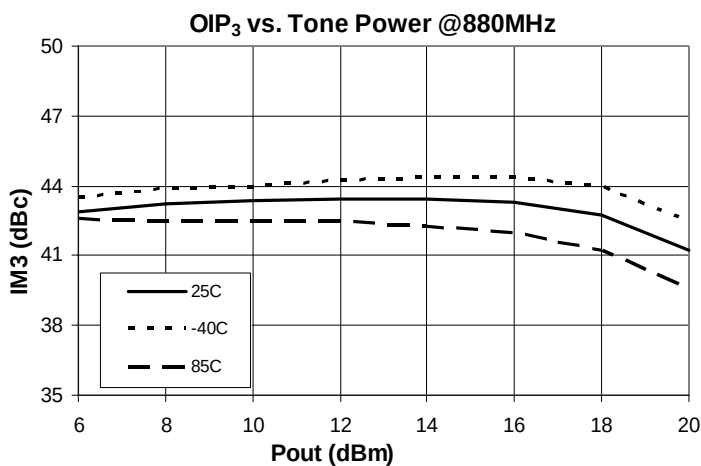
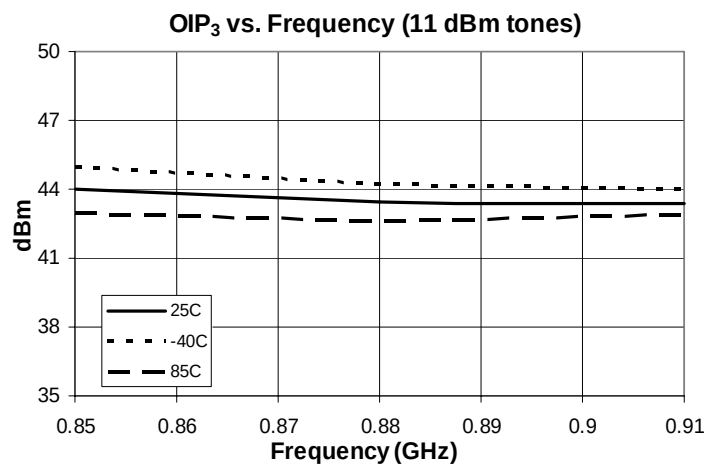
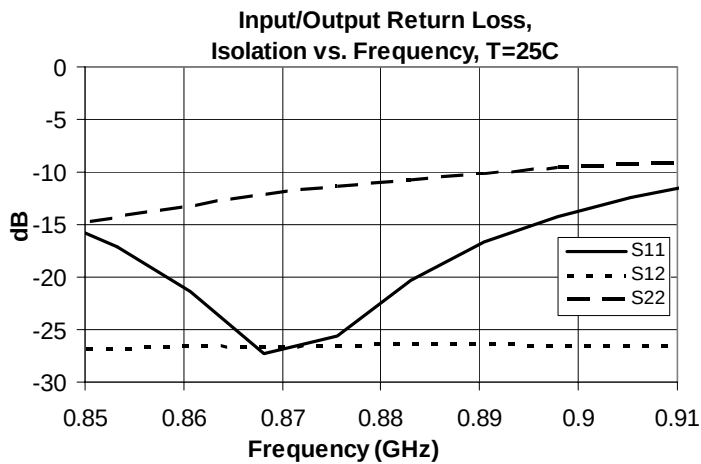
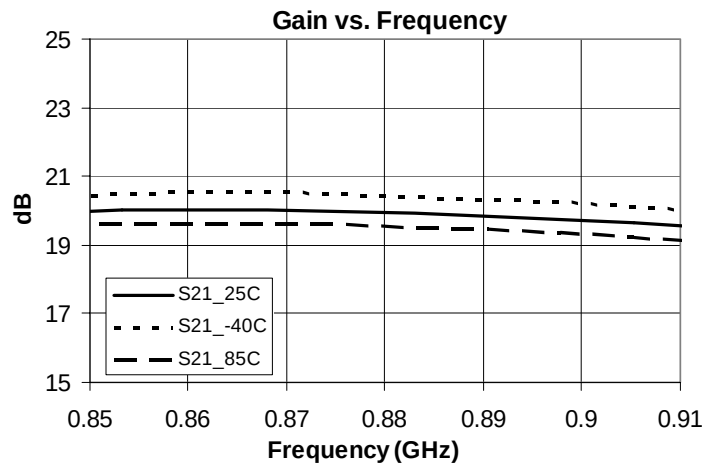
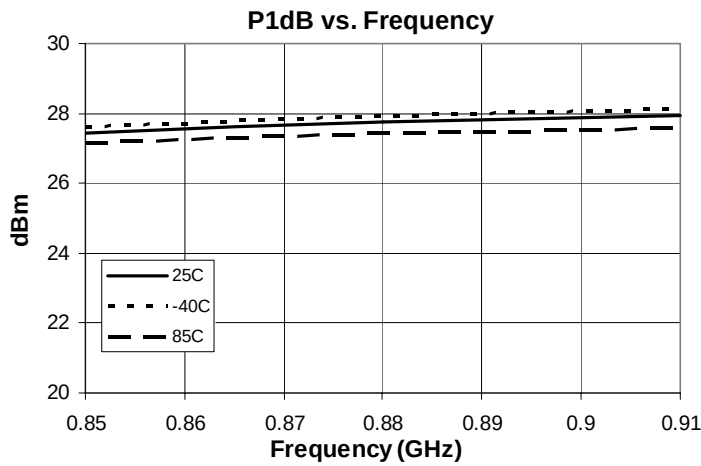
**Test Conditions:** T<sub>a</sub> = 25°C Z<sub>O</sub> = 50 Ohms  
Measured in Application Circuit

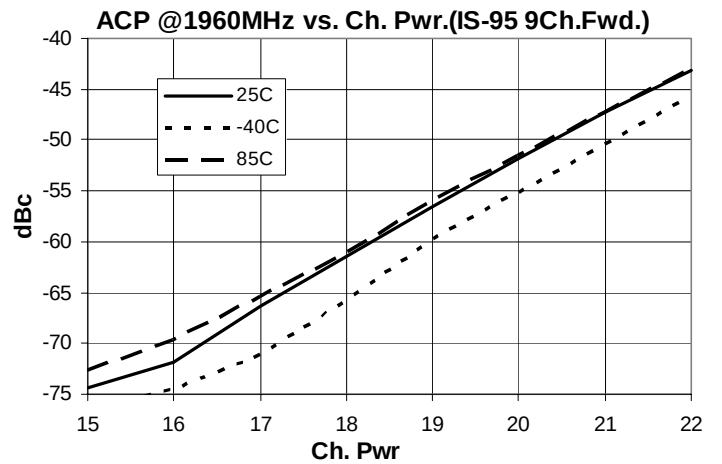
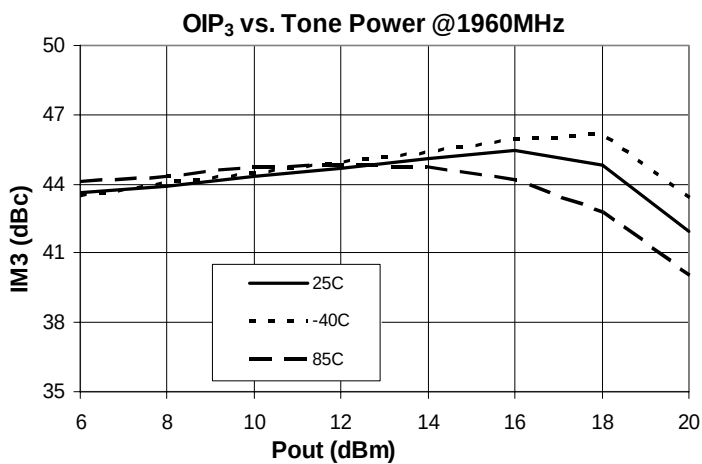
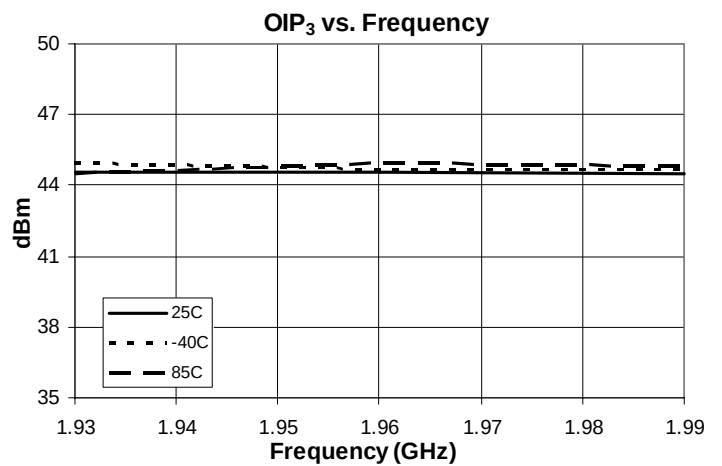
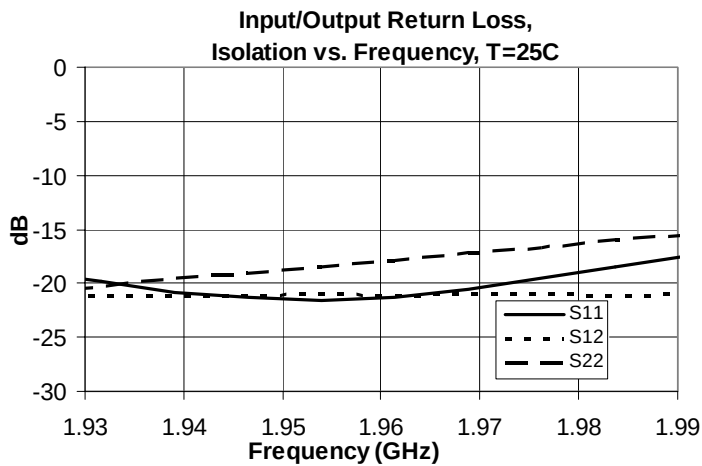
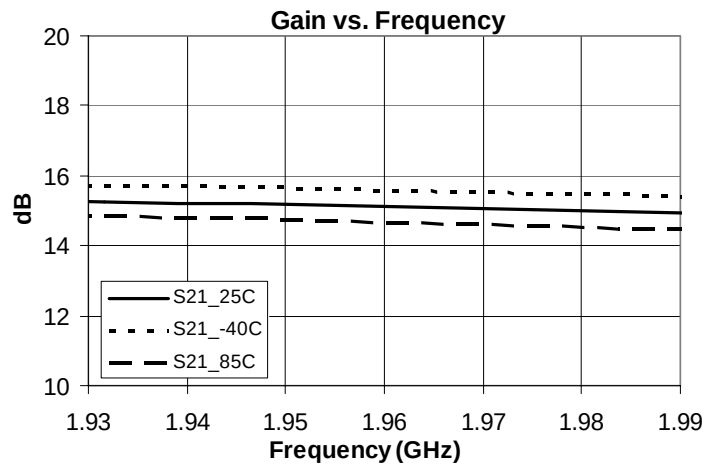
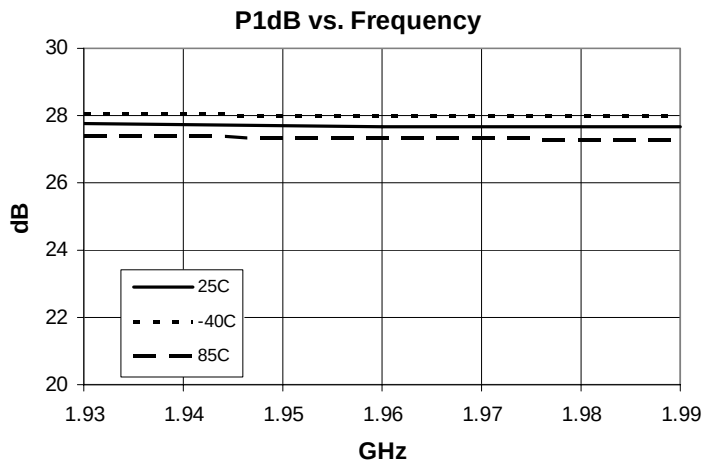
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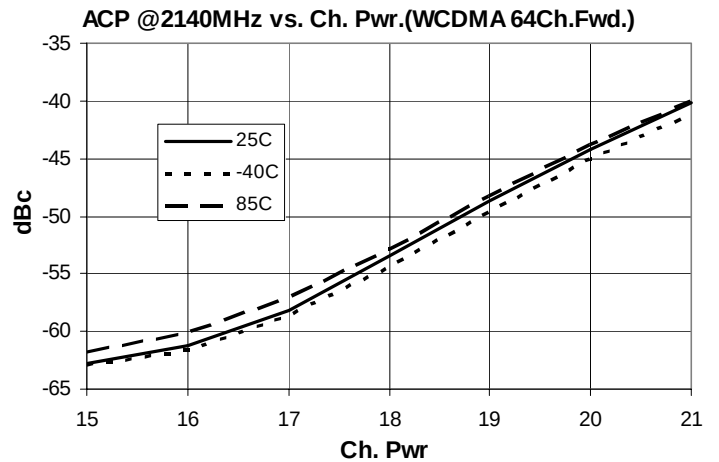
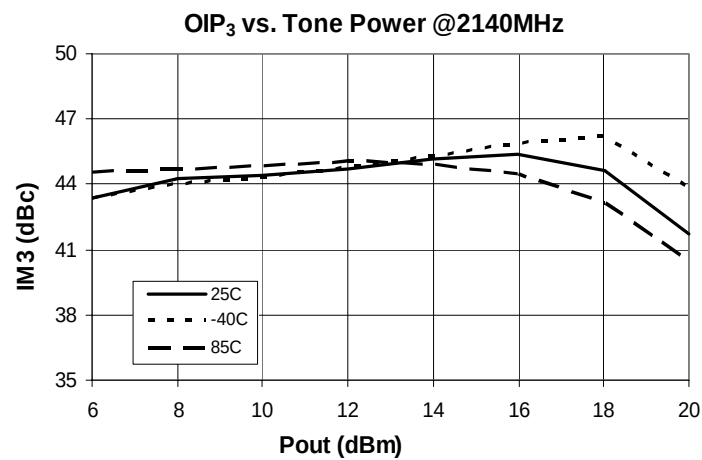
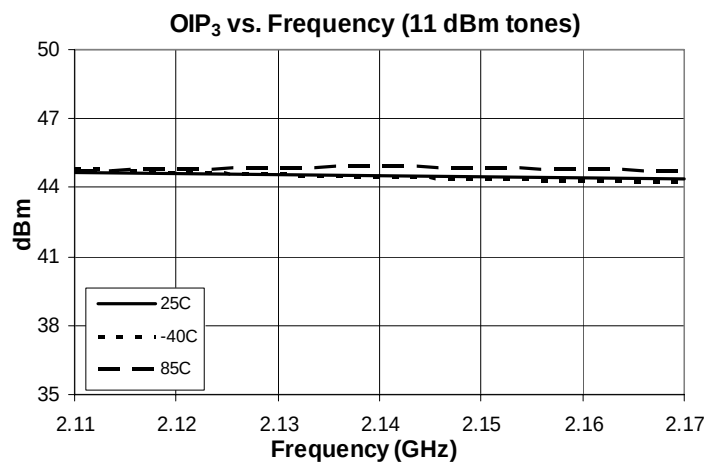
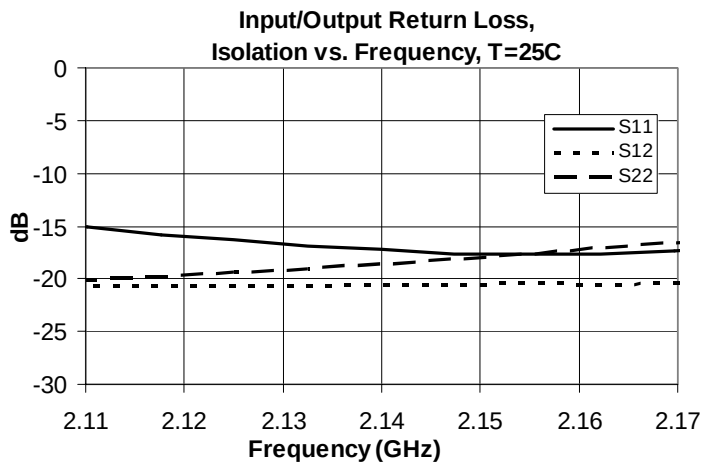
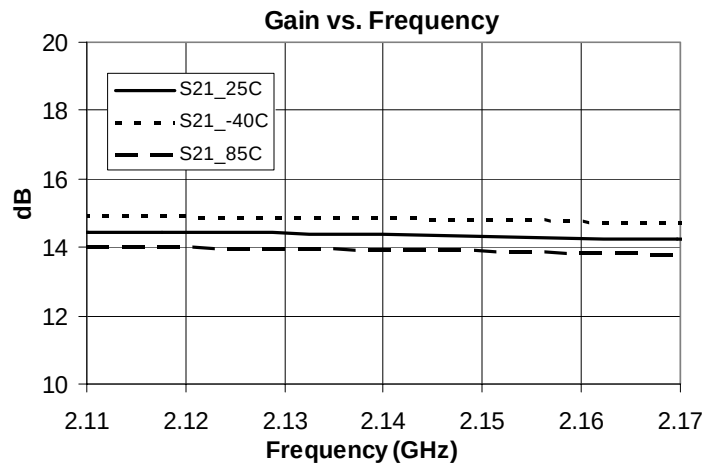
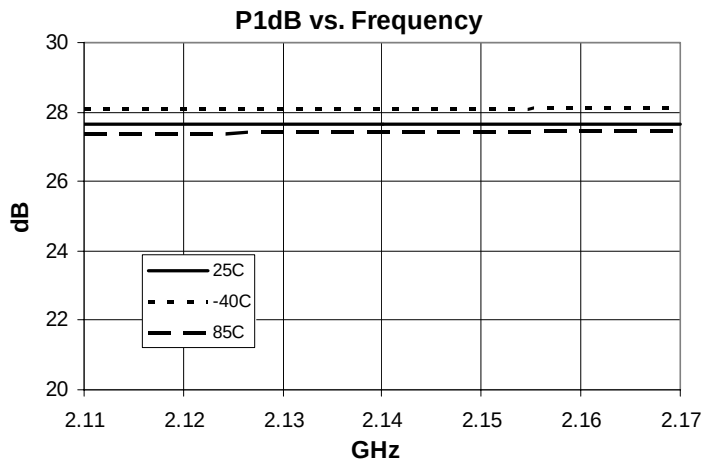
303 S. Technology Ct.  
Broomfield, CO 80021

Phone: (800) SMI-MMIC

<http://www.sirenza.com>

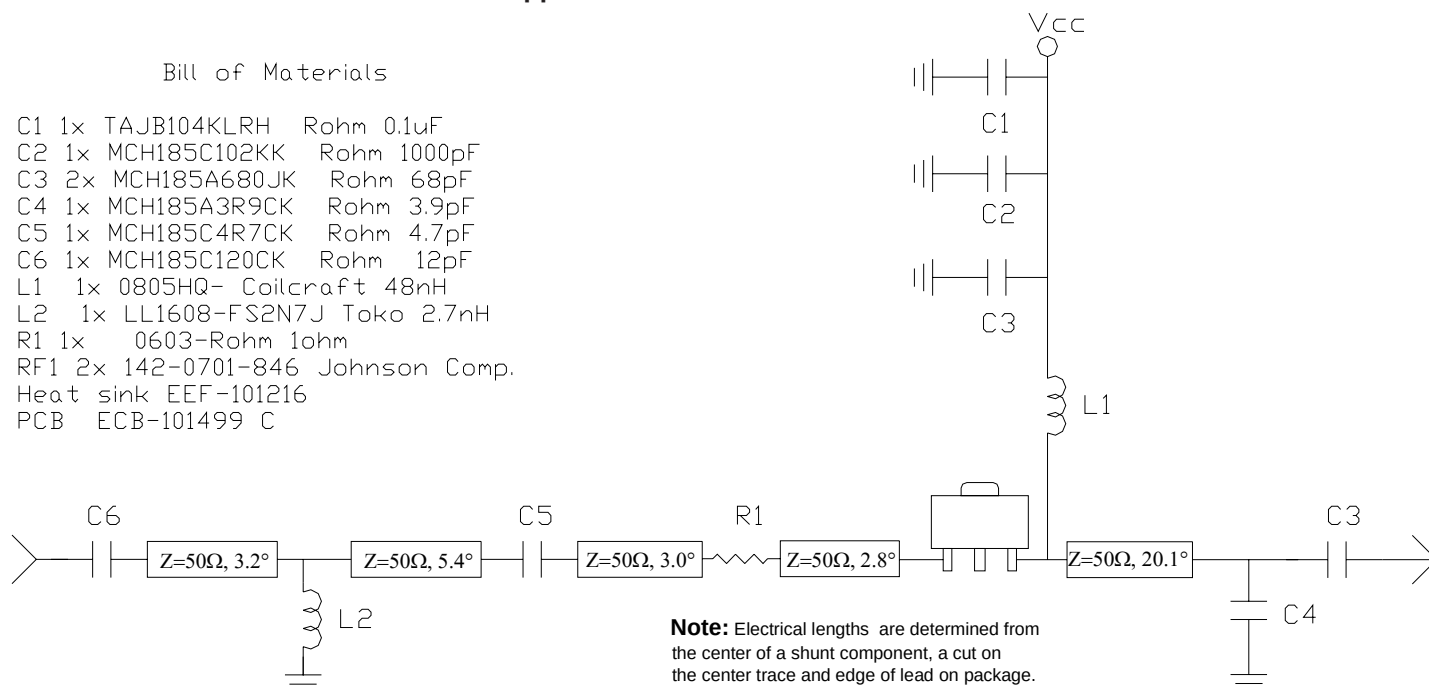
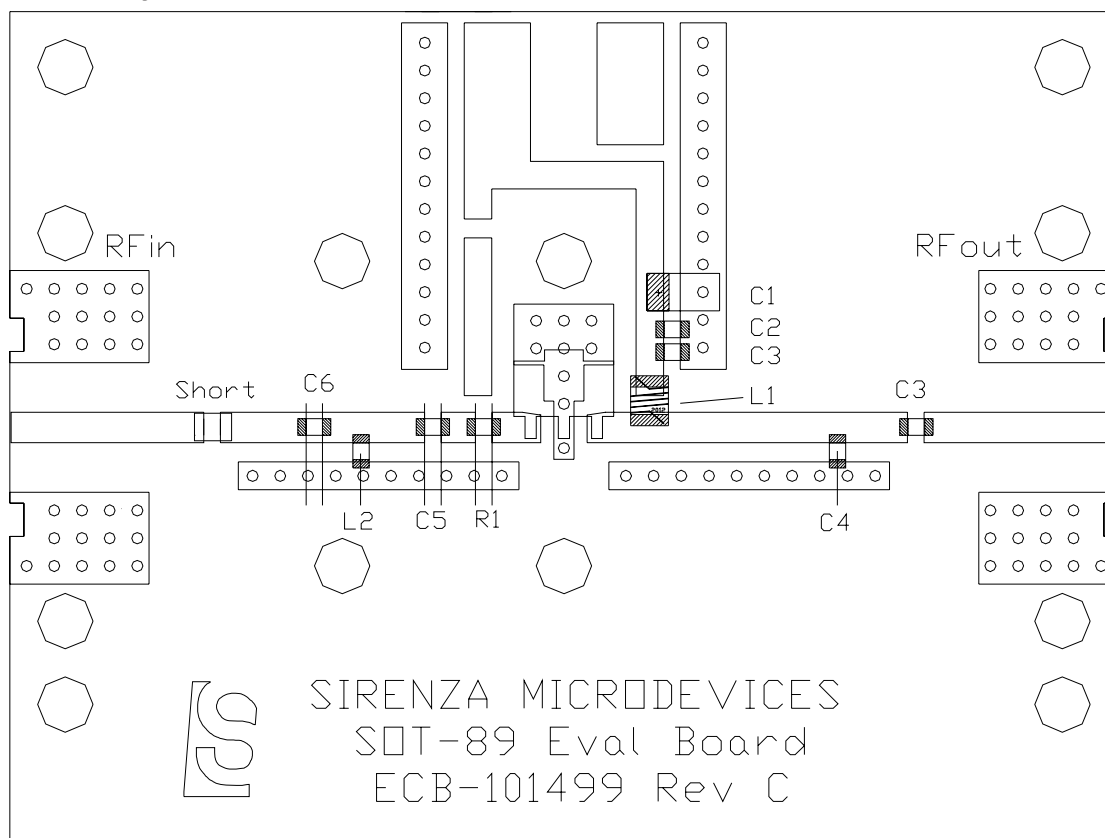






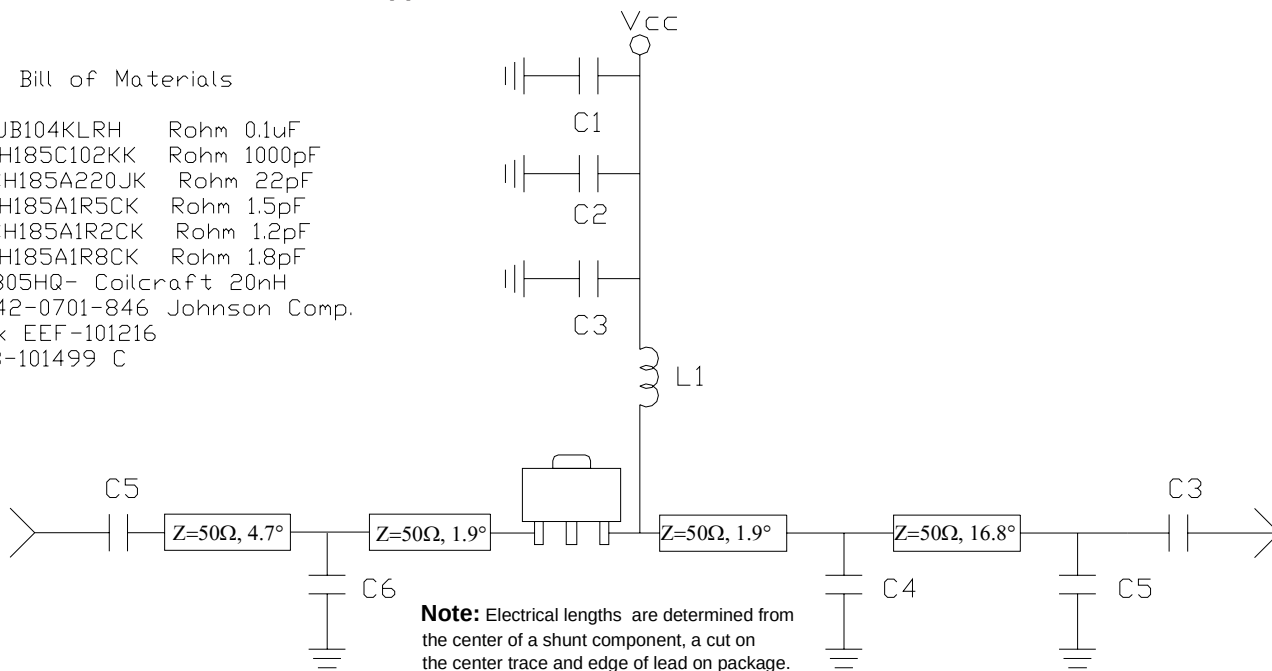
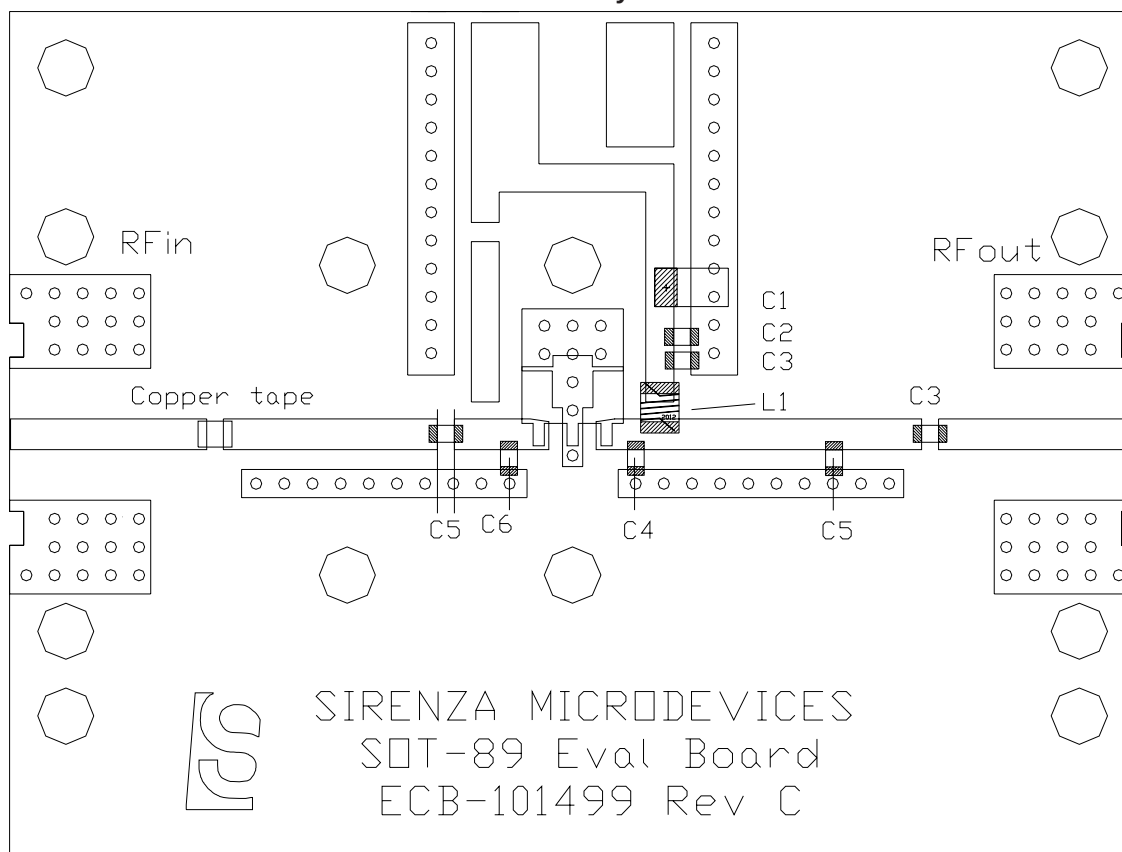
**Application Schematic for 880 MHz**
**Bill of Materials**

C1 1x TAJB104KLRH Rohm 0.1uF  
 C2 1x MCH185C102KK Rohm 1000pF  
 C3 2x MCH185A680JK Rohm 68pF  
 C4 1x MCH185A3R9CK Rohm 3.9pF  
 C5 1x MCH185C4R7CK Rohm 4.7pF  
 C6 1x MCH185C120CK Rohm 12pF  
 L1 1x 0805HQ- Coilcraft 48nH  
 L2 1x LL1608-FS2N7J Toko 2.7nH  
 R1 1x 0603-Rohm 1ohm  
 RF1 2x 142-0701-846 Johnson Comp.  
 Heat sink EEF-101216  
 PCB ECB-101499 C


**Evaluation Board Layout for 880 MHz**


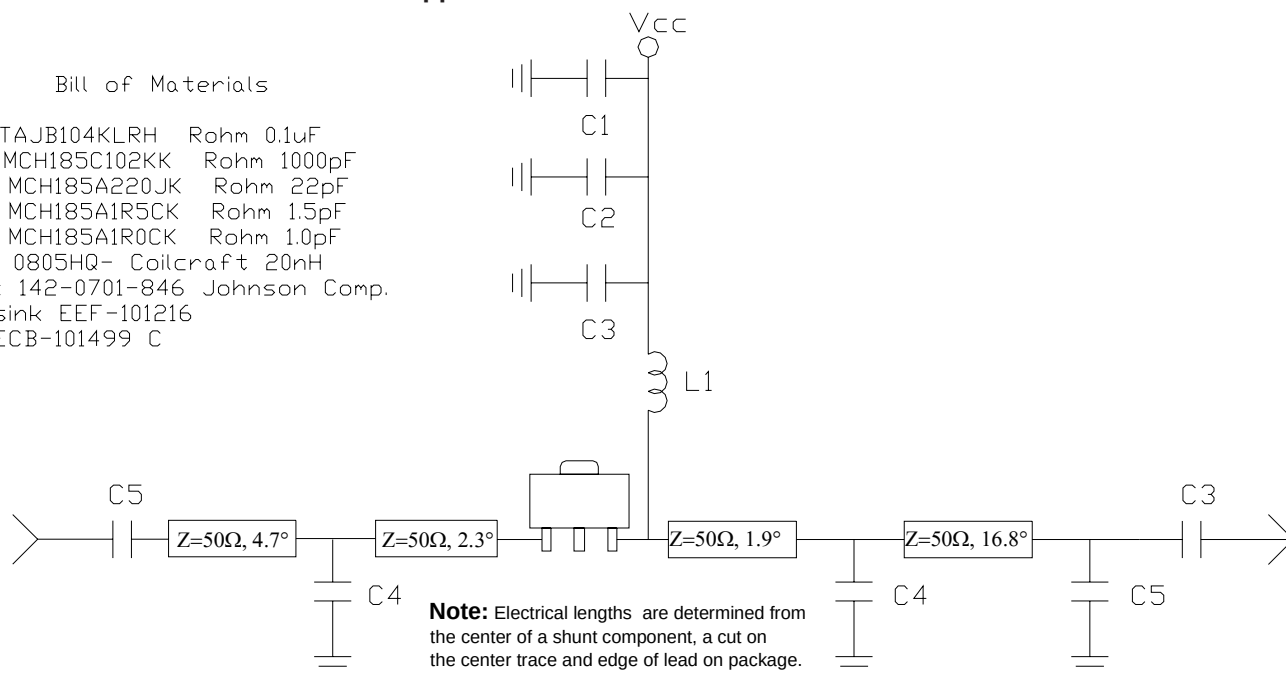
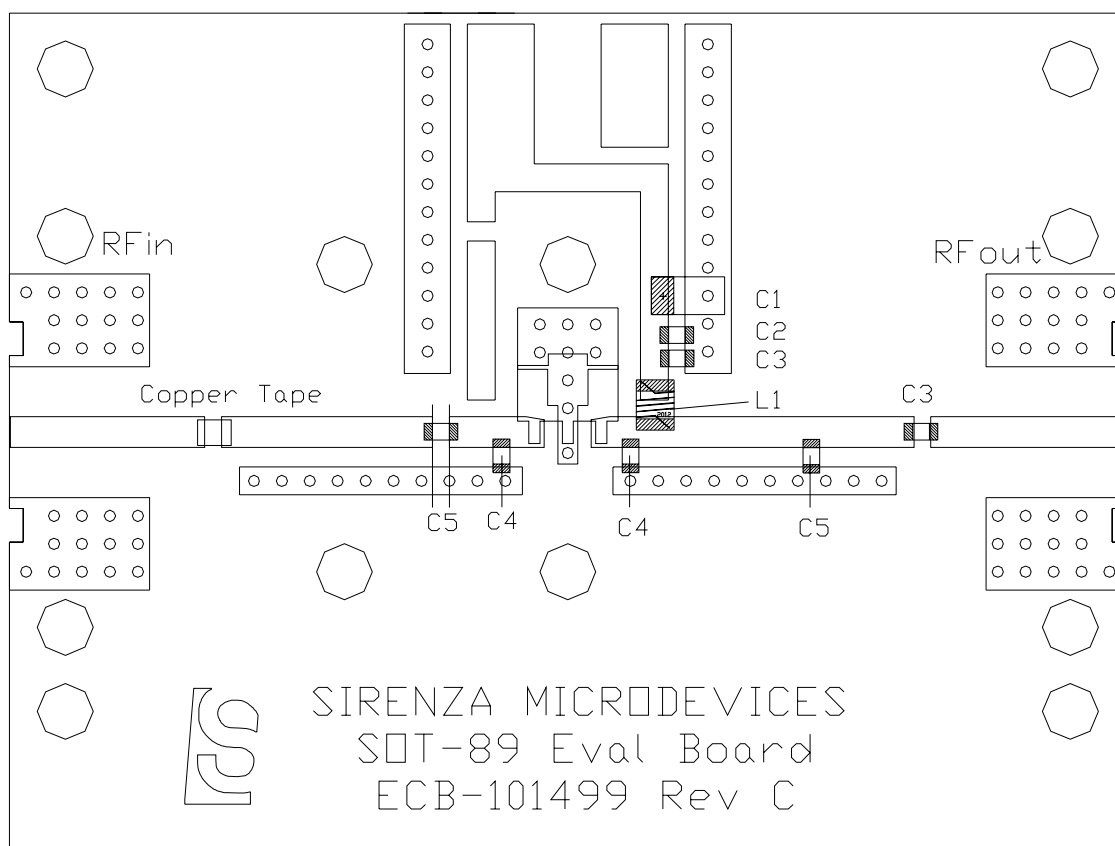
**Application Schematic for 1960 MHz**
**Bill of Materials**

|                      |    |              |               |        |
|----------------------|----|--------------|---------------|--------|
| C1                   | 1x | TAJB104KLRH  | Rohm          | 0.1uF  |
| C2                   | 1x | MCH185C102KK | Rohm          | 1000pF |
| C3                   | 2x | MCH185A220JK | Rohm          | 22pF   |
| C4                   | 1x | MCH185A1R5CK | Rohm          | 1.5pF  |
| C5                   | 2x | MCH185A1R2CK | Rohm          | 1.2pF  |
| C6                   | 1x | MCH185A1R8CK | Rohm          | 1.8pF  |
| L1                   | 1x | 0805HQ-      | Coilcraft     | 20nH   |
| RF1                  | 2x | 142-0701-846 | Johnson Comp. |        |
| Heat sink EEF-101216 |    |              |               |        |
| PCB ECB-101499 C     |    |              |               |        |


**Evaluation Board Layout for 1960 MHz**


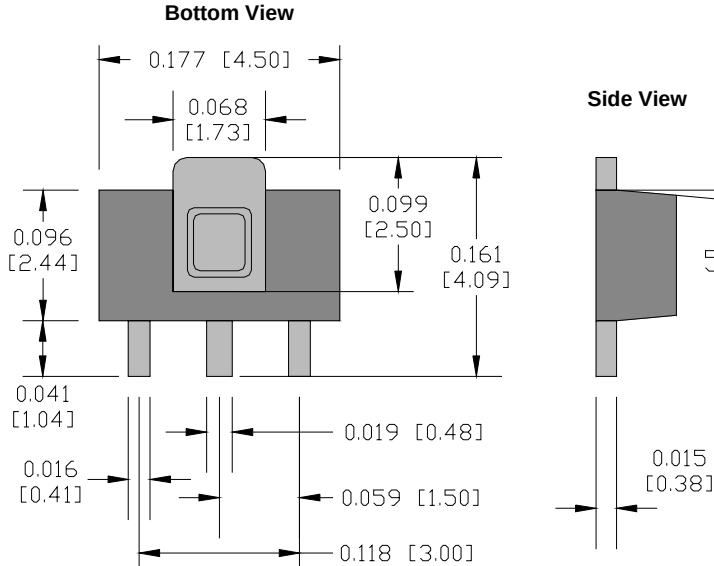
**Application Schematic for 2140 MHz**
**Bill of Materials**

C1 1x TAJB104KLRH Rohm 0.1uF  
 C2 1x MCH185C102KK Rohm 1000pF  
 C3 2x MCH185A220JK Rohm 22pF  
 C4 2x MCH185A1R5CK Rohm 1.5pF  
 C5 2x MCH185A1R0CK Rohm 1.0pF  
 L1 1x 0805HQ- Coilcraft 20nH  
 RF1 2x 142-0701-846 Johnson Comp.  
 Heat sink EEF-101216  
 PCB ECB-101499 C


**Evaluation Board Layout for 2140 MHz**


### Nominal Package Dimensions

Dimensions in inches (millimeters)  
Refer to package drawing posted at [www.sirenza.com](http://www.sirenza.com) for tolerances



### Absolute Maximum Ratings

| Parameter                       | Absolute Limit |
|---------------------------------|----------------|
| Max Device Current ( $I_D$ )    | 500 mA         |
| Max Device Voltage ( $V_D$ )    | 6 V            |
| Max. RF Input Power             | 60mW           |
| Max. Dissipated Power           | 2W             |
| Max. Junction Temp. ( $T_J$ )   | +165°C         |
| Operating Temp. Range ( $T_L$ ) | -40°C to +85°C |
| Max. Storage Temp.              | +150°C         |

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:

$$I_D V_D < (T_J - T_L) / R_{TH}, j-l \quad T_L = T_{LEAD}$$

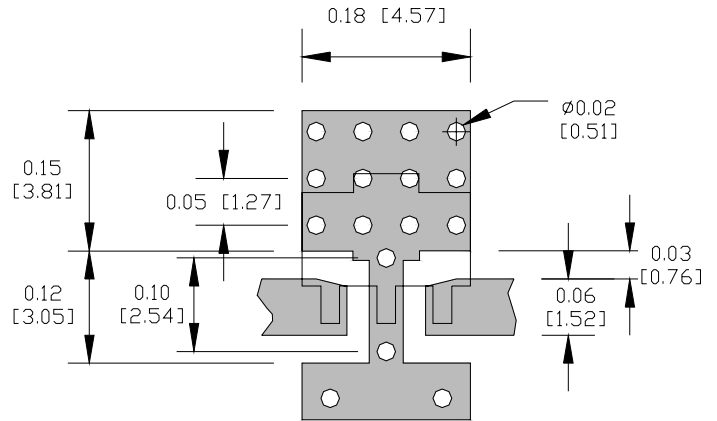


**ESD: Class 2** (Passes 2000V ESD Pulse)  
Appropriate precautions in handling, packaging  
and testing devices must be observed.

**MSL (Moisture Sensitivity Level) Rating: Level 1**

### Suggested PCB Pad Layout

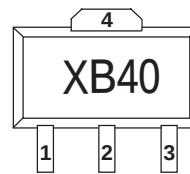
Dimensions in inches [millimeters]



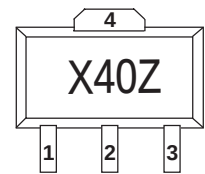
### Part Number Ordering Information

| Part Number | Reel Size | Devices / Reel |
|-------------|-----------|----------------|
| SXB-4089    | 7"        | 1000           |
| SXB-4089Z   | 7"        | 1000           |

### Package Marking



Tin-Lead



Lead Free

| Pin # | Function    | Description                                                                                                                     |
|-------|-------------|---------------------------------------------------------------------------------------------------------------------------------|
| 1     | RF IN       | RF input pin. This pin requires the use of an external DC blocking capacitor 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 and bias pin. DC voltage is present on this pin, therefore a DC blocking capacitor is necessary for proper operation. |