STANFORD MICRODEVICES

Preliminary

NGA-589

DC-6 GHz, Cascadable GaAs HBT MMIC Amplifier

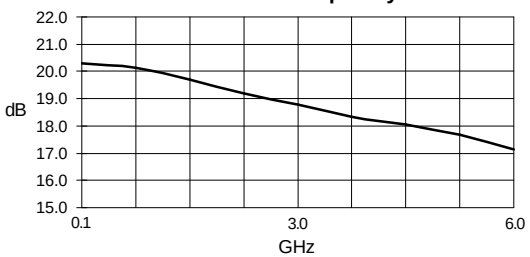
Product Description

Stanford Microdevices' NGA-589 is a high performance Gallium Arsenide Hetrojunction Bipolar Transistor MMIC Amplifier. Designed with InGaP process technology for improved reliability, a Darlington configuration is utilized for broadband performance up to 6 GHz. The heterojunction increases breakdown voltage and minimizes leakage current between junctions. Cancellation of emitter junction non-linearities results in higher suppression of intermodulation products. Typical output IP3 performance at 80mA is +38dBm at 900 MHz.

These unconditionally stable amplifiers provide up to 19dB of gain and 100mW of 1dB compressed power and requires only a single positive voltage supply. Only 2 DC-blocking capacitors, a bias resistor and an optional inductor are needed for operation.

This MMIC is an ideal choice for wireless applications such as cellular, PCS, CDPD, wireless data and SONET.

S21 vs. Frequency



Product Features

- **High Gain : 19dB at 2 GHz**
- **High Output IP3 : +38dBm at 900 MHz**
- **Cascadable 50ohm : 1.5:1 VSWR**
- **Patented GaAsHBT Technology**
- **Operates From Single Supply**
- **Low Thermal Resistance Package**

Applications

- **Cellular, PCS, CDPD**
- **Wireless Data, SONET**

Electrical Specifications at Ta = 25C

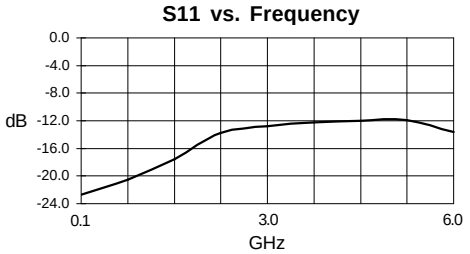
Symbol	Parameters: Test Conditions: Id = 80mA, Z_0 = 50 Ohms		Units	Min.	Typ.	Max.
G_P	Power Gain	f = 0.1-2.0 GHz f = 2.0-3.0 GHz	dB dB		19.0 18.3	
G_F	Gain Flatness Gain Flatness over any 100 MHz band	f = 0.1-3.0 GHz f = 0.1-3.0 GHz	dB dB		+/- 1.0 +/- 0.1	
P_{1dB}	Output Power at 1dB Compression	f = 0.9 GHz f = 1.9 GHz	dBm dBm		19.0 18.5	
NF	Noise Figure	f = 0.1-3.0 GHz	dB		4.5	
IP_3	Third Order Intercept Point	f = 0.9 GHz f = 1.9 GHz	dBm dBm		38.0 35.0	
VSWR	Input / Output	f = 0.1-3.0 GHz f = 3.0-6.0 GHz	-		1.5:1 1.7:1	
T_D	Group Delay	f = 1.9 GHz	psec		90	
ISOL	Reverse Isolation	f = 0.1-6.0 GHz	dB		22.0	
V_D	Device Voltage		V		5.0	

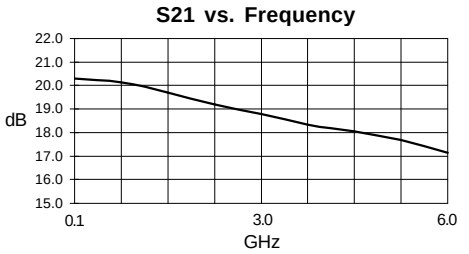
STANFORD MICRODEVICES

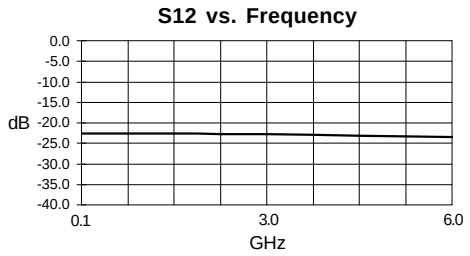
Preliminary

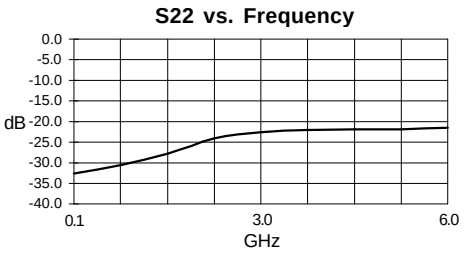
NGA-589 DC-6 GHz Cascadable MMIC Amplifier

Typical Performance at 25° C (Vcc = 5.0V, Icc = 80mA)









Typical S-Parameters Vcc = 5.0V, Icc = 80mA

Freq GHz	|S11|	S11 Ang	|S21|	S21 Ang	|S12|	S12 Ang	|S22|	S22 Ang
.100	0.073	168	10.33	176	0.075	-23	0.023	162
.500	0.089	119	10.13	161	0.075	-23	0.031	126
.900	0.112	93	9.86	148	0.075	-23	0.040	101
1.00	0.119	90	9.85	145	0.075	-23	0.042	99
1.50	0.152	69	9.48	129	0.074	-23	0.054	85
2.00	0.183	51	9.07	114	0.074	-23	0.067	79
2.50	0.206	35	8.60	96	0.072	-23	0.075	70
3.00	0.225	21	8.27	84	0.071	-23	0.079	58
3.50	0.235	6	7.99	68	0.071	-23	0.081	42
4.00	0.244	-9	7.66	54	0.081	-23	0.082	36
4.50	0.240	-23	7.32	39	0.087	-23	0.087	37
5.00	0.208	-38	7.19	27	0.085	-24	0.085	41
5.50	0.179	-62	6.96	12	0.081	-24	0.081	43
6.00	0.185	-91	6.81	-3	0.058	-24	0.058	45

STANFORD MICRODEVICES

Preliminary

NGA-589 DC-6 GHz Cascadable MMIC Amplifier

Absolute Maximum Ratings

Parameter	Absolute Maximum
Device Current	100mA
Power Dissipation	550mW
RF Input Power	200mW
Junction Temperature	+150C
Operating Temperature	-45C to +85C
Storage Temperature	-65C to +150C

Notes:

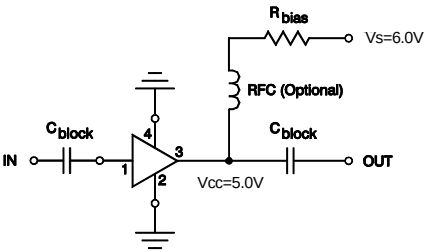
1. Operation of this device above any one of these parameters may cause permanent damage.

Recommended Bias Resistor Values						
Supply Voltage (Vs)	6V	7.5V	9V	12V	15V	20V
Rbias (Ohms) @ 80mA	12.5	31.5	50	88	125	188

MTTF vs. Temperature @ Icc = 80mA

Lead Temperature	MTTF (hrs)
+50C	>10,000,000
+80C	>1,000,000

Thermal Resistance (Lead-Junction): 100° C/W



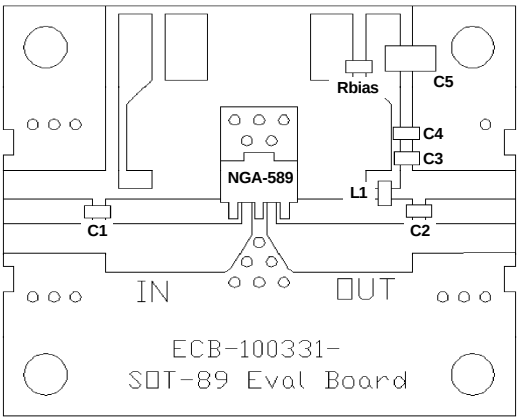
Typical Biasing Configuration
Vcc=5.0V, Icc=80mA

Pin Designation	
1	RF in
2	GND
3	RF out and Bias
4	GND

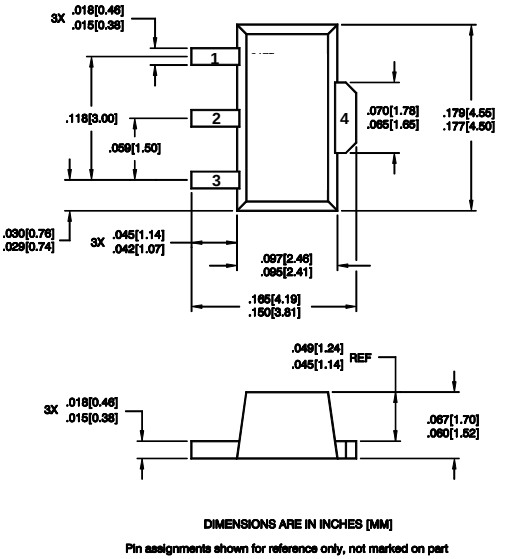
Mounting Instructions

The data shown was taken on a 31mil thick FR-4 board with 1 ounce of copper on both sides.

1. Use 1 or 2 ounce copper, if possible.
2. Solder the copper pad on the backside of the device package to the ground plane.
3. Use a large ground pad area with many plated through-holes as shown.



Outline Drawing



DIMENSIONS ARE IN INCHES [MM]

Pin assignments shown for reference only, not marked on part