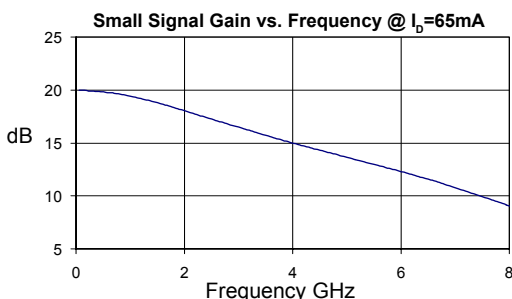


## Product Description

Stanford Microdevices' SNA-586 is a high performance Gallium Arsenide Heterojunction Bipolar Transistor MMIC Amplifier. A Darlington configuration is utilized for broadband performance up to 5 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 IP3 at 850 MHz with 65mA is 32.5 dBm.

These unconditionally stable amplifiers provide 18 dB of gain and 18.4 dBm of 1dB compressed power and require 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.



## Electrical Specifications

Symbol	Parameters: Test Conditions: $Z_0 = 50 \text{ Ohms}$ , $I_b = 65\text{mA}$ , $T = 25^\circ\text{C}$	Units	Min.	Typ.	Max.
$P_{1\text{dB}}$	Output Power at 1dB Compression	f = 850 MHz dBm f = 1950 MHz dBm f = 2400 MHz dBm		17.6 18.4 18.4	
$IP_3$	Third Order Intercept Point Power out per tone = 0 dBm	f = 850 MHz dBm f = 1950 MHz dBm f = 2400 MHz dBm		32.5 31.6 31.6	
$S_{21}$	Small Signal Gain	f = 850 MHz dB f = 1950 MHz dB f = 2400 MHz dB	17.6	19.6 18.1 17.4	
Bandwidth	(Determined by $S_{11}$ , $S_{22}$ Values)	MHz		5000	
$S_{11}$	Input VSWR	f = DC-5000 MHz	-	1.4:1	
$S_{22}$	Output VSWR	f = DC-5000 MHz	-	1.4:1	
$S_{12}$	Reverse Isolation	f = 850 MHz dB f = 1950 MHz dB f = 2400 MHz dB		22.3 21.6 21.3	
NF	Noise Figure, $Z_s = 50 \text{ Ohms}$	f = 1950 MHz		4.0	
$V_D$	Device Voltage	V	4.4	4.9	5.4
Rth,j-l	Thermal Resistance (junction - lead)	$^\circ\text{C/W}$		254	

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## SNA-586

### DC-5 GHz, Cascadable GaAs HBT MMIC Amplifier

#### NGA-586 Recommended for New Designs



## Product Features

- High Output IP3: 32.5 dBm @ 850 MHz
- Cascadable 50 Ohm Gain Block
- Patented GaAs HBT Technology
- Operates From Single Supply

## Applications

- Cellular, PCS, CDPD, Wireless Data, SONET

### Absolute Maximum Ratings

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

Bias Conditions should also satisfy the following expression:

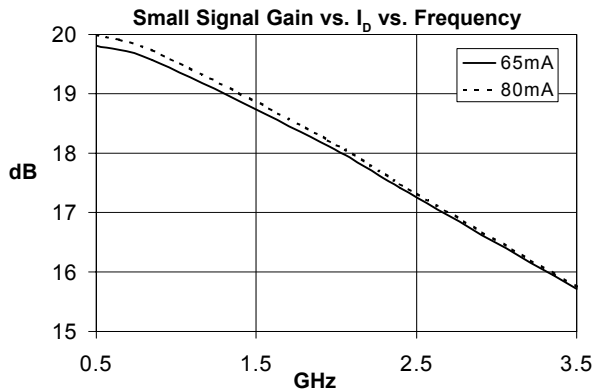
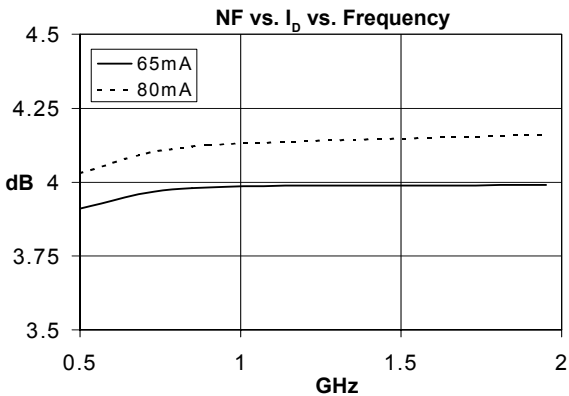
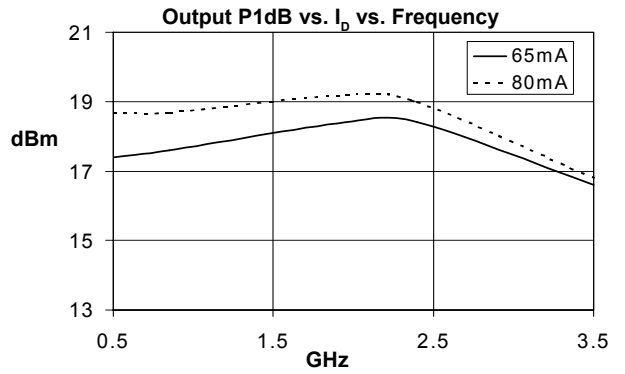
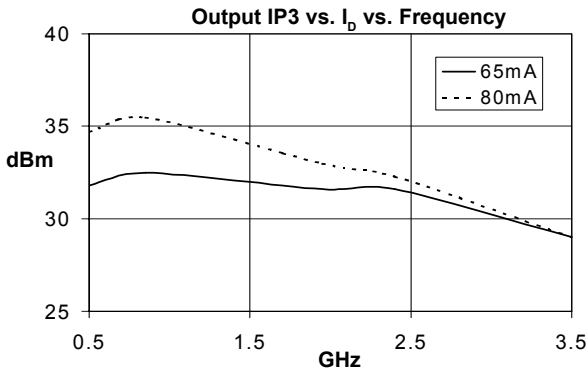
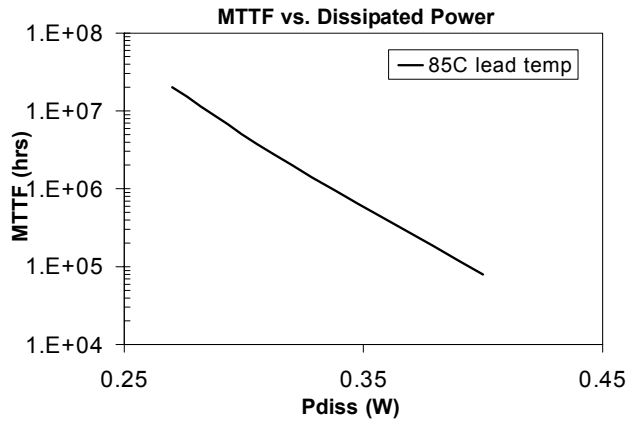
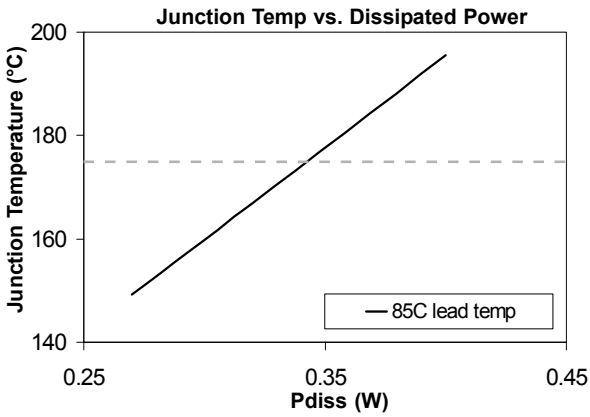
$$I_D V_D (\text{max}) < (T_J - T_{OP})/R_{th, j-l}$$

Parameter	Value	Unit
Supply Current	110	mA
Operating Temperature	-40 to +85	C
Maximum Input Power	16	dBm
Storage Temperature Range	-40 to +150	C
Operating Junction Temperature	+175	C

Parameter	Typical		Test Condition ( $I_D = 65 \text{ mA}$ , unless otherwise noted)
	25°C	Unit	
<b>500 MHz</b>			
Gain	19.8	dB	$Z_S = 50 \text{ Ohms}$ Tone spacing = 1 MHz, Pout per tone = 0 dBm
Noise Figure	3.9	dB	
Output IP3	31.8	dBm	
Output P1dB	17.4	dBm	
Input Return Loss	14.1	dB	
Isolation	22.5	dB	
<b>850 MHz</b>			
Gain	19.6	dB	$Z_S = 50 \text{ Ohms}$ Tone spacing = 1 MHz, Pout per tone = 0 dBm
Noise Figure	4.0	dB	
Output IP3	32.5	dBm	
Output P1dB	17.6	dBm	
Input Return Loss	15.6	dB	
Isolation	22.3	dB	
<b>1950 MHz</b>			
Gain	18.1	dB	$Z_S = 50 \text{ Ohms}$ Tone spacing = 1 MHz, Pout per tone = 0 dBm
Noise Figure	4.0	dB	
Output IP3	31.6	dBm	
Output P1dB	18.4	dBm	
Input Return Loss	16.6	dB	
Isolation	21.6	dB	
<b>2400 MHz</b>			
Gain	17.4	dB	Tone spacing = 1 MHz, Pout per tone = 0 dBm
Output IP3	31.6	dBm	
Output P1dB	18.4	dBm	
Input Return Loss	16.8	dB	
Isolation	21.3	dB	

**\*NOTE:** While the SNA-586 can be operated at different bias currents, 65 mA is the recommended bias for lower junction temperature and longer life. This reflects typical operating conditions which we have found to be an optimal balance between high IP3 and MTTF. In general, MTTF is improved to more than 100,000 hours when biasing at 65 mA and operating up to 85°C ambient temperature.

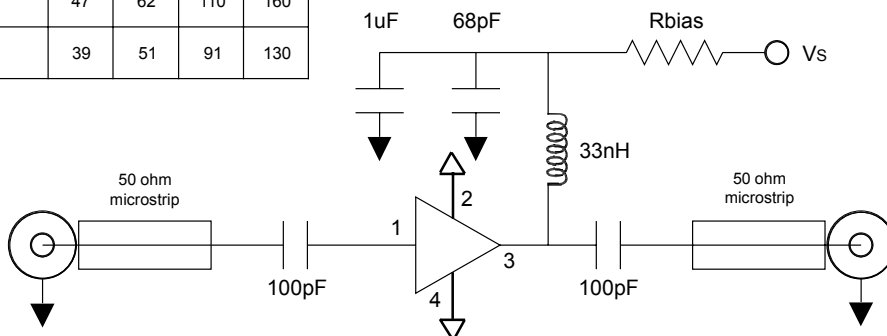
## SNA-586 DC-5GHz Cascadable MMIC Amplifier



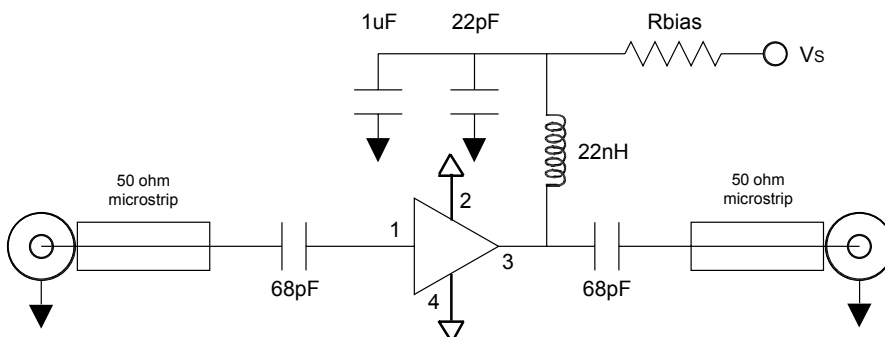
Pin #	Function	Description
1	RF IN	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.
2	GND	Connection to ground. Use via holes for best performance to reduce lead inductance. Place vias as close to ground leads as possible.
3	RF OUT/Vcc	RF output and bias pin. Bias should be supplied to this pin through an external series resistor and RF choke inductor. Because DC biasing is present on this pin, a DC blocking capacitor should be used in most applications (see application schematic). The supply side of the bias network should be well bypassed.
4	GND	Same as Pin 2.

**Application Schematic for Operation at 850 MHz**

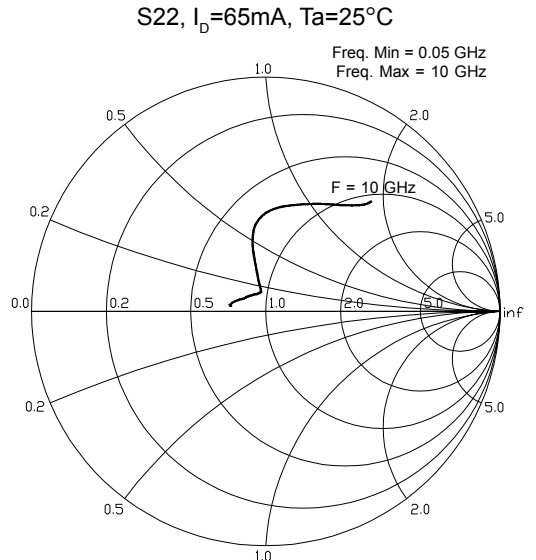
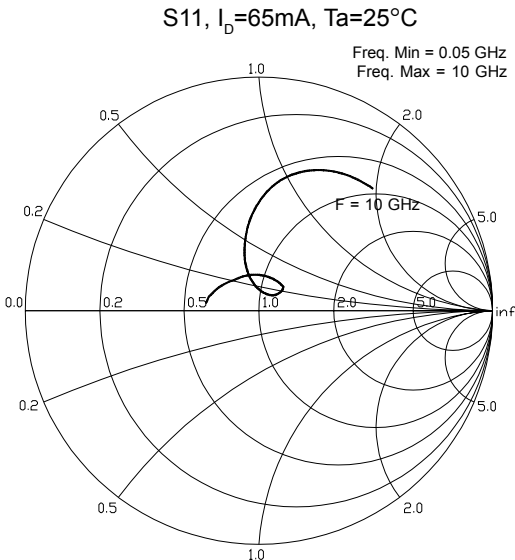
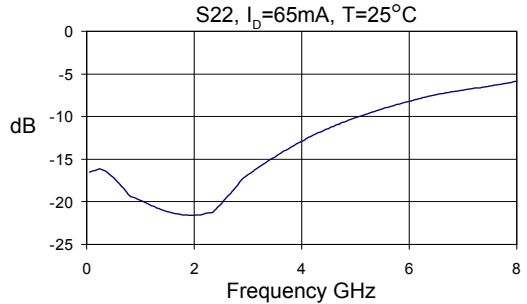
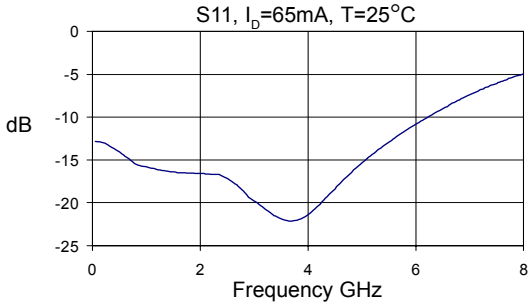
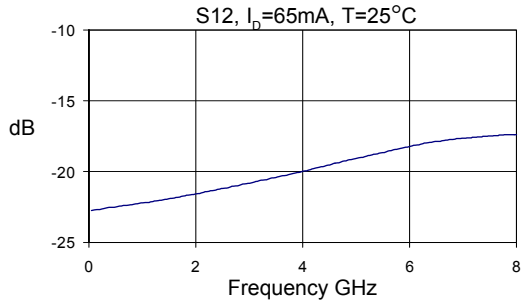
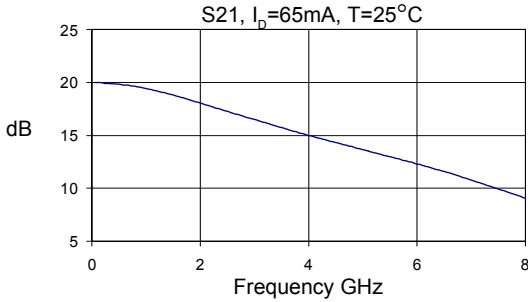
Recommended Bias Resistor Values				
Supply Voltage(Vs)	8V	9V	12V	15V
Rbias (Ohms) @ 65 mA	47	62	110	160
Rbias (Ohms) @ 80 mA	39	51	91	130



**Application Schematic for Operation at 1950 MHz**



## SNA-586 DC-5GHz Cascadable MMIC Amplifier



## SNA-586 DC-5GHz Cascadable MMIC Amplifier

### Part Number Ordering Information

Part Number	Reel Size	Devices/Reel
SNA-586	7"	1000

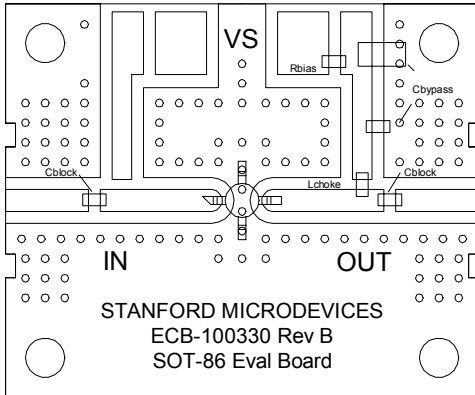


### Caution ESD Sensitive:

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

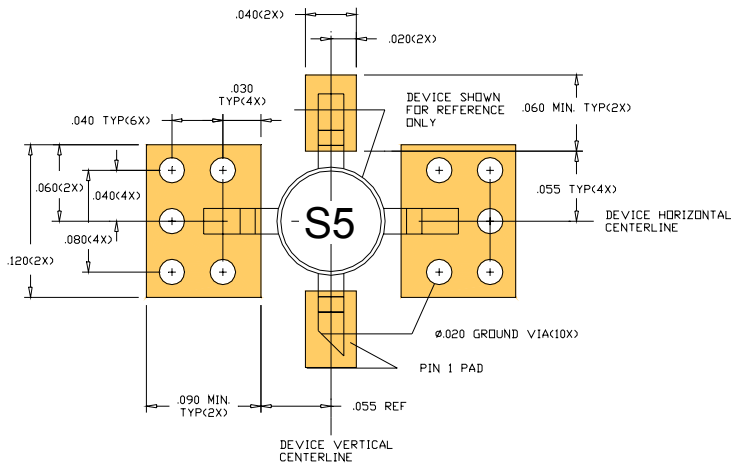
### Part Symbolization

The part will be symbolized with an "S5" designator on the top surface of the package.

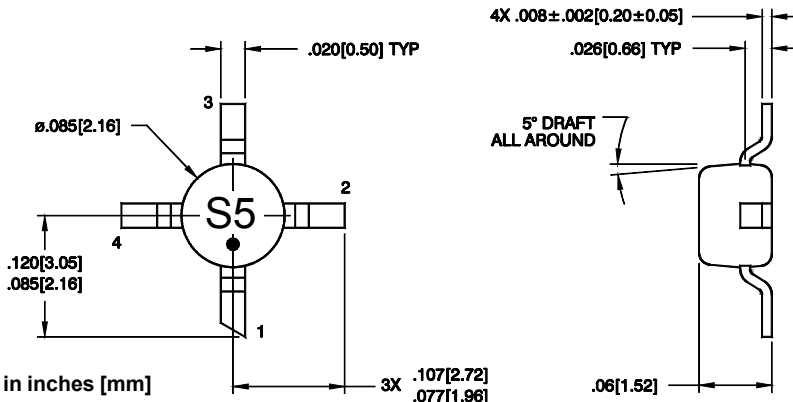


Evaluation Board Layout

### PCB Pad Layout



### Package Dimensions



Dimensions are in inches [mm]