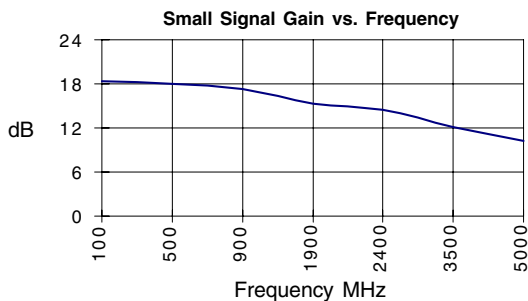


## Product Description

Stanford Microdevices' SGA-2386 is a high performance cascadeable 50-ohm amplifier designed for operation from a 2.7-volt supply. This RFIC uses the latest Silicon Germanium Heterostructure Bipolar Transistor (SiGe HBT) process featuring 1 micron emitters with  $f_T$  up to 65 GHz.

This circuit uses a darlington pair topology with resistive feedback for broadband performance as well as stability over its entire temperature range. Internally matched to 50 ohm impedance, the SGA-2386 requires only DC blocking and bypass capacitors for external components.



Preliminary

## SGA-2386

### DC-2800 MHz Silicon Germanium HBT Cascadeable Gain Block



### Product Features

- DC-2800 MHz Operation
- 2.7V Single Voltage Supply
- High Output Intercept: +21dBm typ. at 850 MHz
- High Gain: 17.2dB typ. at 850 MHz
- Low Noise Figure: 2.9 dB typ. at 850 MHz

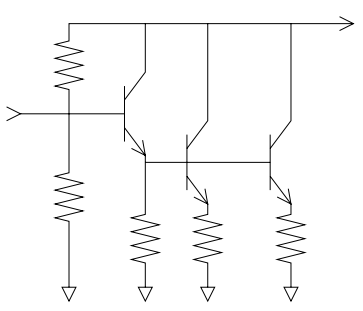
### Applications

- Broadband Gain Blocks
- Cordless Phones
- IF/ RF Buffer Amplifier
- Drivers for CATV Amplifiers

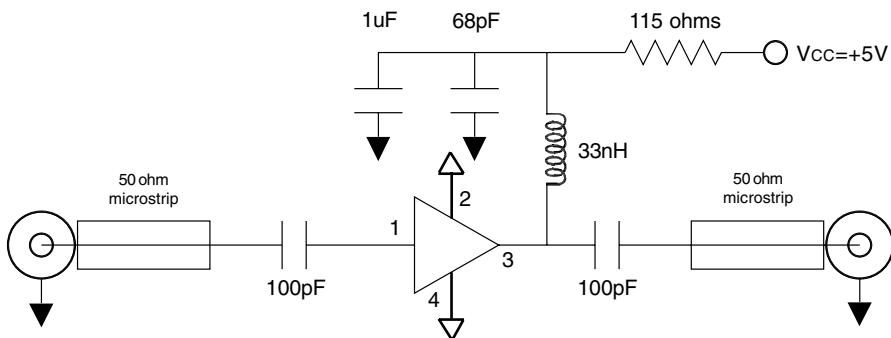
Symbol	Parameters: Test Conditions: $Z_0 = 50 \text{ Ohms}$ , $I_d = 20 \text{ mA}$ , $T = 25^\circ\text{C}$		Units	Min.	Typ.	Max.
$P_{1dB}$	Output Power at 1dB Compression	$f = 850 \text{ MHz}$ $f = 1950 \text{ MHz}$	dBm dBm		8.8 8.0	
$S_{21}$	Small Signal Gain	$f = \text{DC} - 1000 \text{ MHz}$ $f = 1000 - 2000 \text{ MHz}$ $f = 2000 - 2800 \text{ MHz}$	dB dB dB	15.5	17.2 15.3 14.0	
$S_{12}$	Reverse Isolation	$f = \text{DC} - 2800 \text{ MHz}$	dB		21.0	
$S_{11}$	Input VSWR	$f = \text{DC} - 2800 \text{ MHz}$	-		1.67:1	
$S_{22}$	Output VSWR	$f = \text{DC} - 2800 \text{ MHz}$	-		1.40:1	
$IP_3$	Third Order Intercept Point	$f = 850 \text{ MHz}$ $f = 1950 \text{ MHz}$	dBm dBm		21.0 21.2	
NF	Noise Figure	$f = \text{DC} - 1000 \text{ MHz}$ $f = 1000 - 2400 \text{ MHz}$	dB dB		2.9 3.6	
$T_D$	Group Delay	$f = 1000 \text{ MHz}$	pS		112.0	
$V_D$	Device Voltage		V	2.4	2.7	3.0

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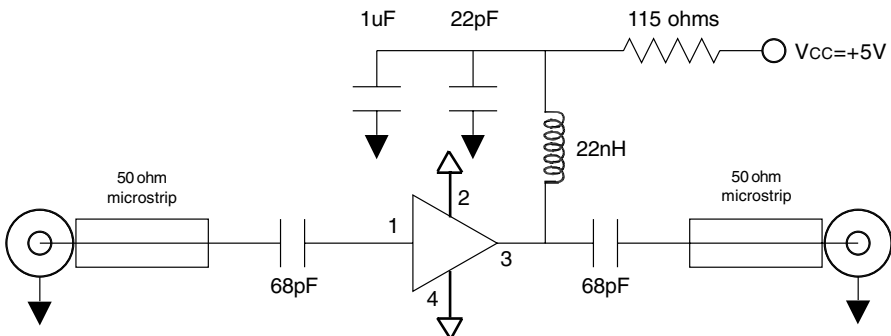
Parameter	Specification			Unit	Test Condition
	Min	Typ.	Max.		
<b>Device Bias</b>					T= 25C
Operating Voltage		2.7		V	
Operating Current		20.0		mA	
<b>500 MHz</b>					T= 25C
Gain		18.0		dB	
Noise Figure		2.9		dB	
Output IP3		20.3		dBm	
Output P1dB		8.2		dBm	
Input Return Loss		19.6		dB	
Isolation		21.1		dB	
<b>850 MHz</b>					T= 25C
Gain		17.2		dB	
Noise Figure		2.9		dB	
Output IP3		21.0		dBm	
Output P1dB		8.8		dBm	
Input Return Loss		12.0		dB	
Isolation		21.4		dB	
<b>1950 MHz</b>					T= 25C
Gain		15.3		dB	
Noise Figure		3.5		dB	
Output IP3		21.2		dBm	
Output P1dB		8.0		dBm	
Input Return Loss		11.5		dB	
Isolation		21.7		dB	
<b>2400 MHz</b>					T= 25C
Gain		14.5		dB	
Noise Figure		3.6		dB	
Output IP3		21.3		dBm	
Output P1dB		7.6		dBm	
Input Return Loss		13.7		dB	
Isolation		21.3		dB	

Pin #	Function	Description	Device Schematic
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 as close to ground leads as possible.	
3	RF OUT/ BIAS	RF output and bias pin. DC voltage is present on this pin, therefore a DC blocking capacitor is necessary for proper operation.	
4	GND	Sames as Pin 2	

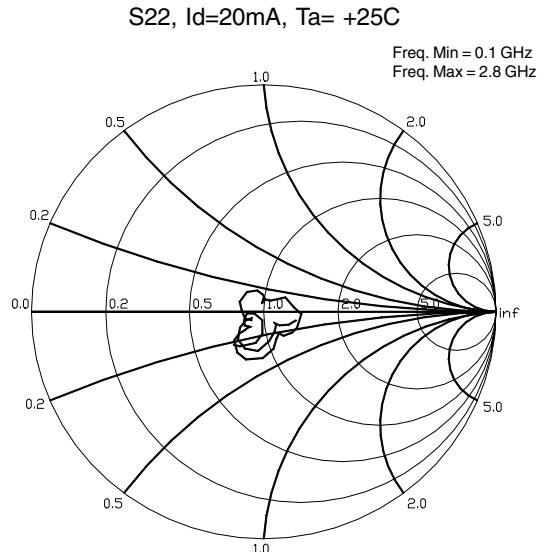
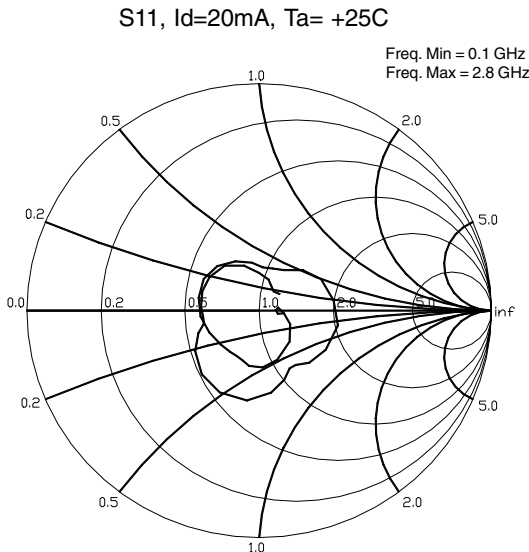
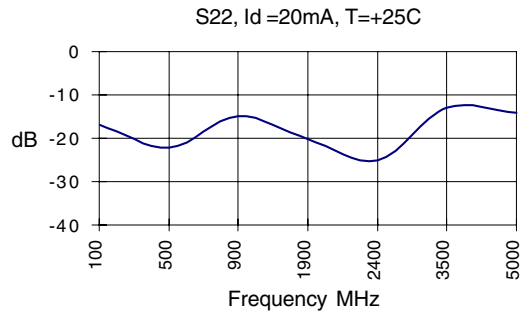
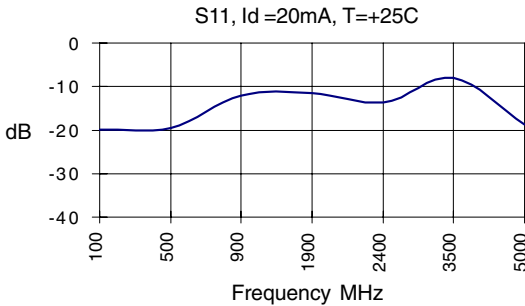
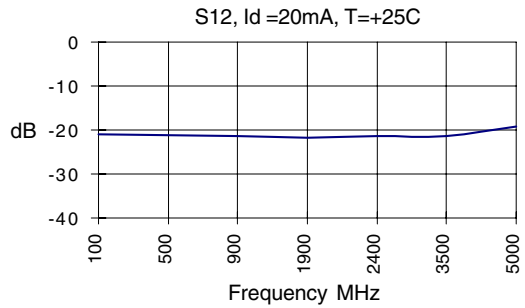
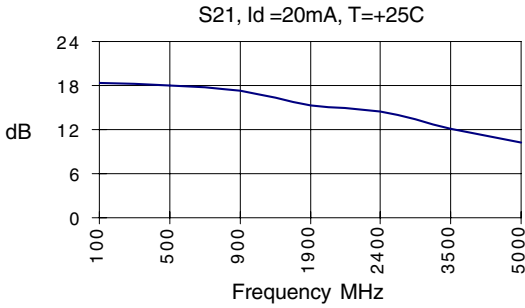
### Application Schematic for +5V Operation at 900 MHz



### Application Schematic for +5V Operation at 1900 MHz

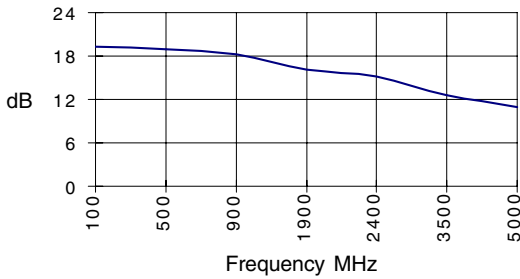


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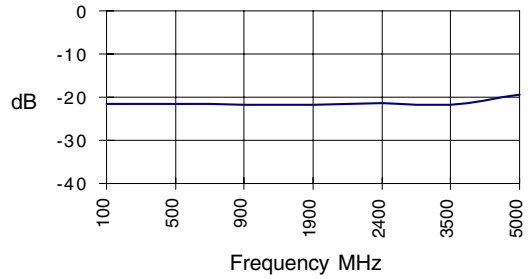


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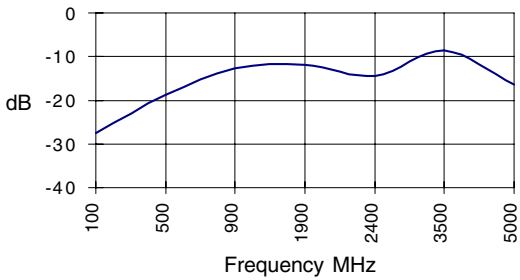
S21, Id =20mA, T=-40C



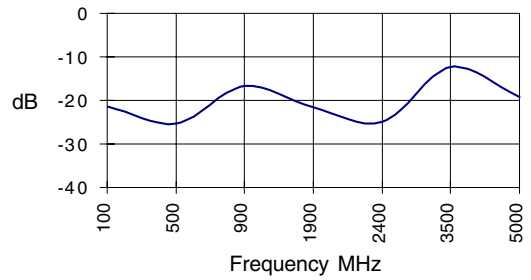
S12, Id =20mA, T=-40C



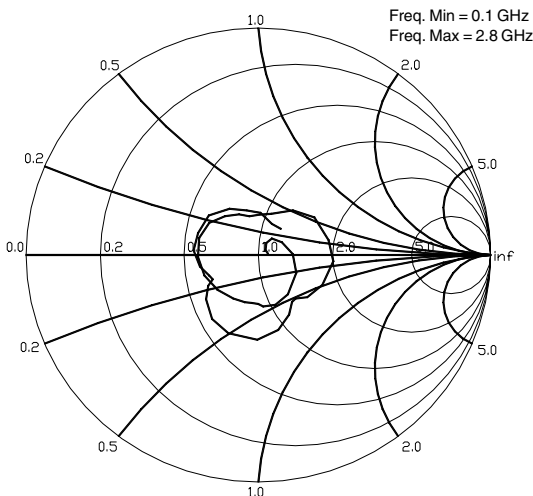
S11, Id =20mA, T=-40C



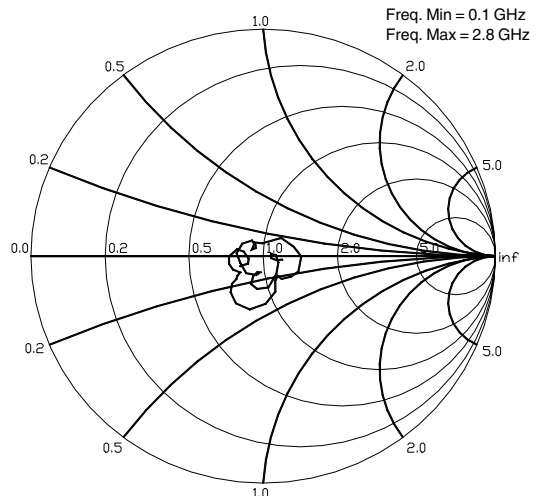
S22, Id =20mA, T=-40C



S11, Id=20mA, Ta= -40C

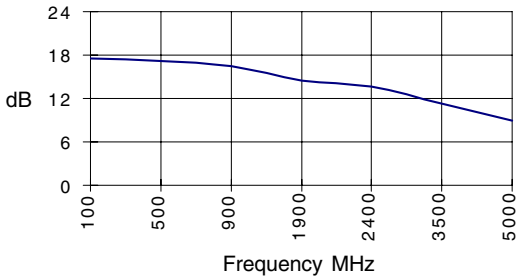


S22, Id=20mA, Ta= -40C

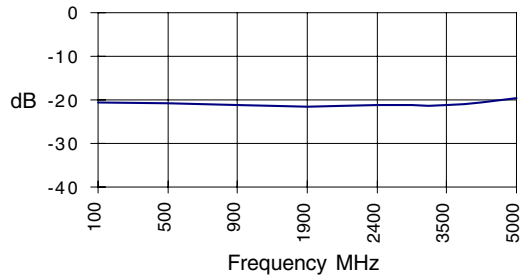


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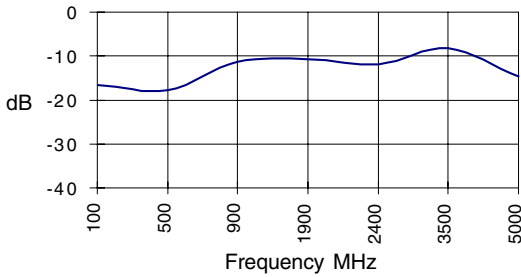
S21, Id =20mA, T=85C



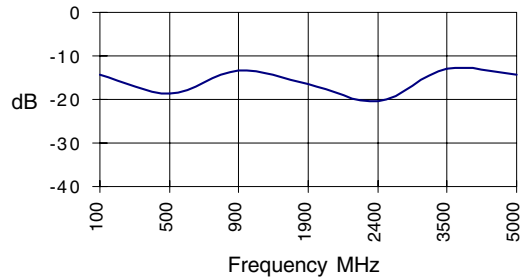
S12, Id =20mA, T=85C



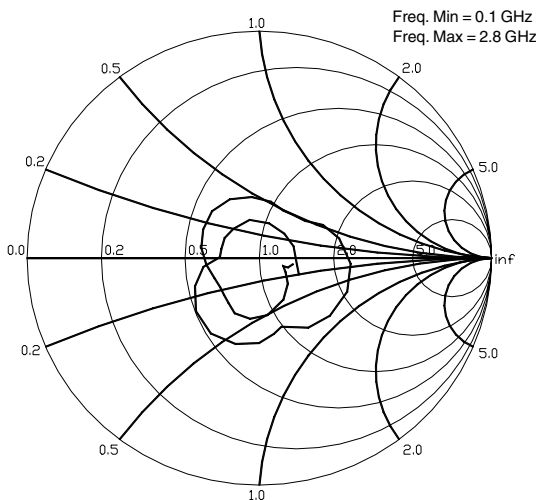
S11, Id =20mA, T=85C



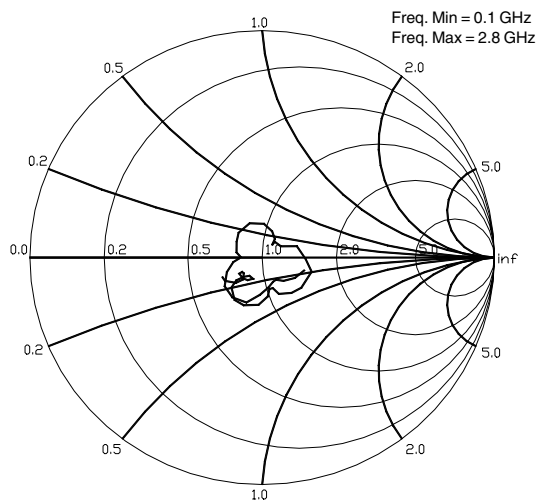
S22, Id =20mA, T=85C



S11, Id=20mA, Ta= 85C



S22, Id=20mA, Ta= 85C



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**Absolute Maximum Ratings**

Parameter	Value	Unit
Supply Current	40	mA
Operating Temperature	-40 to +85	C
Maximum Input Power	+7	dBm
Storage Temperature Range	-40 to +85	C
Operating Junction Temperature	+150	C

**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.

Thermal Resistance (Lead-Junction):  
97° C/W

**Part Number Ordering Information**

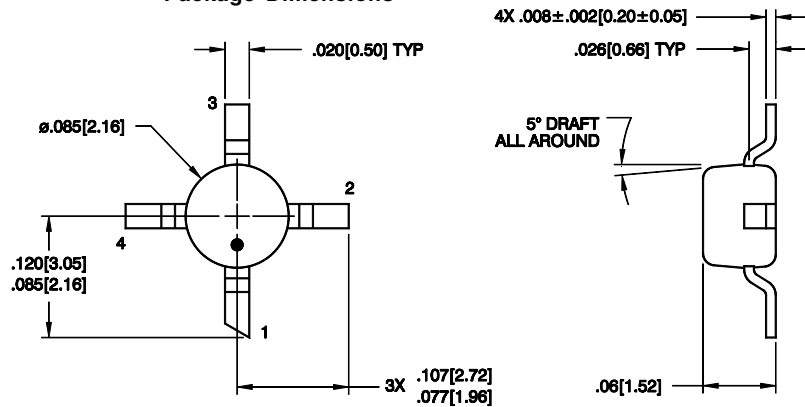
Part Number	Reel Size	Devices/Reel
SGA-2386-TR1	7"	1000
SGA-2386-TR2	13"	3000

**Recommended Bias Resistor Values**

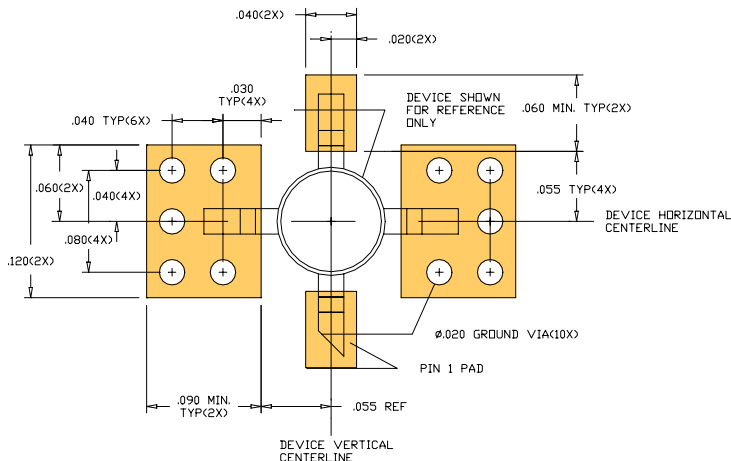
Supply Voltage(Vs)	3V	5V	7.5V	9V	12V
Rbias (Ohms)	15	115	240	315	465

**Package Dimensions**

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



**PCB Pad Layout**



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