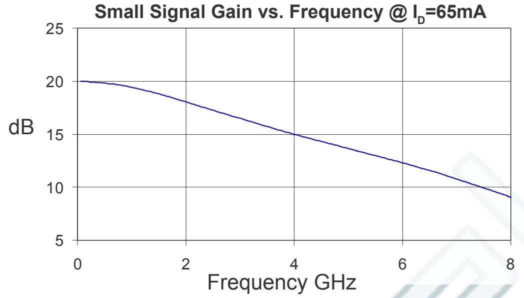
Product Description

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.

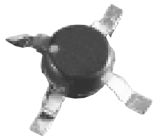
These unconditionally stable amplifiers provide 18 dB of gain and 18.4 dBm of 1dB compressed power and require only a single positive voltage supply. Only 2 DC-blocking capacitors, a bias resistor and an optional inductor are needed for operation. This MMIC is an ideal choice for wireless applications such as cellular, PCS, CDPD, wireless data and SONET.



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**

Electrical Specifications

Symbol	Parameters: Test Conditions: Z_0 = 50 Ohms, I_D = 65mA, T = 25°C		Units	Min.	Typ.	Max.
P_{1dB}	Output Power at 1dB Compression	f = 850 MHz f = 1950 MHz f = 2400 MHz	dBm dBm dBm		17.6 18.4 18.4	
IP_3	Third Order Intercept Point Power out per tone = 0 dBm	f = 850 MHz f = 1950 MHz f = 2400 MHz	dBm dBm dBm		32.5 31.6 31.6	
S_{21}	Small Signal Gain	f = 850 MHz f = 1950 MHz f = 2400 MHz	dB dB 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 f = 1950 MHz f = 2400 MHz	dB dB dB		22.3 21.6 21.3	
NF	Noise Figure, Z_S = 50 Ohms	f = 1950 MHz	dB		4.0	
V_D	Device Voltage		V	4.4	4.9	5.4
Rth,j-l	Thermal Resistance (junction - lead)		°C/W		254	

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Absolute Maximum Ratings

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

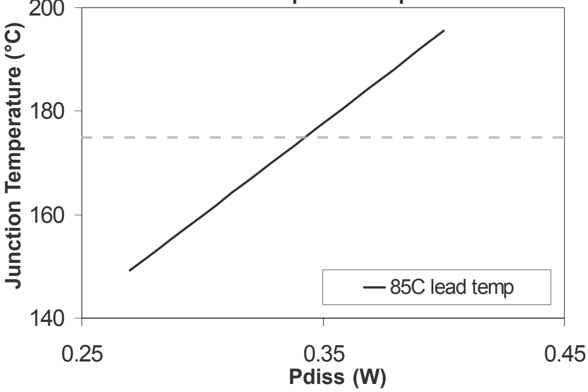
Bias Conditions should also satisfy the following expression:
$I_D V_D$ (max) < $(T_J - T_{OP})$/Rth, j-l

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

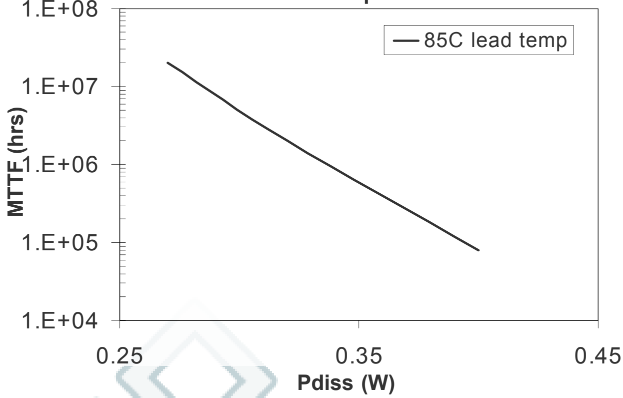
Parameter	Typical 25°C	Unit	Test Condition (I_D = 65 mA, unless otherwise noted)
500 MHz			
Gain	19.8	dB	
Noise Figure	3.9	dB	Z_S = 50 Ohms
Output IP3	31.8	dBm	Tone spacing = 1 MHz, Pout per tone = 0 dBm
Output P1dB	17.4	dBm	
Input Return Loss	14.1	dB	
Isolation	22.5	dB	
850 MHz			
Gain	19.6	dB	
Noise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

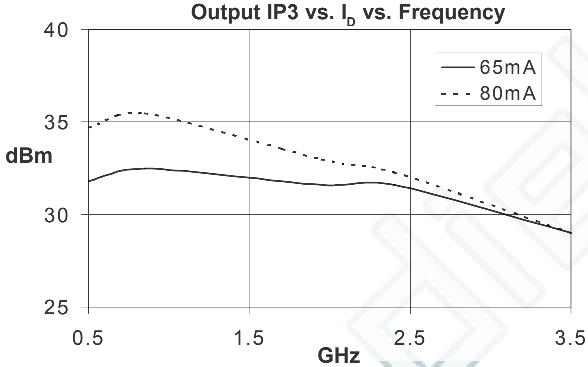
Junction Temp vs. Dissipated Power



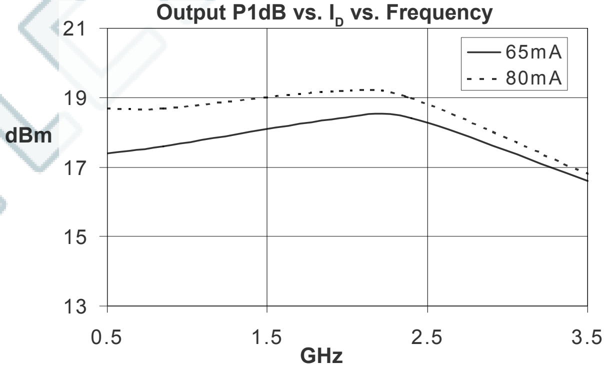
MTTF vs. Dissipated Power



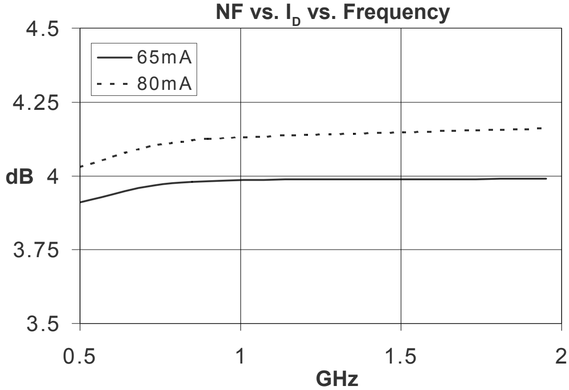
Output IP3 vs. I_D vs. Frequency



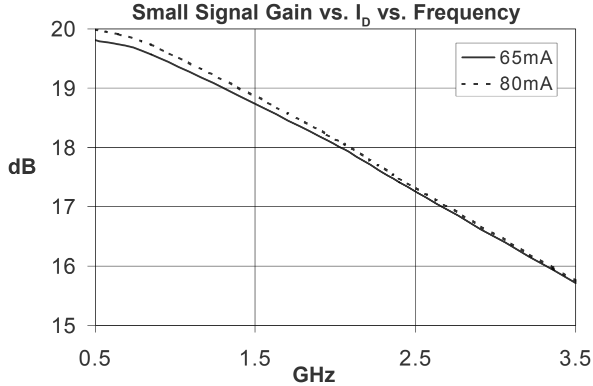
Output P1dB vs. I_D vs. Frequency



NF vs. I_D vs. Frequency



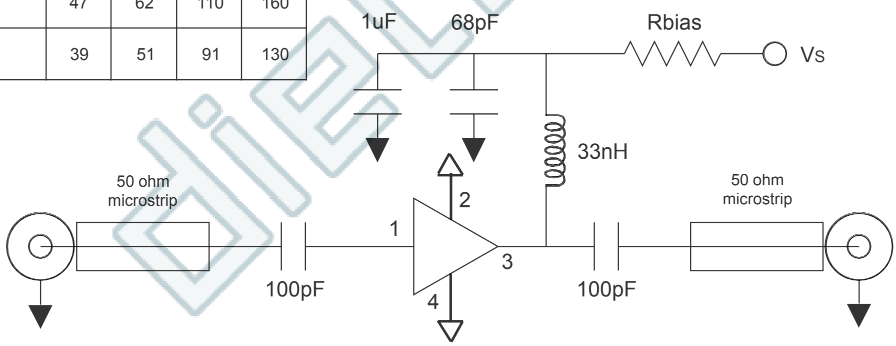
Small Signal Gain vs. I_D vs. Frequency



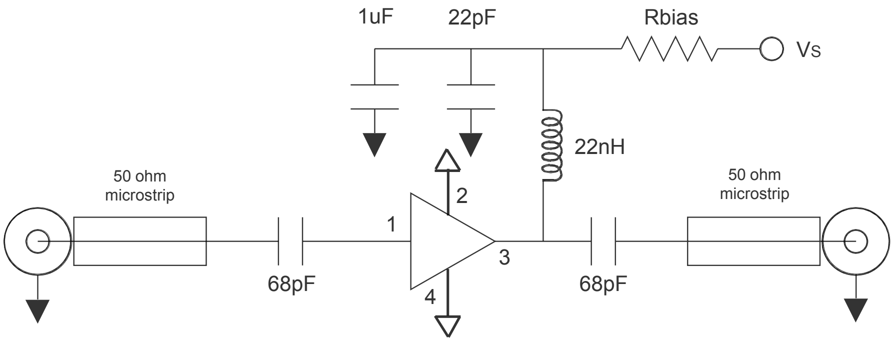
Pin #	Function	Description
1	RF IN	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.
2	GND	Connection to ground. Use via holes for best performance to reduce lead inductance. Place vias as close to ground leads as possible.
3	RF OUT/Vcc	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

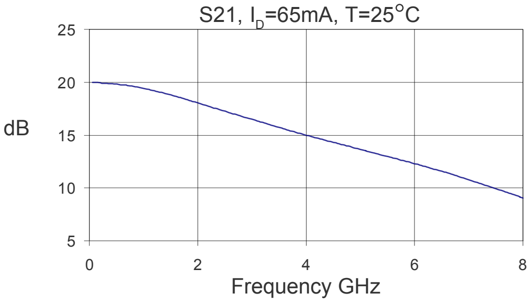
Recommended Bias Resistor Values				
Supply Voltage(Vs)	8V	9V	12V	15V
Rbias (Ohms) @ 65 mA	47	62	110	160
Rbias (Ohms) @ 80 mA	39	51	91	130



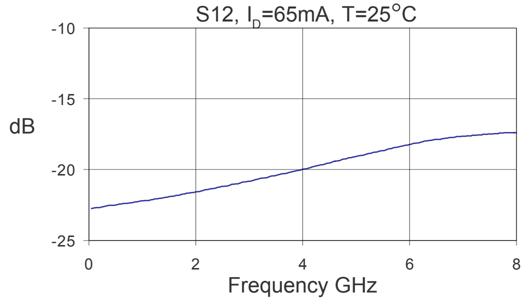
Application Schematic for Operation at 1950 MHz



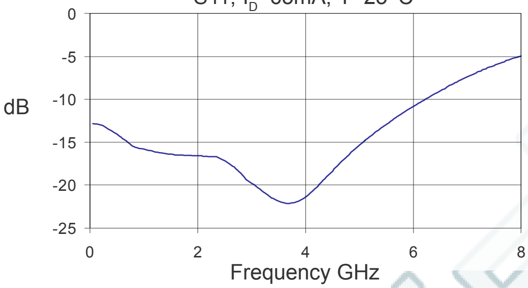
S21, I_D=65mA, T=25°C



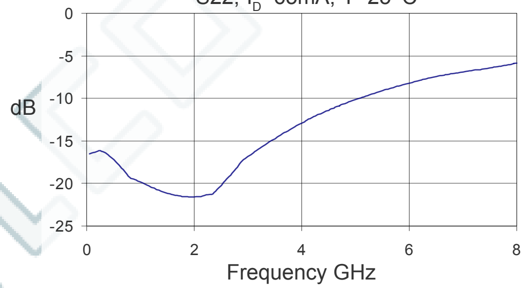
S12, I_D=65mA, T=25°C



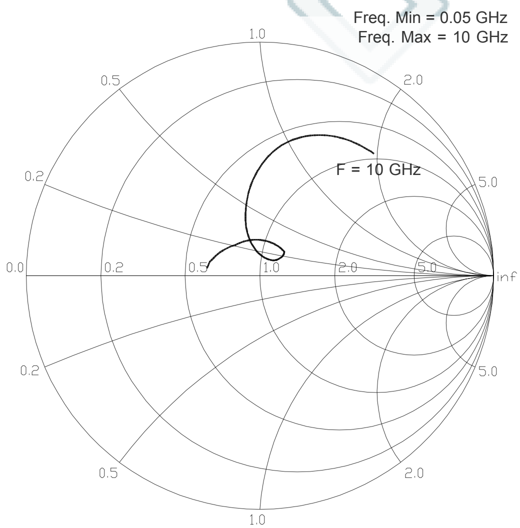
S11, I_D=65mA, T=25°C



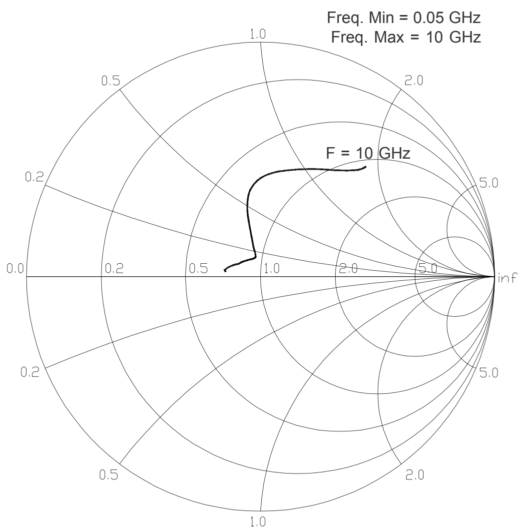
S22, I_D=65mA, T=25°C



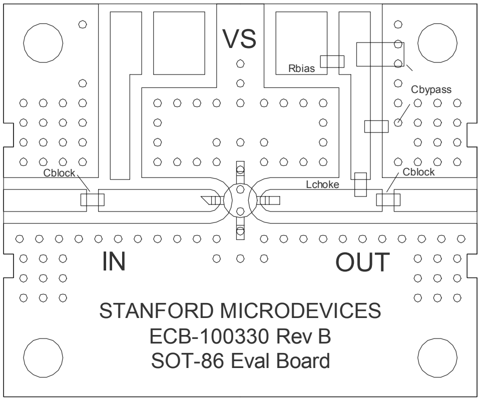
S11, I_D=65mA, Ta=25°C



S22, I_D=65mA, Ta=25°C



SNA-586 DC-5GHz Cascadable MMIC Amplifier



Evaluation Board Layout

Part Number Ordering Information

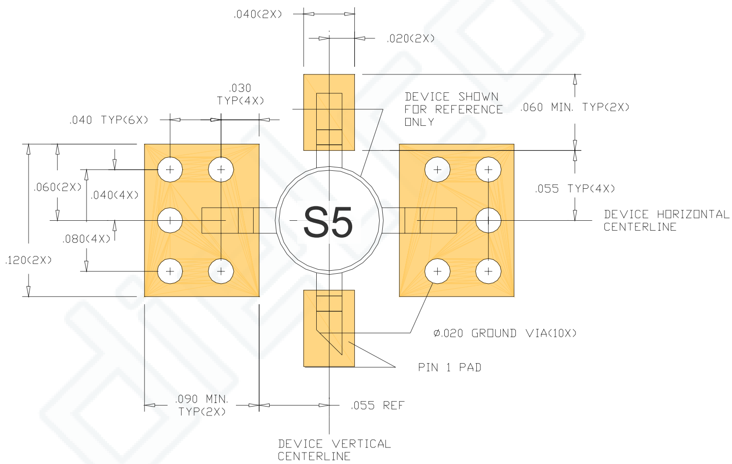
Part Number	Reel Size	Devices/Reel
SNA-586	7"	1000

Caution ESD Sensitive:
Appropriate precautions in handling, packaging and testing devices must be observed.

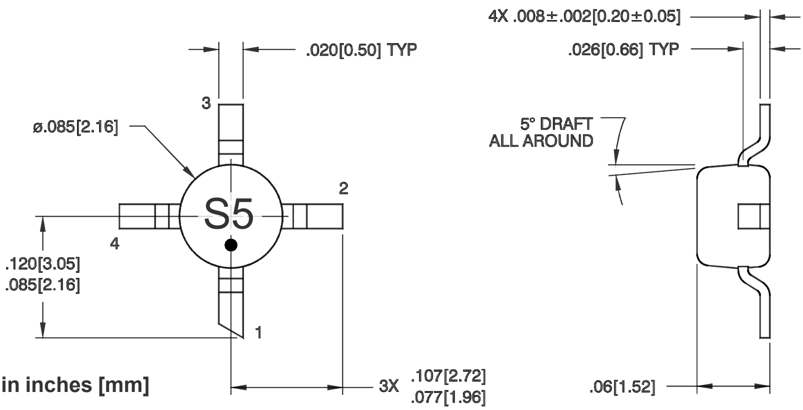
Part Symbolization

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

PCB Pad Layout



Package Dimensions



Dimensions are in inches [mm]