

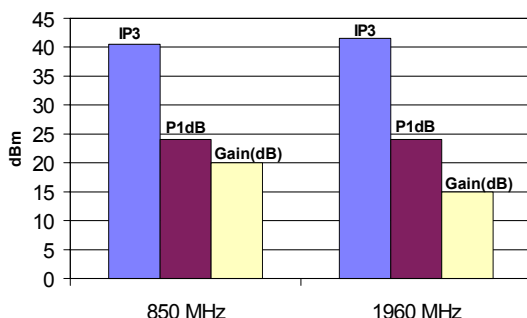
## Product Description

Stanford Microdevices' SXA-289 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 5-2000 MHz cellular, ISM, WLL and narrowband PCS applications.

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

**Typical IP<sub>3</sub>, P<sub>1dB</sub>, Gain**



## SXA-289

### 5-2000 MHz Medium Power GaAsHBT Amplifier



## Product Features

- Patented High Reliability GaAs HBT Technology
- High Output 3rd Order Intercept : +41.5 dBm typ. at 1960 MHz
- Surface-Mountable Power Plastic Package

## Applications

- PCS, Cellular Systems
- High Linearity IF Amplifiers

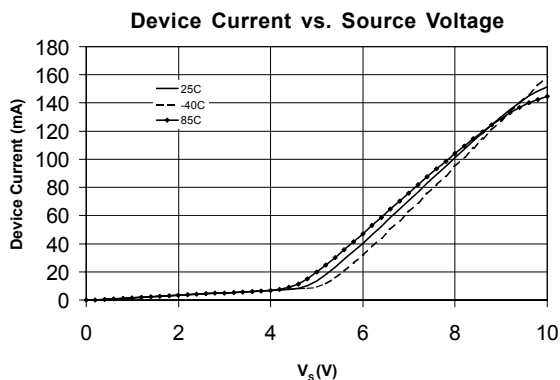
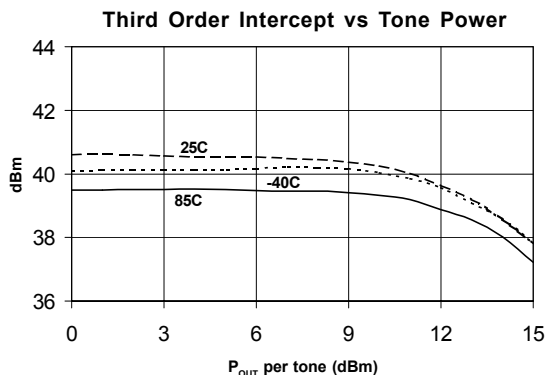
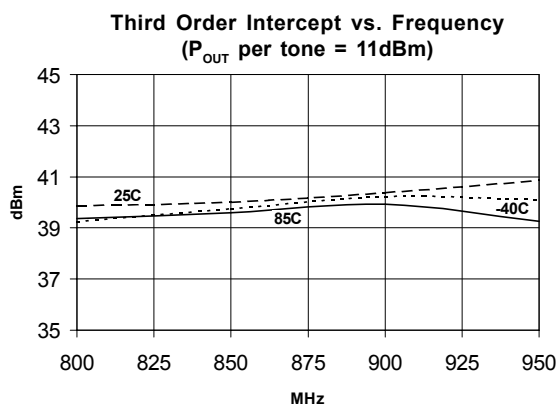
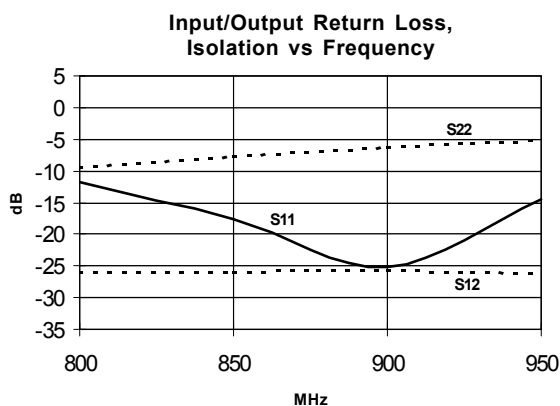
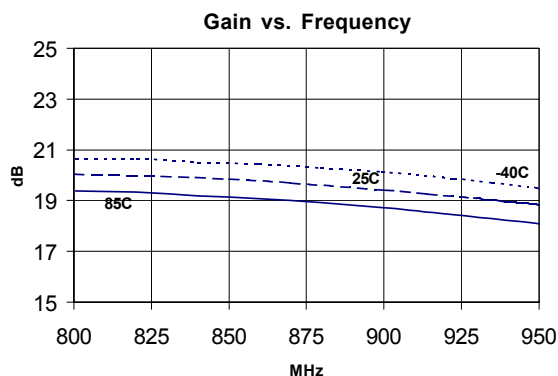
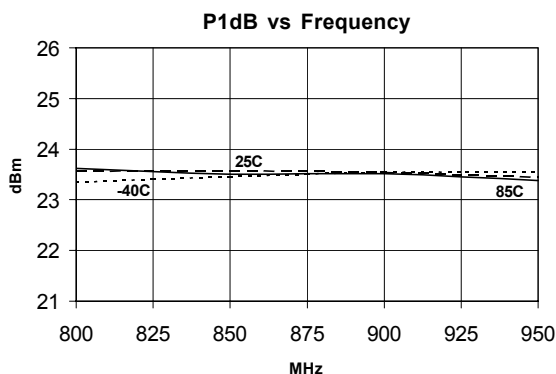
| Symbol          | Parameters: Test Conditions:<br>$Z_0 = 50 \text{ Ohms}$ , $T_a = 25^\circ\text{C}$ |                                                                                      | Units              | Min. | Typ.           | Max. |
|-----------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------|------|----------------|------|
| $P_{1dB}$       | Output Power at 1dB Compression                                                    | $f = 850 \text{ MHz}$<br>$f = 1960 \text{ MHz}$                                      | dBm<br>dBm         |      | 24.0<br>24.0   |      |
| $S_{21}$        | Small signal gain                                                                  | $f = 850 \text{ MHz}$<br>$f = 1960 \text{ MHz}$                                      | dB<br>dB           | 18.0 | 20.0<br>15.0   | 21.5 |
| $S_{11}$        | Input VSWR                                                                         | $f = 850 \text{ MHz}$<br>$f = 1960 \text{ MHz}$                                      | -                  |      | 1.3:1<br>1.7:1 |      |
| $IP_3$          | Output Third Order Intercept Point<br>(Pout/Tone = +11 dBm, Tone spacing = 1 MHz)  | $f = 850 \text{ MHz}$<br>$f = 1960 \text{ MHz}$                                      | dBm<br>dBm         | 38.0 | 40.5<br>41.5   |      |
| NF              | Noise Figure                                                                       | $f = 850 \text{ MHz}$<br>$f = 1960 \text{ MHz}$                                      | dB<br>dB           |      | 5.0<br>5.7     |      |
| $I_d$           | Device Current                                                                     | $V_s = 8\text{V}$<br>$R_{bias} = 27 \text{ ohms}$<br>$V_{device} = 5 \text{ V typ.}$ | mA                 | 85   | 105            | 120  |
| $R_{\theta JA}$ | Thermal Resistance (junction - lead)                                               |                                                                                      | $^\circ\text{C/W}$ |      | 108            |      |

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## SXA-289 5-2000 MHz Power Amplifier

**850 MHz Application Circuit Data,  $I_{cc}=105mA$ ,  $T=+25^{\circ}C$ ,  $R_{bias}=27\ \Omega$ ,  $V_s=8V$**

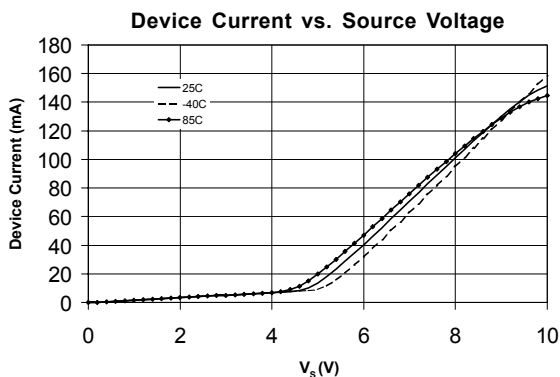
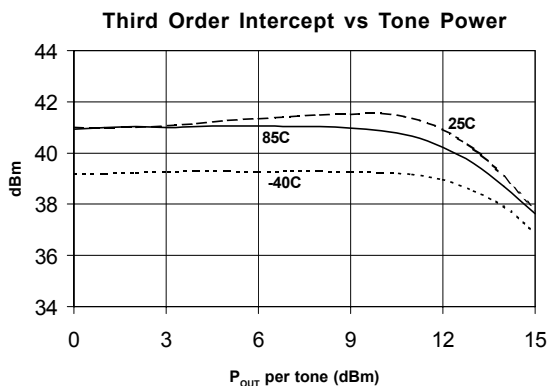
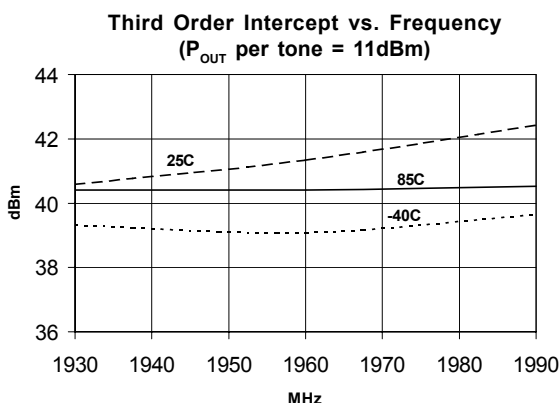
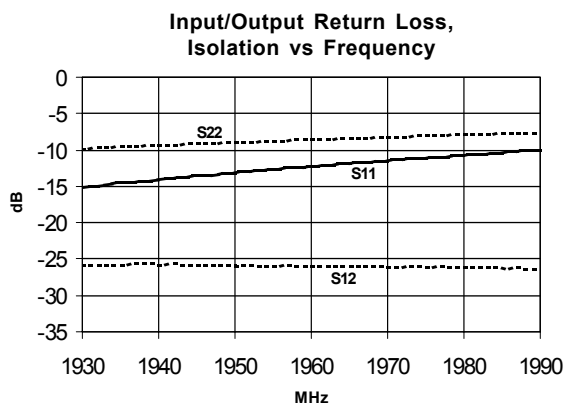
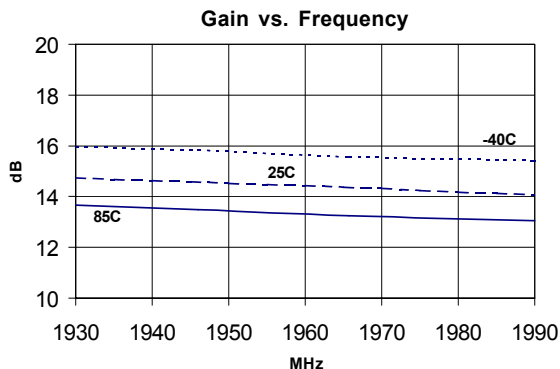
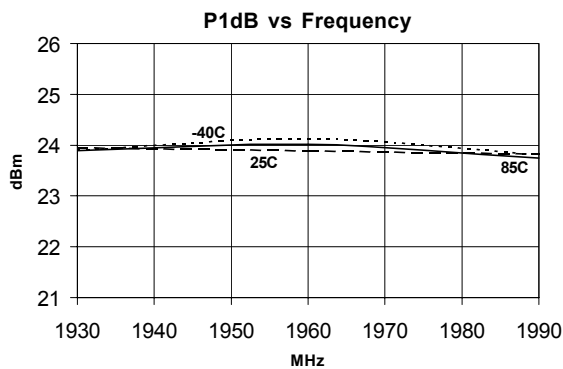
Note: Tuned for Output IP3



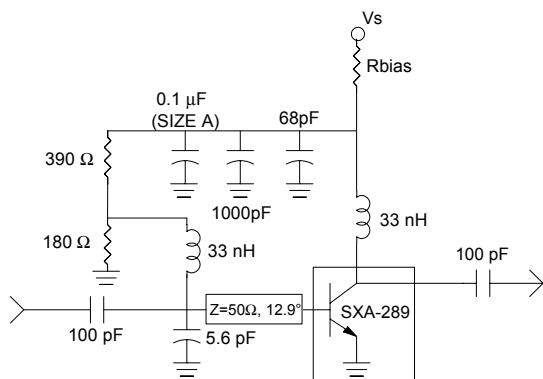
## SXA-289 5-2000 MHz Power Amplifier

**1960 MHz Application Circuit Data,  $I_{cc}=105\text{mA}$ ,  $T=+25^\circ\text{C}$ ,  $R_{bias}=27\ \Omega$ ,  $V_s=8\text{V}$**

Note: Tuned for Output IP3

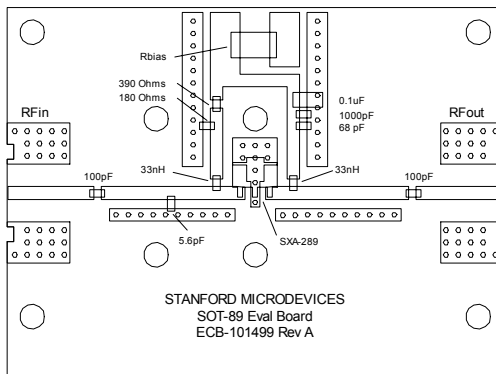


### Voltage Feed Resistor Bias Circuit (for $\geq 7V$ supply)



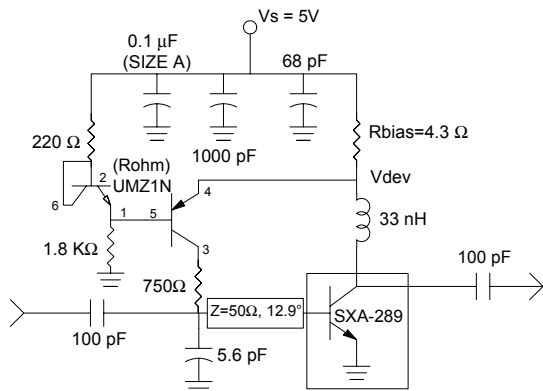
850 MHz Schematic

| Recommended Bias Resistor Values |      |      |      |      |
|----------------------------------|------|------|------|------|
| Supply Voltage(Vs)               | 7V   | 8V   | 10V  | 12V  |
| Rbias (Ohms)                     | 18   | 27   | 47   | 62   |
| Power Rating                     | 0.5W | 1.0W | 1.5W | 2.0W |



850 MHz Evaluation Board Layout

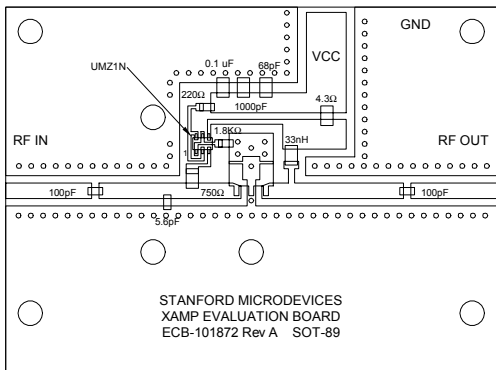
### Active Current Feedback Bias Circuit (for 5V supply)



850 MHz Schematic

| Frequency              | 850 MHz |
|------------------------|---------|
| Small Signal Gain (dB) | 20.0    |
| Input Return Loss (dB) | -22.8   |
| Output IP3 (dBm)       | 37.7*   |
| P1dB (dBm)             | 23.0    |

\*Note: IP3 performance degraded due to lower (4.5V) device voltage.

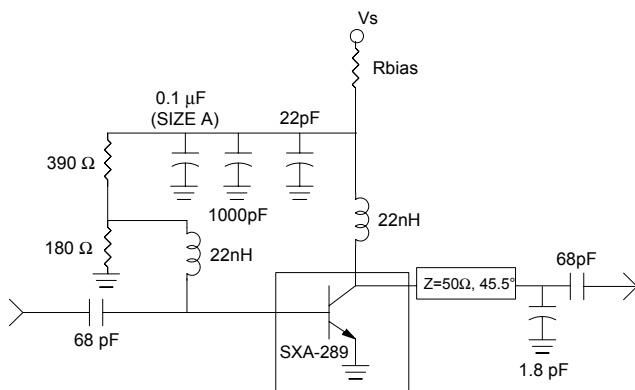


850 MHz Active Bias Evaluation Board Layout

**NOTE: Reference Application Note AN-026 for more information on Active Current Feedback Bias Circuit.**

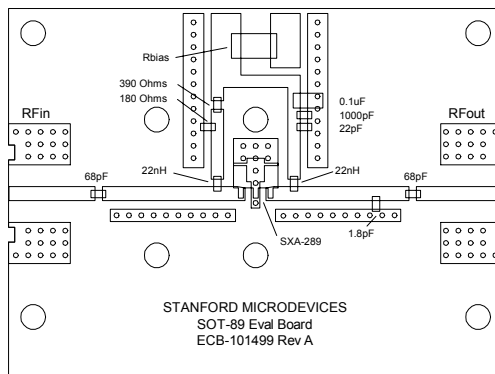
ALL COMPONENTS 0603 UNLESS NOTED OTHERWISE

### Voltage Feed Resistor Bias Circuit (for $\geq 7V$ supply)



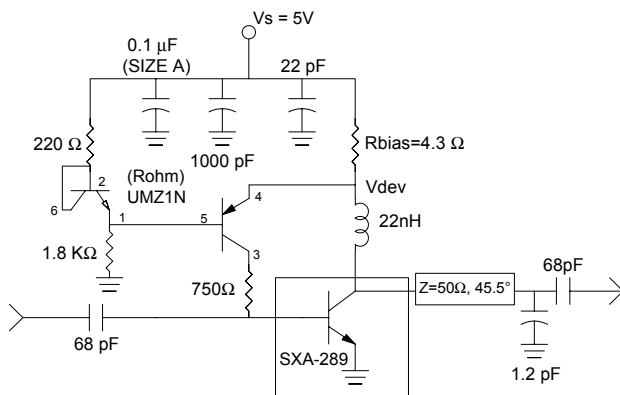
1960 MHz Schematic

| Recommended Bias Resistor Values |      |      |      |      |
|----------------------------------|------|------|------|------|
| Supply Voltage(Vs)               | 7V   | 8V   | 10V  | 12V  |
| Rbias (Ohms)                     | 18   | 27   | 47   | 62   |
| Power Ratings                    | 0.5W | 1.0W | 1.5W | 2.0W |



1960 MHz Evaluation Board Layout

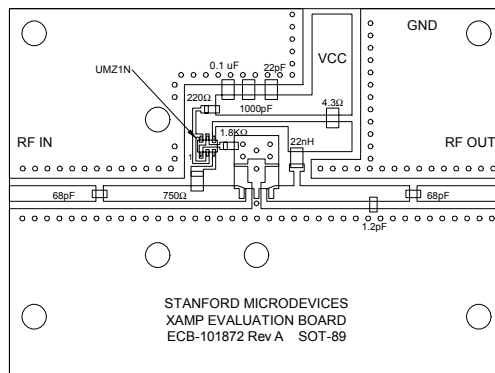
### Active Current Feedback Bias Circuit (for 5V supply)



1960 MHz Schematic

| Frequency              | 1960 MHz |
|------------------------|----------|
| Small Signal Gain (dB) | 14.9     |
| Input Return Loss (dB) | -12.1    |
| Output IP3 (dBm)       | 38.0*    |
| P1dB(dBm)              | 23.3     |

\*Note: IP3 performance degraded due to lower (4.5V) device voltage.



1960 MHz Active Bias Evaluation Board Layout

**NOTE: Reference Application Note AN-026 for more information on Active Current Feedback Bias Circuit.**

ALL COMPONENTS 0603 UNLESS NOTED OTHERWISE

### Absolute Maximum Ratings

| Parameter             | Absolute Maximum |
|-----------------------|------------------|
| Device Voltage        | 6V               |
| Device Current        | 200mA            |
| Power Dissipation     | 1500mW           |
| RF Input Power        | 100mW            |
| Junction Temperature  | +150C            |
| Operating Temperature | -40C to +85C     |
| Storage Temperature   | -65C to +150C    |



### Caution: ESD sensitive

Appropriate precautions in handling, packaging and testing devices must be observed.

## SXA-289 5-2000 MHz Power Amplifier

### Part Number Ordering Information

| Part Number | Devices Per Reel | Reel Size |
|-------------|------------------|-----------|
| SXA-289     | 1000             | 7"        |

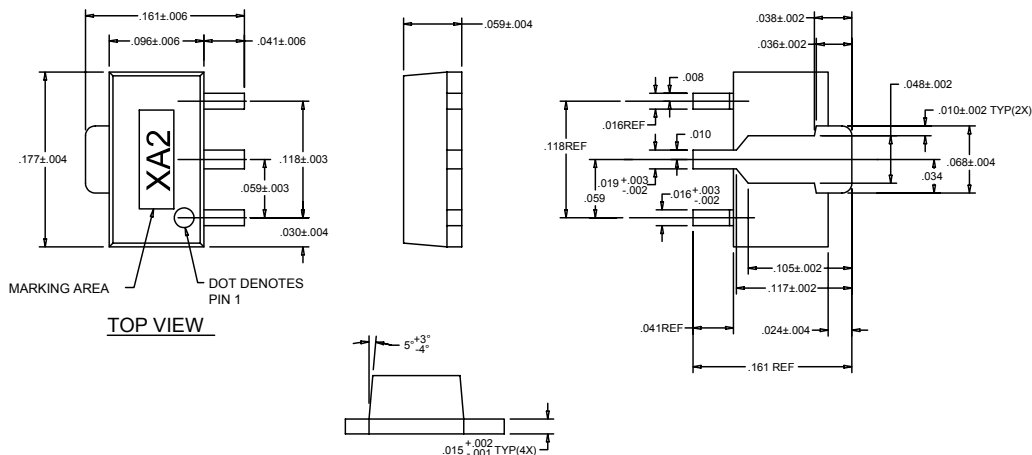
### Part Symbolization

The part will be symbolized with a "XA2" designator on the top surface of the package.

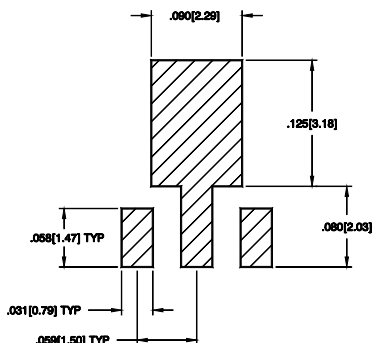
### Pin Description

| 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                                                                                                   |

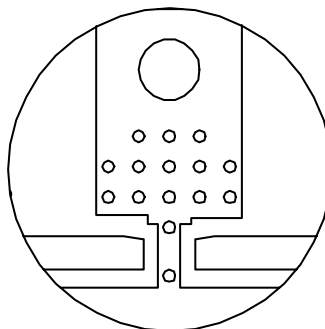
### Package Dimensions



### PCB Pad Layout



### Recommended via and mounting hole pattern (For RF Ground and Thermal considerations)



DIMENSIONS ARE IN INCHES [MM]

Use multiple plated-through vias holes located close to the package pins to ensure a good RF ground connection to a continuous groundplane on the backside of the board.