



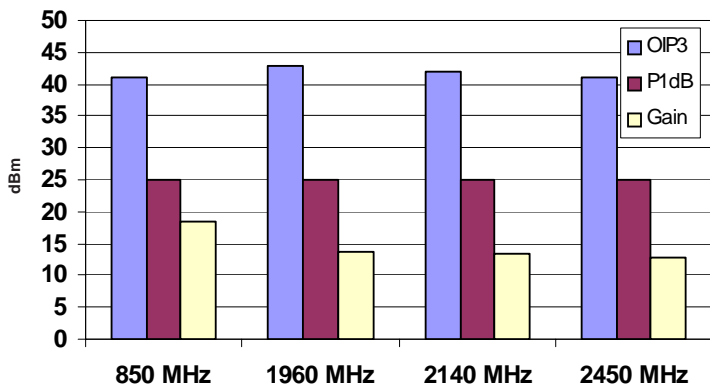
## Product Description

Sirenza Microdevices' SXA-389B amplifier is a high efficiency GaAs Heterojunction Bipolar Transistor (HBT) MMIC housed in low-cost surface-mountable plastic package. These HBT MMICs are fabricated using molecular beam epitaxial growth technology which produces reliable and consistent performance from wafer to wafer and lot to lot.

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.

Typical OIP<sub>3</sub>, P1dB, Gain



## SXA-389B

## SXA-389BZ



### 400-2500 MHz 1/4 W Medium Power GaAs HBT Amplifier with Active Bias



## Product Features

- Now Available in Lead Free, RoHS Compliant, & Green Packaging
- Lower R<sub>th</sub> for increased MTTF  
10<sup>8</sup> hrs. at T<sub>Lead</sub> = 85°C
- On-chip Active Bias Control, Single 5V Supply
- Excellent Linearity:  
+43 dBm typ. OIP<sub>3</sub> at 1960 MHz
- High P1dB : +25 dBm typ.
- High Gain: +18.5 dB at 850 MHz
- Efficient: consumes only 575 mW

## Applications

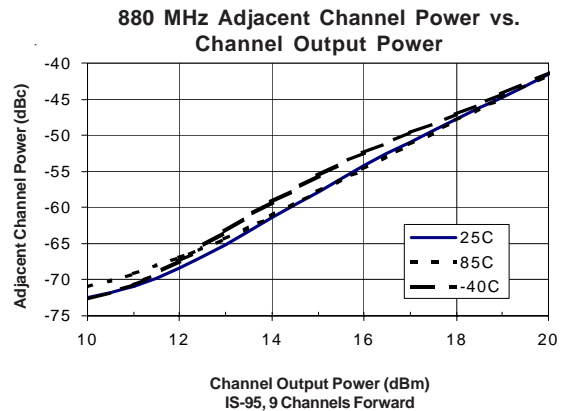
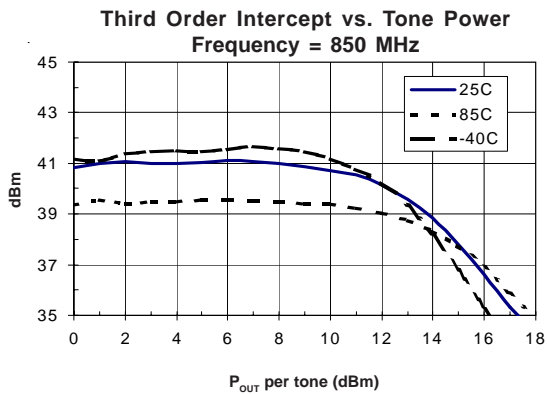
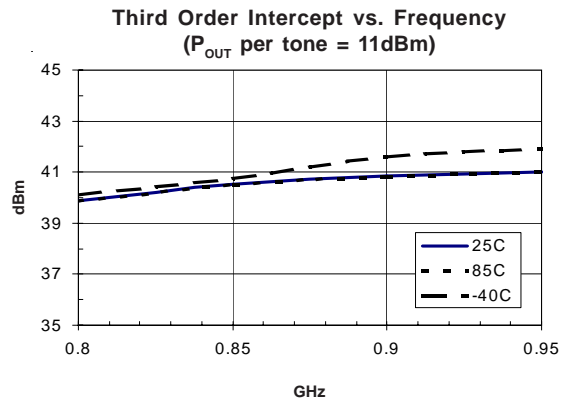
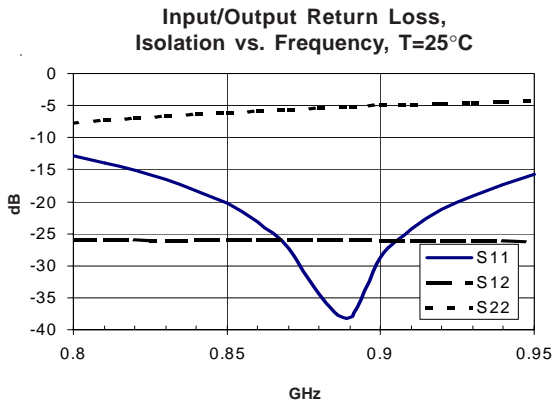
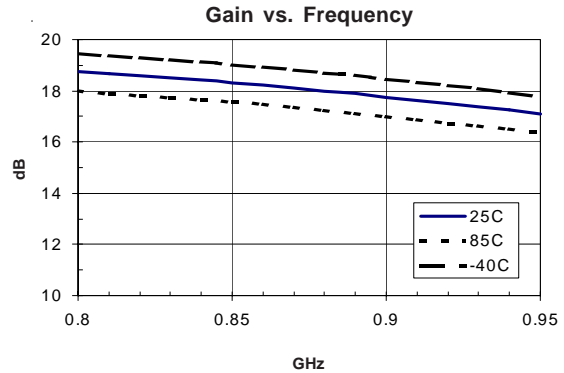
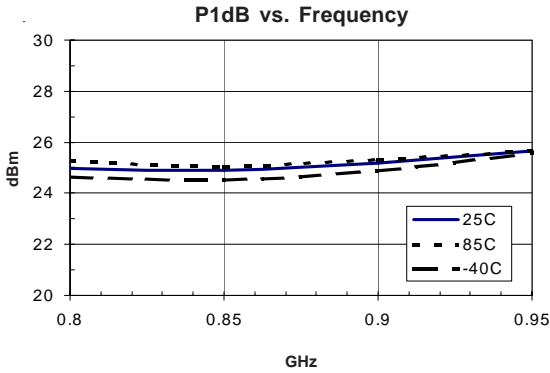
- W-CDMA, PCS, Cellular Systems
- Multi-Carrier Applications

| Symbol               | Parameters: Test Conditions:<br>Z <sub>0</sub> = 50 Ohms, T <sub>a</sub> = 25°C                |   | Units | Min. | Typ.                             | Max.  |
|----------------------|--|---|-------|------|----------------------------------|-------|
| P <sub>1dB</sub>     | Output Power at 1dB Compression  | f = 850 MHz<br>f = 1960 MHz<br>f = 2140 MHz<br>f = 2450 MHz | dBm   | 24   | 25<br>25<br>25<br>25             |       |
| S <sub>21</sub>      | Small signal gain  | f = 850 MHz<br>f = 1960 MHz<br>f = 2140 MHz<br>f = 2450 MHz | dB    | 12.5 | 18.4<br>13.6<br>13.5<br>12.8     | 15    |
| S <sub>11</sub>      | Input VSWR   | f = 850 MHz<br>f = 1960 MHz<br>f = 2140 MHz<br>f = 2450 MHz | -     |      | 1.2:1<br>1.3:1<br>1.2:1<br>1.2:1 | 2.0:1 |
| OIP <sub>3</sub>     | Output Third Order Intercept Point<br>(P <sub>out</sub> /Tone = +11 dBm, Tone spacing = 1 MHz) | f = 850 MHz<br>f = 1960 MHz<br>f = 2140 MHz<br>f = 2450 MHz | dBm   | 39   | 41<br>43<br>42<br>41             |       |
| NF                   | Noise Figure   | f = 850 MHz<br>f = 1960 MHz<br>f = 2140 MHz<br>f = 2450 MHz | dB    |      | 4.5<br>4.8<br>5.0<br>5.7         | 6.3   |
| I <sub>b</sub>       | Device Current   | V <sub>cc</sub> = 5V  | mA    | 90   | 115                              | 135   |
| P <sub>DISS</sub>    | Operating Dissipated Power   |   | mW    |      | 575                              |       |
| R <sub>th, j-l</sub> | Thermal Resistance (junction - lead)   |   | ° C/W |      | 70                               |       |

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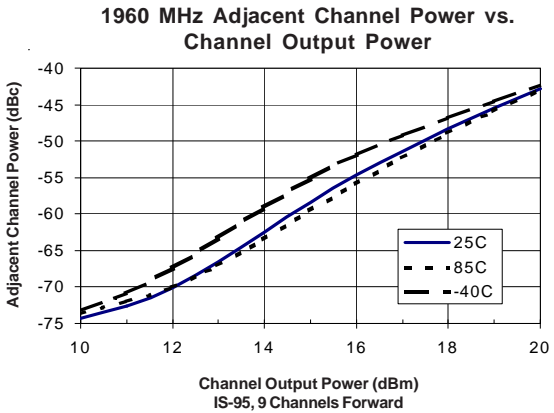
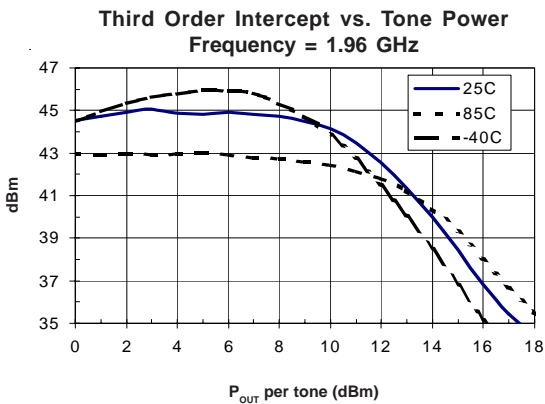
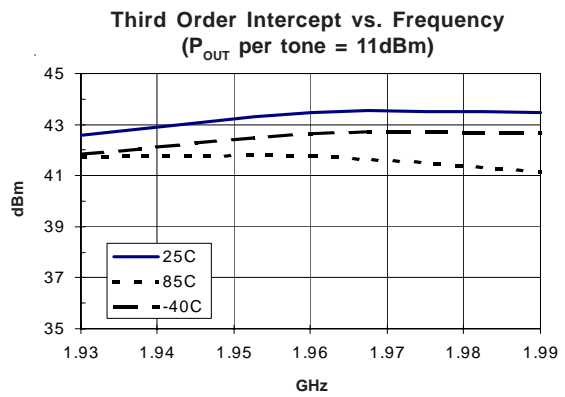
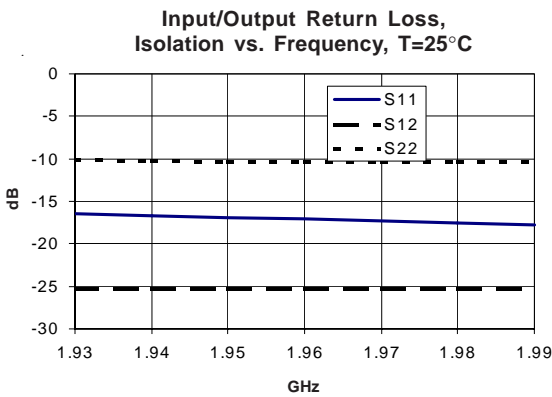
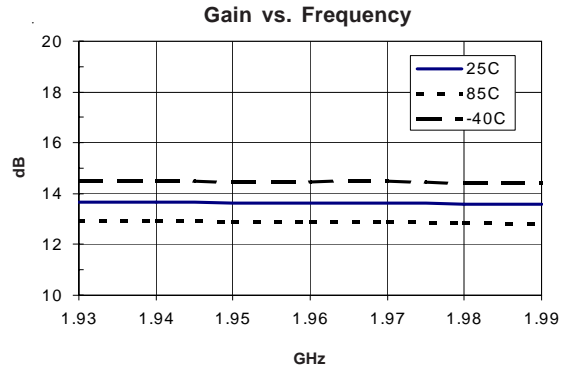
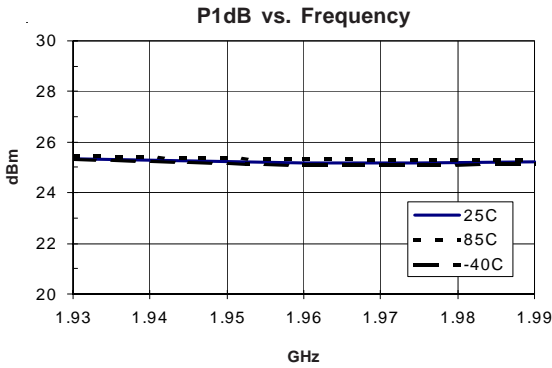
**850 MHz Application Circuit Data,  $V_{CC}=5V, I_D=115mA$**

Note: Tuned for Output IP3



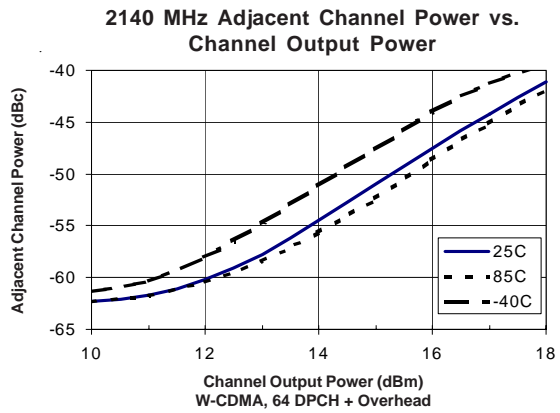
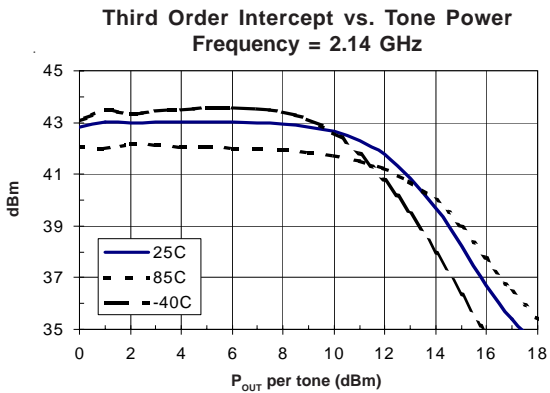
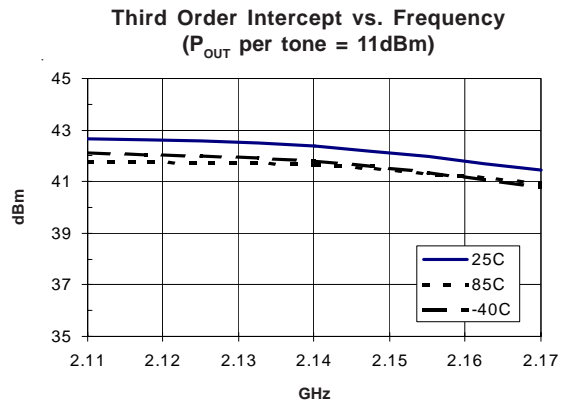
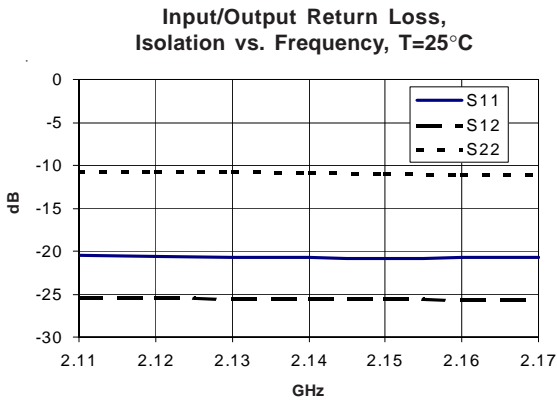
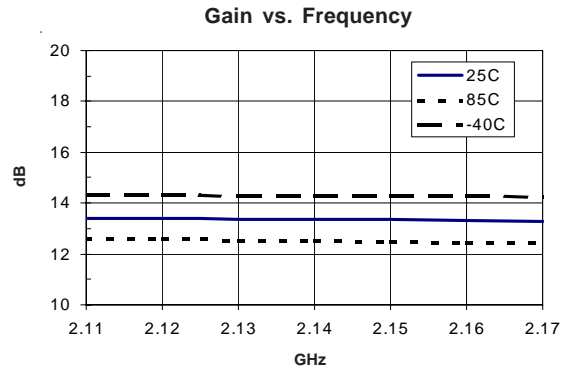
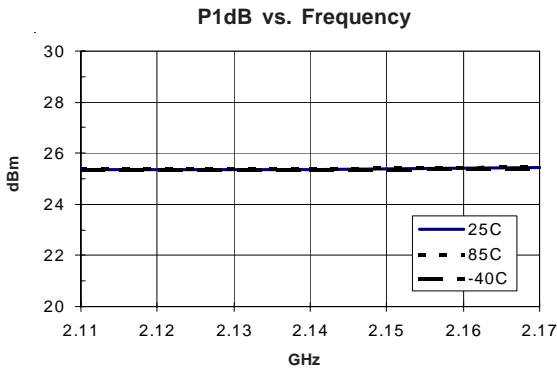
**1960 MHz Application Circuit Data,  $V_{CC} = 5V$ ,  $I_D = 115mA$**

Note: Tuned for Output IP3



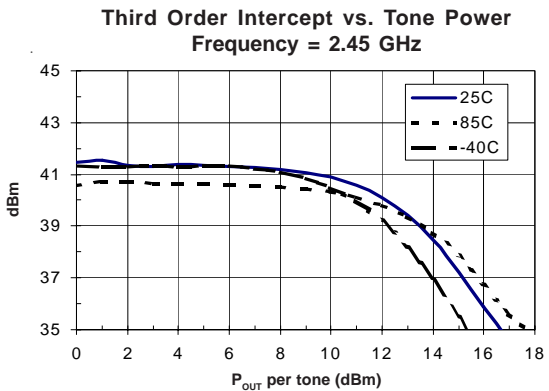
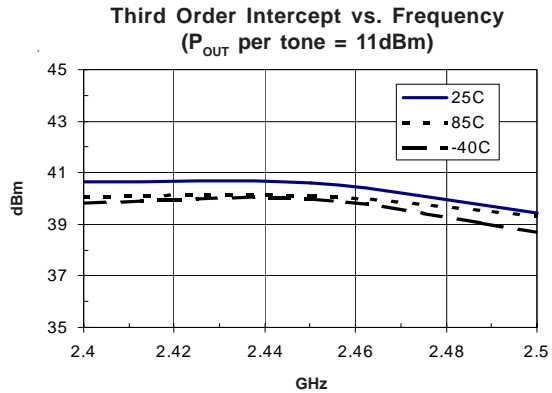
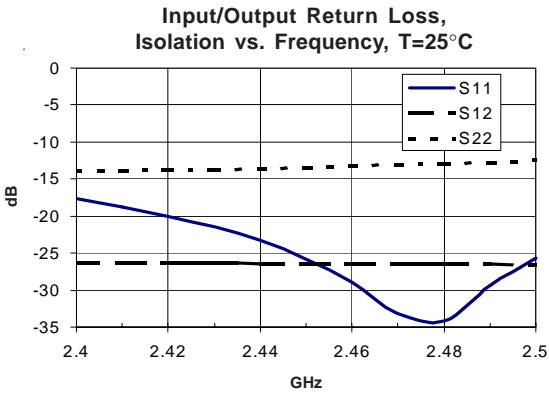
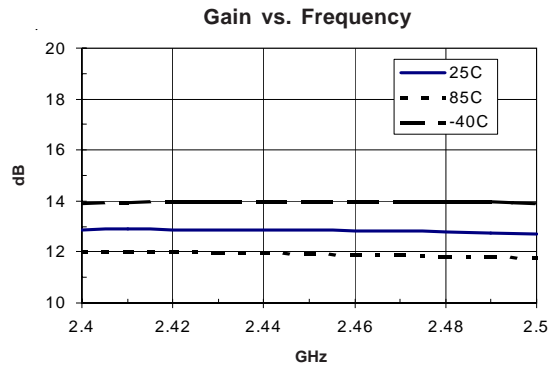
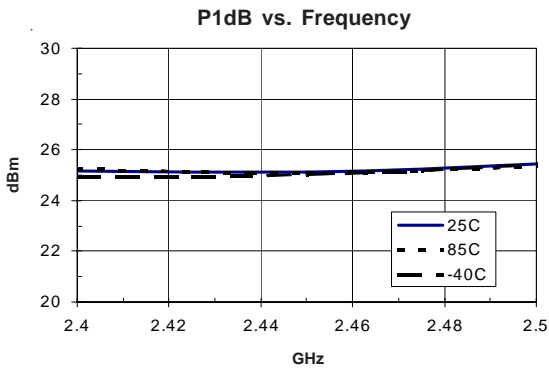
**2140 MHz Application Circuit Data,  $V_{CC}=5V$ ,  $I_D=115mA$**

Note: Tuned for Output IP3

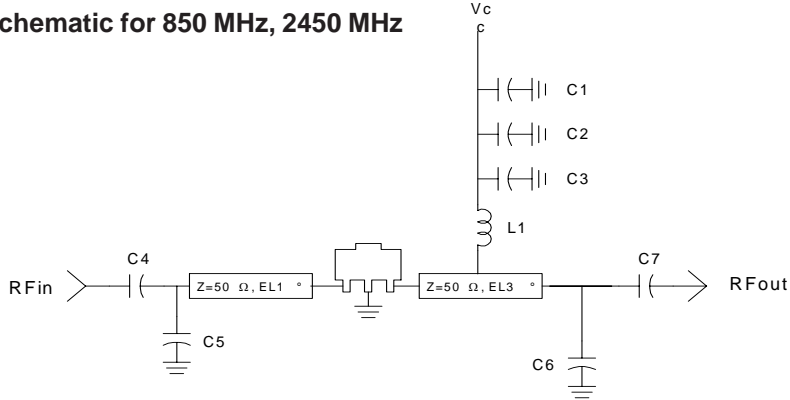


**2450 MHz Application Circuit Data,  $V_{CC}=5V$ ,  $I_D=115mA$**

Note: Tuned for Output IP3



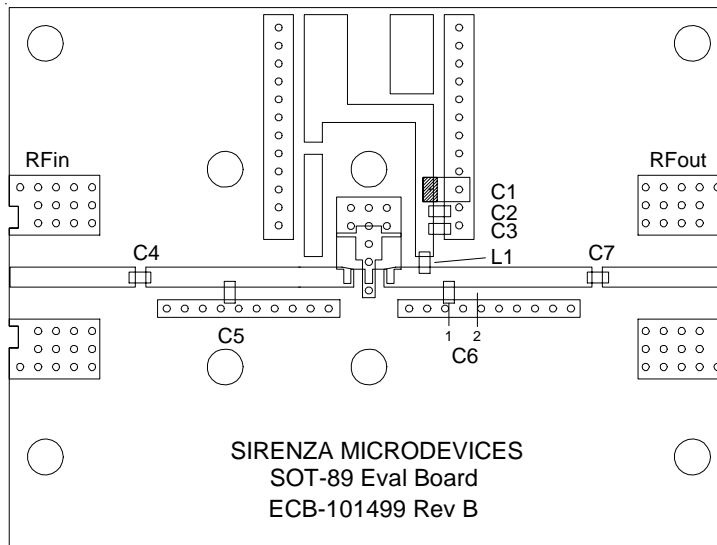
**Application Schematic for 850 MHz, 2450 MHz**



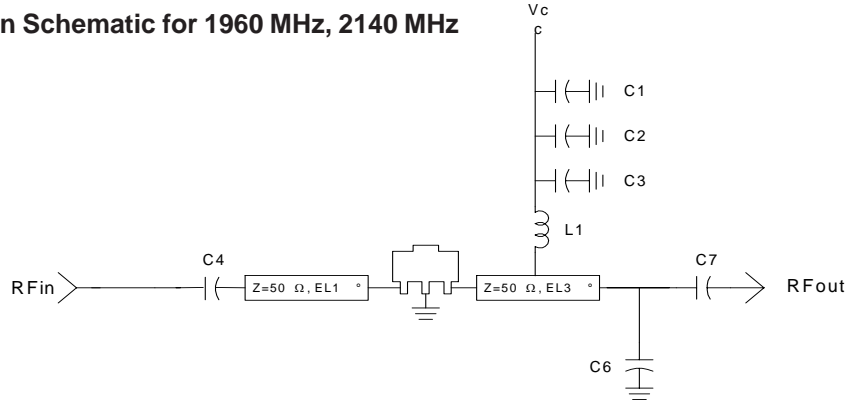
| Ref. Des. | Vendor Series       | 850 MHz       | 2450 MHz      |
|-----------|---------------------|---------------|---------------|
| C1        | Matsuo 267M3502104K | 0.1uF 10%     | 0.1uF 10%     |
| C2        | Rohm MCH18          | 1000pF 5%     | 1000pF 5%     |
| C3, C7    | Rohm MCH18          | 47pF 5%       | 22pF 5%       |
| C4        | Rohm MCH18          | 47pF 5%       | 1.2pF ±0.25pF |
| C5        | Rohm MCH18          | 5.6pF ±0.25pF | -             |

| Ref. Des.   | Vendor Series  | 850 MHz       | 2450 MHz      |
|-------------|----------------|---------------|---------------|
| C6          | Rohm MCH18     | 3.9pF ±0.25pF | 1.0pF ±0.25pF |
| C6 Position |                | 1             | 2             |
| L1          | Toko LL1608-FS | 33nH 5%       | 15nH 5%       |
| EL1         |                | 15            | 76            |
| EL3         |                | 7.2           | 31.5          |

**Evaluation Board Layout for 850 MHz, 2450 MHz**



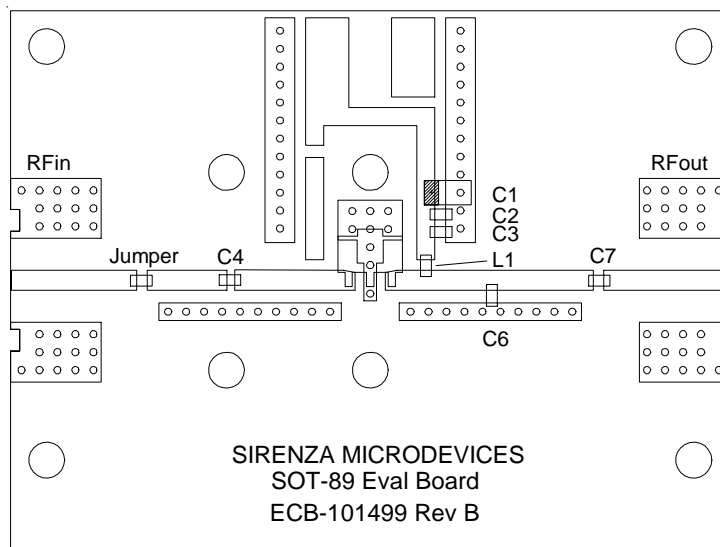
**Application Schematic for 1960 MHz, 2140 MHz**



| Ref. Des. | Vendor Series       | 1960/2140 MHz    |
|-----------|---------------------|------------------|
| C1        | Matsuo 267M3502104K | 0.1uF<br>10%     |
| C2        | Rohm MCH18          | 1000pF<br>5%     |
| C3, C7    | Rohm MCH18          | 22pF<br>5%       |
| C4        | Rohm MCH18          | 2.2pF<br>±0.25pF |
| C5        | Rohm MCH18          | -                |

| Ref. Des. | Vendor Series  | 1960/2140 MHz    |
|-----------|----------------|------------------|
| C6        | Rohm MCH18     | 1.0pF<br>±0.25pF |
| L1        | Toko LL1608-FS | 18nH<br>5%       |
| EL1       |                | 35               |
| EL3       |                | 30               |

**Evaluation Board Layout for 1960 MHz, 2140 MHz**



**Absolute Maximum Ratings**

| Parameter                        | Absolute Limit |
|----------------------------------|----------------|
| Max. Supply Current ( $I_b$ )    | 240 mA         |
| Max. Device Voltage ( $V_{cc}$ ) | 6.0 V          |
| Max. Power Dissipation           | 1500 mW        |
| Max. RF Input Power              | 100 mW         |
| Max. Junction Temp. ( $T_j$ )    | +165 °C        |
| Operating Lead Temp. ( $T_L$ )   | -40 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:  
 $I_b V_{cc} (max) < (T_j - T_{j0}) / R_{\theta j-c}$



**ESD: Class 1B (Passes 500V ESD Pulse)**  
 Appropriate precautions in handling, packaging and testing devices must be observed.

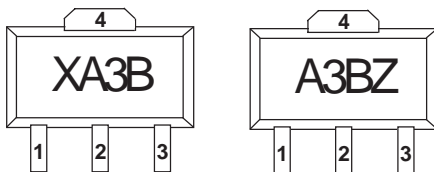
**Part Number Ordering Information**

| Part Number | Devices Per Reel | Reel Size |
|-------------|------------------|-----------|
| SXA-389B    | 1000             | 7"        |
| SXA-389BZ   | 1000             | 7"        |

**Pin Description**

| Pin # | Function      | Description   |
|-------|---------------|---|
| 1     | Base          | Base Pin  |
| 2     | GND & Emitter | Connection to ground. Use via holes to reduce lead inductance. Place vias as close to ground leads as possible. |
| 3     | Collector     | Collector Pin   |
| 4     | GND & Emitter | Same as Pin 2   |

**Part Identification Marking**



**See Application Note AN-075  
 for Package Outline Drawing**

**Recommended Mounting Configuration for Optimum RF and Thermal Performance**

