

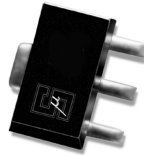
## Product Description

Stanford Microdevices' SXA-289 amplifier is a high efficiency GaAs Heterojunction Bipolar Transistor (HBT) amplifier housed in low-cost surface-mountable plastic package. These HBT amplifiers 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 50-2000 MHz cellular, ISM and narrowband PCS bands. Its high linearity makes it an ideal choice for multi-carrier as well as digital applications.

## SXA-289

### 50-2000 MHz Power Amplifier



### Product Features

- Patented High Reliability GaAs HBT Technology
- High Linearity Performance : +42dBm Typ. at 1900 MHz
- Surface-Mountable Plastic Package

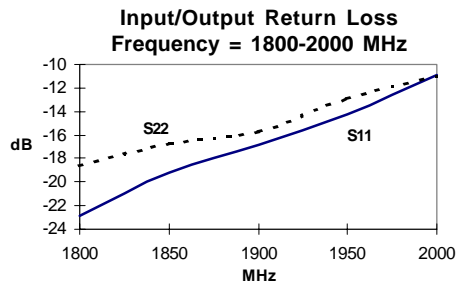
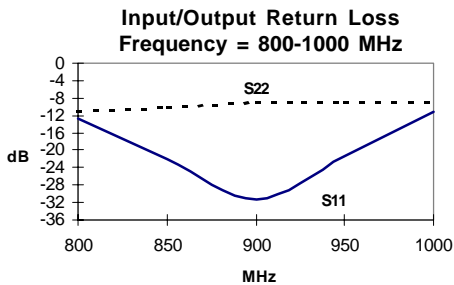
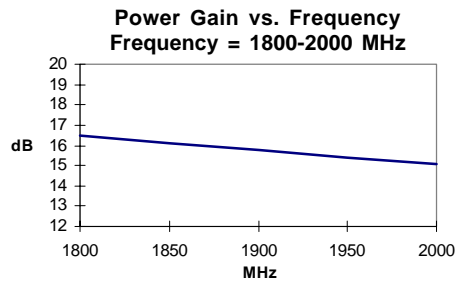
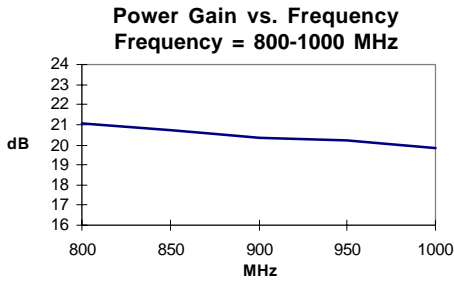
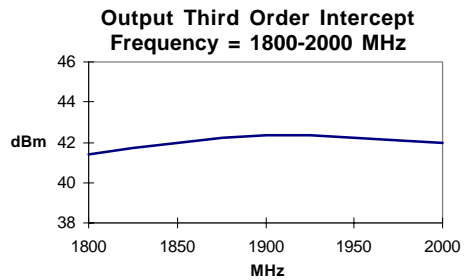
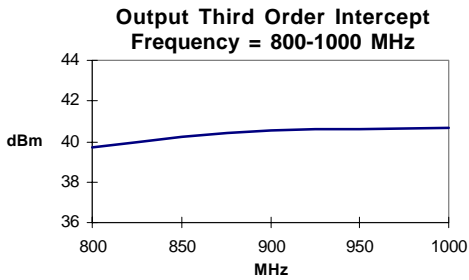
### Applications

- PCS, Cellular Systems
- Multi-Carrier Applications

### Electrical Specifications at Ta = 25C

Symbol	Parameters: Test Conditions: Z <sub>0</sub> = 50 Ohms, f = 50-2000 MHz		Units	Min.	Typ.	Max.
P <sub>1dB</sub>	Output Power at 1dB Compression	f = 800-900 MHz f = 1800-2000 MHz	dBm dBm		24.0 24.0	
S <sub>21</sub>	Power Gain	f = 800-900 MHz f = 1800-2000 MHz	dB dB	18.5	20.5 15.5	
S <sub>12</sub>	Reverse Isolation	f = 800-900 MHz f = 1800-2000 MHz	dB dB		30.0 30.0	
VSWR	Input VSWR	f = 800-900 MHz f = 1800-2000 MHz	-		1.5:1 1.5:1	
VSWR	Output VSWR	f = 800-900 MHz f = 1800-2000 MHz	-		2.0:1 2.0:1	
IP <sub>3</sub>	Third Order Intercept Point	f = 800-900 MHz f = 1800-2000 MHz	dBm dBm	38.0	41.0 42.0	
NF	Noise Figure	f = 800-900 MHz f = 1800-2000 MHz	dB dB		5.0 5.0	
I <sub>d</sub>	Device Current	V <sub>cc</sub> = 8.0 V, R <sub>bias</sub> = 27 ohms (V <sub>device</sub> = 5 V)	mA	85	110	135

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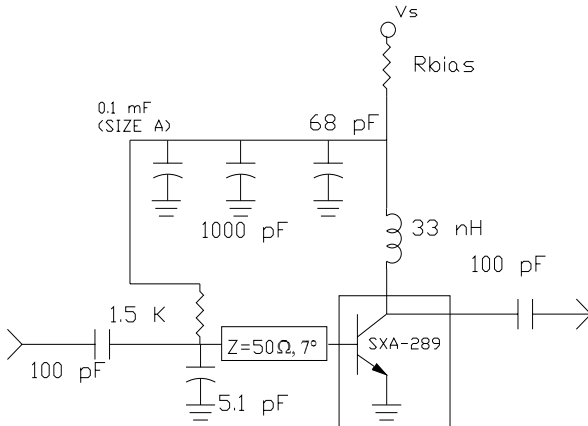
**SXA-289 50-2000 MHz Power Amplifier**
*Typical Performance at 25° C (Vd = 5.0V, Icc=115mA)*


**800-960 MHz Application Circuit**

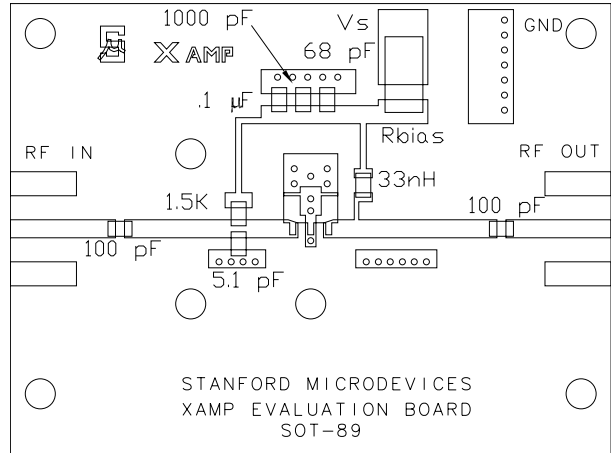
Frequency	800 MHz	960 MHz
Small Signal Gain (dB)	22.0	21.5
Input Return Loss (dB)	-12.2	-15.0
Output Return Loss (dB)	-11.0	-10.8
Output IP3 (dBm)	39.8	40.5
Noise Figure (dB)	5.0	5.0

Recommended Bias Resistor Values				
Supply Voltage(Vs)	7V	8V	10V	12V
Rbias (Ohms)	18	27	47	62
Size (mils) L / H	2010	2010	2512	2512

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

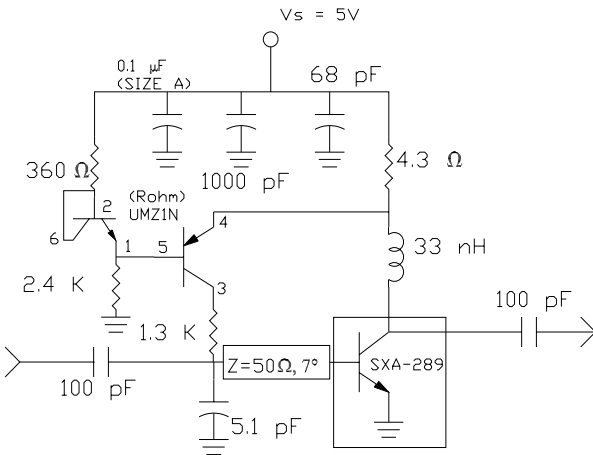


800-960 MHz Schematic

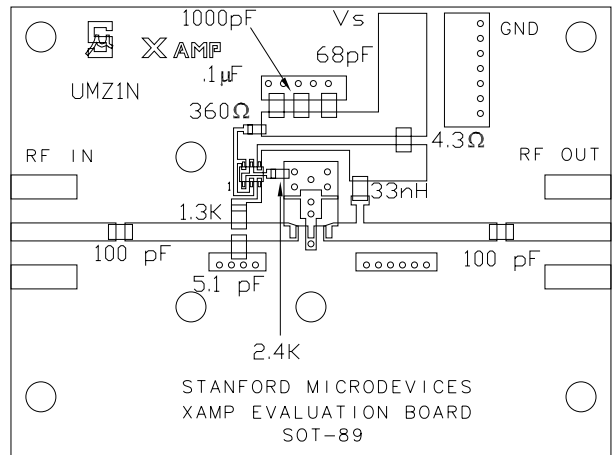


800-960 MHz Evaluation Board Layout

**Active Current Feedback Bias Circuit (for  $\geq 5V$  supply)**



800-960 MHz Schematic



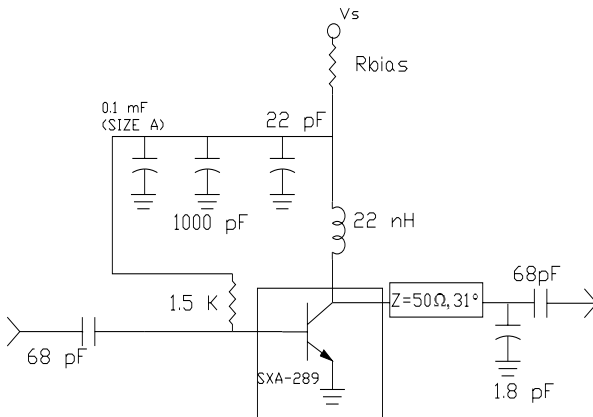
800-960 MHz Evaluation Board Layout

ALL COMPONENTS 0603 UNLESS NOTED OTHERWISE

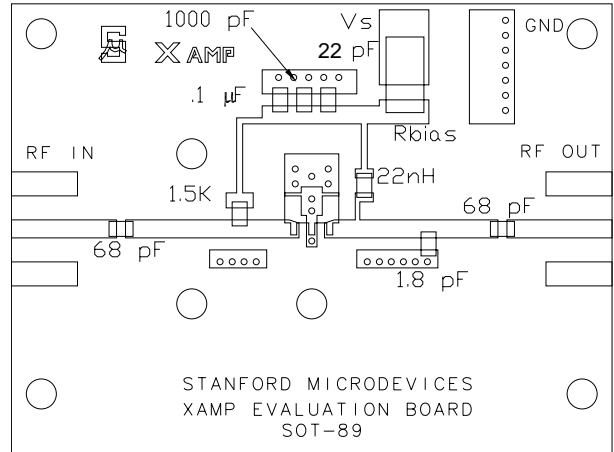
**1800-2000 MHz Application Circuit**

Frequency	1800 MHz	2000 MHz
Small Signal Gain (dB)	16.0	15.0
Input Return Loss (dB)	-22.5	-11.6
Output Return Loss (dB)	-18.4	-11.0
Output IP3 (dBm)	41.8	42.0
Noise Figure (dB)	5.0	5.0

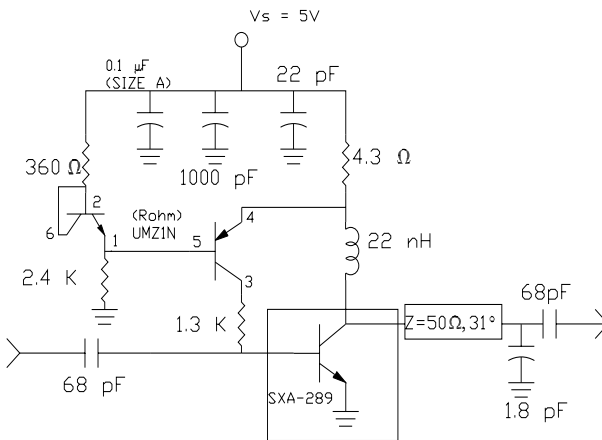
Recommended Bias Resistor Values				
Supply Voltage (Vs)	7V	8V	10V	12V
Rbias (Ohms)	18	27	47	62
Size (mils) L / H	2010	2010	2512	2512

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


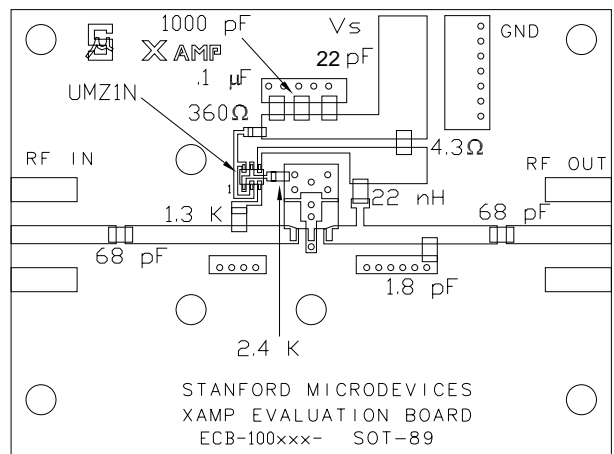
1800-2000 MHz Schematic



1800-2000 MHz Evaluation Board Layout

**Active Current Feedback Bias Circuit (for  $\geq 5V$  supply)**


1800-2000 MHz Schematic



1800-2000 MHz Evaluation Board Layout

ALL COMPONENTS 0603 UNLESS NOTED OTHERWISE

**SXA-289 50-2000 MHz Power Amplifier**
**Absolute Maximum Ratings**

Parameter	Absolute Maximum
Device Voltage	7V
Device Current	200mA
Power Dissipation	1500mW
RF Input Power	100mW
Junction Temperature	+150C
Operating Temperature	-45C to +85C
Storage Temperature	-65C to +150C

**Caution:**


Operation of this device above any one of these parameters may cause permanent damage. Appropriate precautions in handling, packaging and testing devices must be observed.

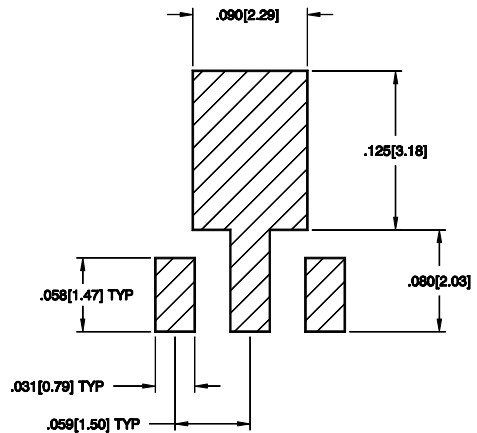
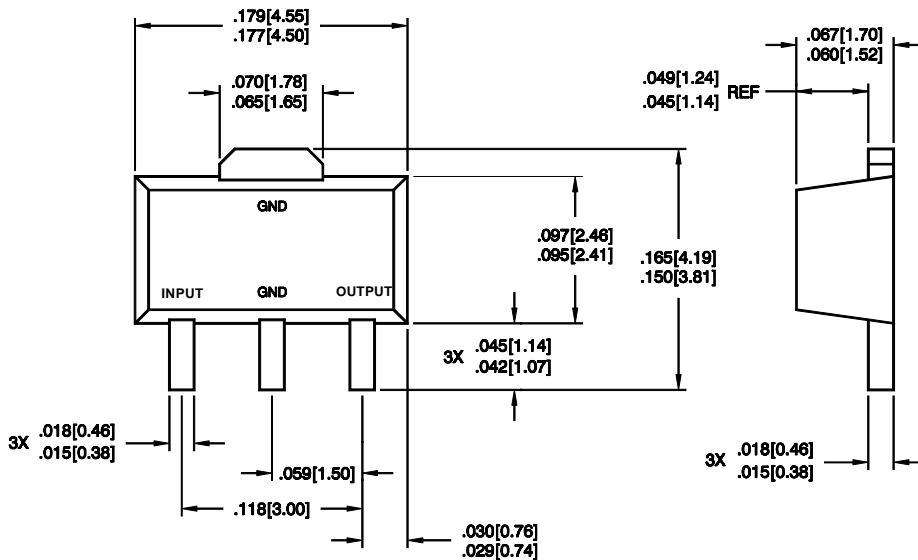
**MTTF vs. Temperature  
@ Id = 115mA typ.**

Lead Temperature	Junction Temperature	MTTF (hrs)
+25C	+90C	>10,000,000
+60C	+125C	>5,000,000
+85C	+150C	1,000,000

Thermal Resistance (Lead-Junction):  
108° C/W at Tj= 150°C

**Part Number Ordering Information**

Part Number	Devices Per Reel	Reel Size
SXA-289-TR1	500	7"
SXA-289-TR2	1000	13"
SXA-289-EB-9	Eval Board for 900 MHz	-
SXA-289-EB-19	Eval Board for 1900 MHz	-
SXA-289-EV-5	5 pc. Evaluation Development Kit	-

**Recommended Land Pattern**

**Package Outline Drawing**


Pin assignments shown for reference only, not marked on part

*Typical S-Parameters  $V_d = 5.0V$ ,  $I_{cc} = 115mA$* 

Freq GHz	S11	S11 Ang	S21	S21 Ang	S12	S12 Ang	S22	S22 Ang
.050	0.412	-147	25.53	147	0.02	5	0.34	-136
.150	0.461	-166	20.49	138	0.02	2	0.30	-168
.25	0.515	-173	17.42	124	0.02	1	0.29	-174
.35	0.550	178	14.83	111	0.03	0	0.29	-178
.45	0.570	171	12.79	100	0.03	0	0.28	-179
.55	0.580	163	11.17	91	0.03	-3	0.28	178
.65	0.580	156	9.95	83	0.03	-4	0.28	178
.75	0.574	150	9.03	75	0.03	-7	0.28	178
.85	0.562	143	8.35	68	0.03	-8	0.28	178
.95	0.546	136	7.78	61	0.03	-10	0.28	178
1.05	0.521	129	7.33	53	0.03	-15	0.28	179
1.15	0.489	121	7.00	46	0.03	-19	0.29	-179
1.25	0.448	112	6.75	38	0.03	-24	0.29	-178
1.35	0.396	103	6.54	30	0.03	-31	0.30	-176
1.45	0.332	91	6.37	21	0.03	-39	0.32	-174
1.55	0.255	76	6.20	12	0.03	-48	0.35	-173
1.65	0.169	52	6.03	2	0.03	-60	0.38	-174
1.75	0.104	0.5	5.80	-10	0.03	-72	0.41	-175
1.85	0.143	-69	5.50	-21	0.03	-88	0.45	-178
1.95	0.250	-102	5.14	-33	0.03	-105	0.49	178
2.05	0.365	-122	4.68	-45	0.02	-125	0.51	173
2.15	0.471	-138	4.19	-57	0.02	-148	0.54	168
2.25	0.561	-152	3.70	-68	0.02	-172	0.55	162
2.35	0.631	-164	3.21	-78	0.02	164	0.55	157
2.45	0.685	-175	2.79	-87	0.02	143	0.55	153
2.55	0.726	174	2.40	-96	0.02	124	0.54	148