Preliminary

SGA-5386

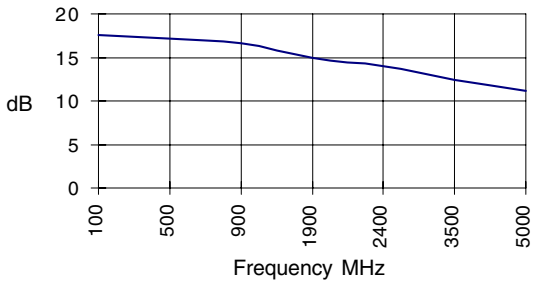
DC-3200 MHz Silicon Germanium HBT Cascadeable Gain Block

Product Description

Stanford Microdevices' SGA-5386 is a high performance cascadeable 50-ohm amplifier designed for operation at voltages as low as 3.6V. 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-5386 requires only DC blocking and bypass capacitors for external components.

Small Signal Gain vs. Frequency



Product Features

- **DC-3200 MHz Operation**
- **Single Voltage Supply**
- **High Output Intercept: +31dBm typ. at 850 MHz**
- **Low Current Draw: 60mA at 3.6V typ.**
- **Low Noise Figure: 3.5dB typ. at 850 MHz**

Applications

- **Oscillator Amplifiers**
- **PA for Low Power Applications**
- **IF/ RF Buffer Amplifier**
- **Drivers for CATV Amplifiers**

Electrical Specifications at Ta = 25C

Symbol	Parameters: Test Conditions: Z_0 = 50 Ohms, f = DC-3200MHz		Units	Min.	Typ.	Max.
P_{1dB}	Output Power at 1dB Compression	f = 850 MHz f = 1950 MHz	dBm dBm		17.0 14.7	
S_{21}	Small Signal Gain	f = DC-1000 MHz f = 1000-2000 MHz f = 2000-5000 MHz	dB dB dB	15.0	17.2 16.6 15.5	
S_{12}	Reverse Isolation	f = DC-1000 MHz f = 1000-2000 MHz f = 2000-5000 MHz	dB dB dB		20.8 21.2 21.2	
VSWR	Input VSWR	f = DC-5000 MHz	-		1.25:1	
VSWR	Output VSWR	f = DC-5000 MHz	-		1.25:1	
IP_3	Third Order Intercept Point	f = 850 MHz f = 1950 MHz	dBm dBm		31.0 29.0	
NF	Noise Figure	f = DC-1000 MHz f = 1000-2400 MHz	dB dB		3.5 4.0	
T_D	Group Delay	f = 1000 MHz	pS		112.0	
V_D	Device Voltage		V	3.1	3.6	4.1
I_D	Device Current		mA		60.0	

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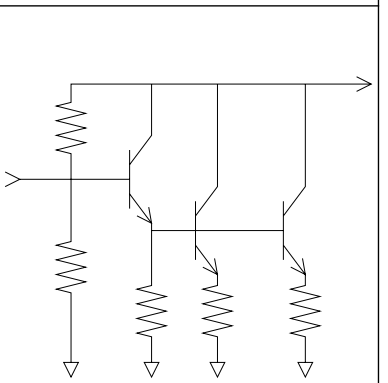
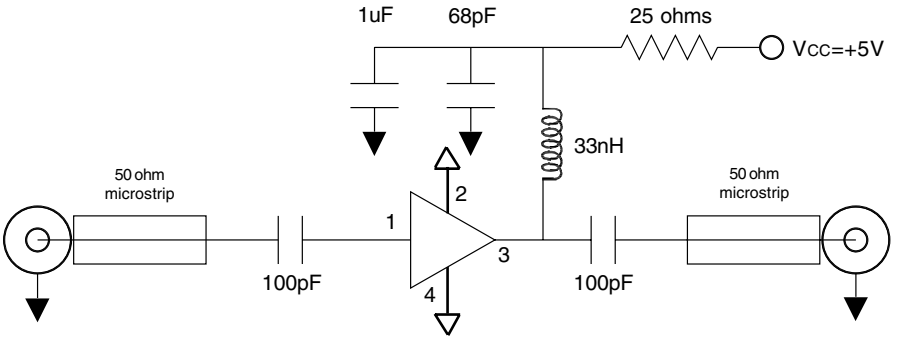
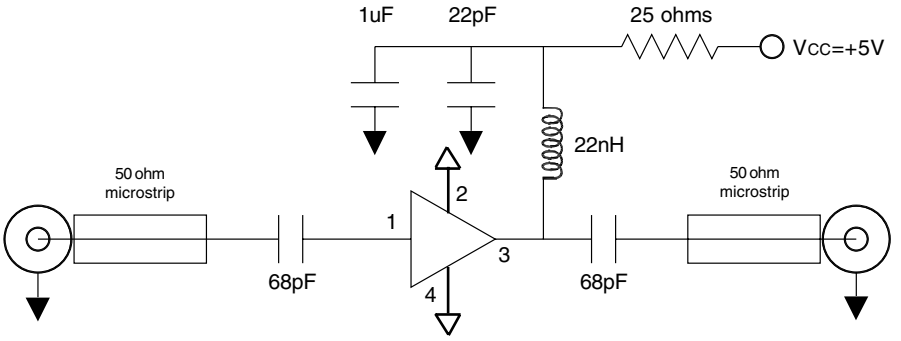
Parameter	Specification				Test Condition
	Min	Typ.	Max.	Unit	
Bandwidth					T= 25C
Frequency Range	DC		3200	MHz	
Device Bias					T= 25C
Operating Voltage		3.6		V	
Operating Current		60.0		mA	
500 MHz					T= 25C
Gain		17.2		dB	
Noise Figure		3.4		dB	
Output IP3		32.0		dBm	
Output P1dB		17.0		dBm	
Input Return Loss		19.6		dB	
Isolation		20.8		dB	
850 MHz					T= 25C
Gain		16.6		dB	
Noise Figure		3.5		dB	
Output IP3		32.0		dBm	
Output P1dB		17.0		dBm	
Input Return Loss		16.9		dB	
Isolation		21.1		dB	
1950 MHz					T= 25C
Gain		14.9		dB	
Noise Figure		4.0		dB	
Output IP3		29.0		dBm	
Output P1dB		14.7		dBm	
Input Return Loss		18.0		dB	
Isolation		21.3		dB	
2400 MHz					T= 25C
Gain		14.0		dB	
Noise Figure		4.1		dB	
Output IP3		27.0		dBm	
Output P1dB		13.6		dBm	
Input Return Loss		15.8		dB	
Isolation		21.2		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

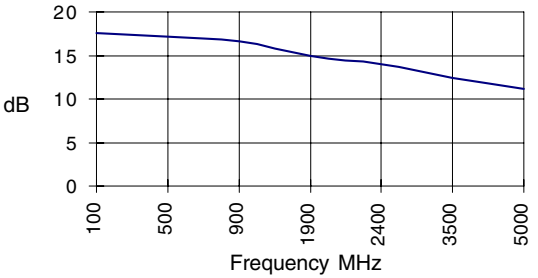


Application Schematic for +5V Operation at 1900 MHz

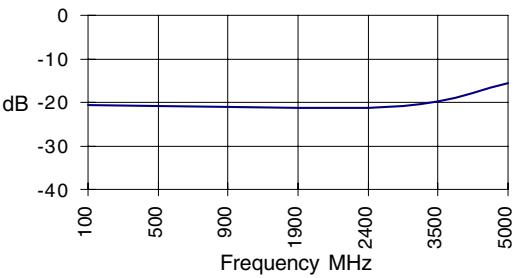


SGA-5386 DC-3200 MHz 3.5V SiGe Amplifier

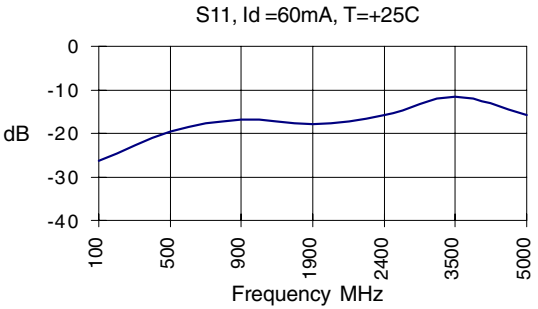
S21, Id =60mA, T=+25C



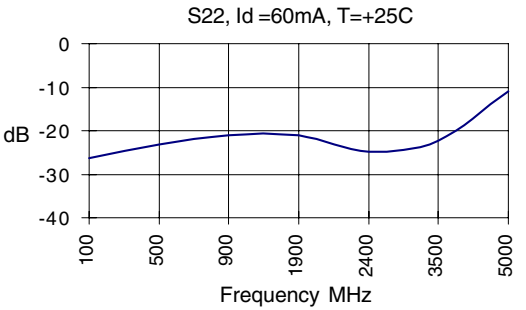
S12, Id =60mA, T=+25C



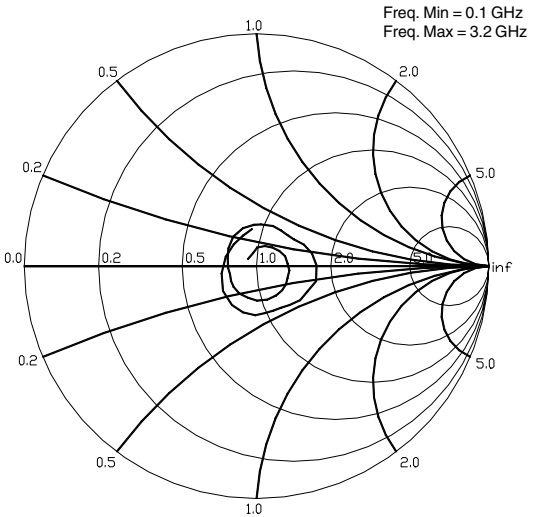
S11, Id =60mA, T=+25C



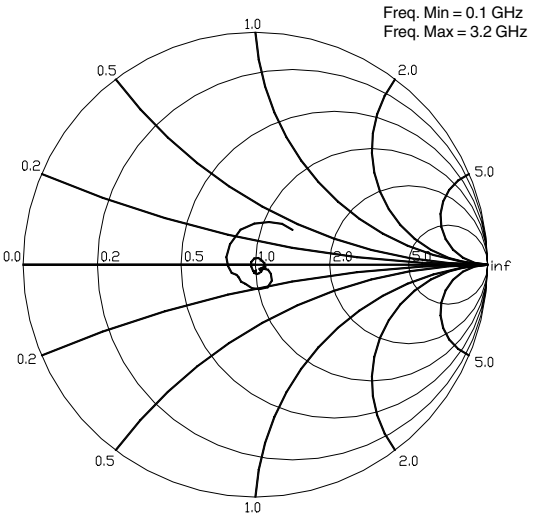
S22, Id =60mA, T=+25C



S11, Id=60mA, Ta= +25C



S22, Id=60mA, Ta= +25C



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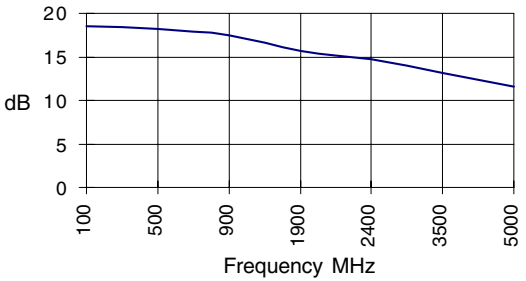
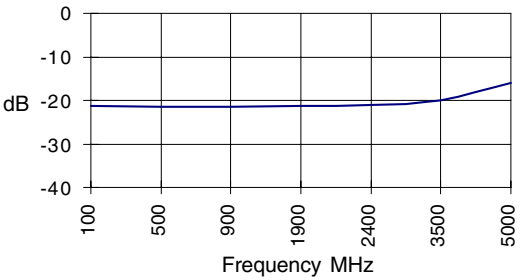
SGA-5386 DC-3200 MHz 3.5V SiGe Amplifier

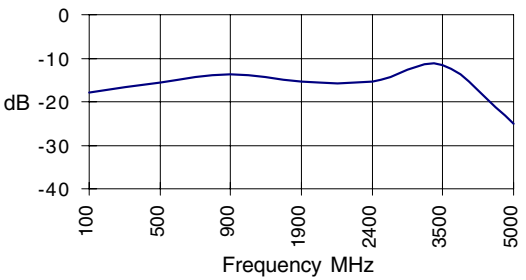
S21, Id =60mA, T=-40C



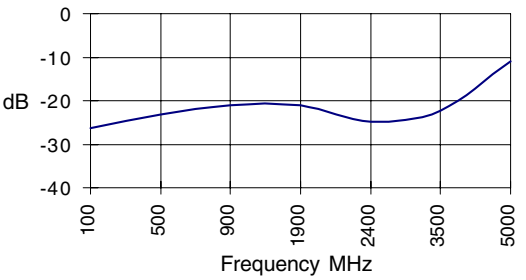
S12, Id =60mA, T=-40C



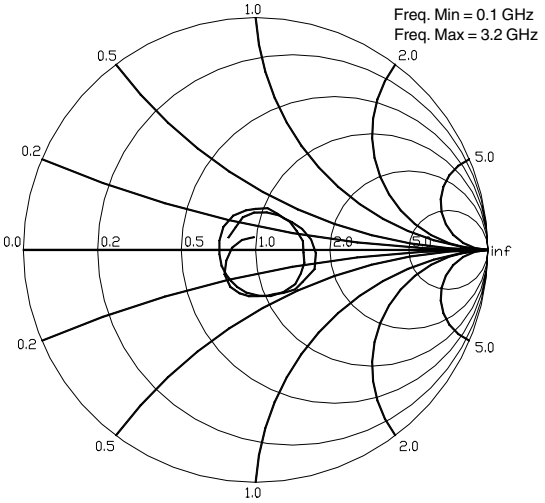
S11, Id =60mA, T=-40C



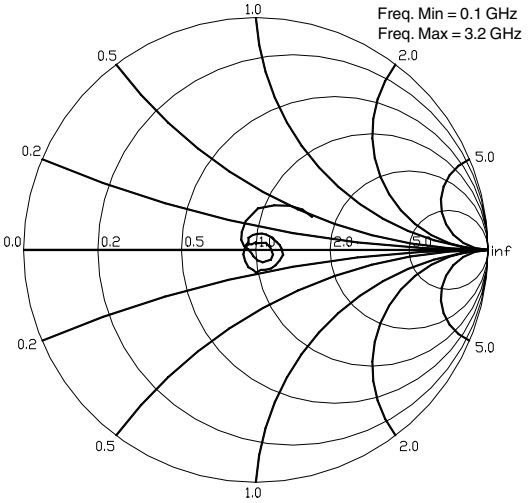
S22, Id =60mA, T=-40C



S11, Id=60mA, Ta= -40C



S22, Id=60mA, Ta= -40C



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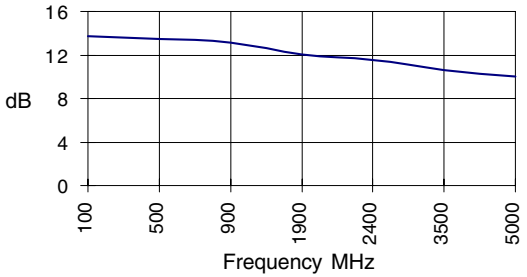
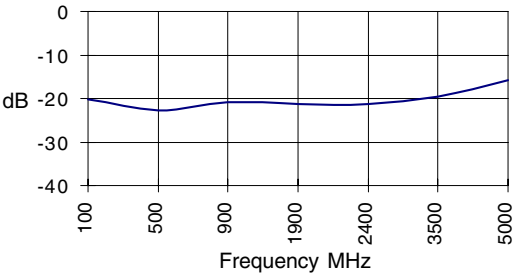
SGA-5386 DC-3200 MHz 3.5V SiGe Amplifier

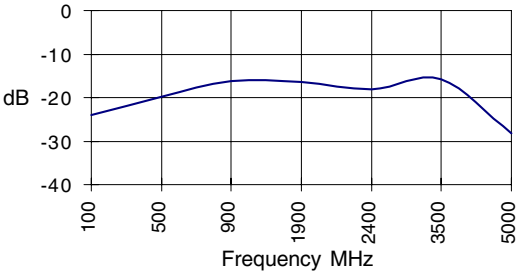
S21, Id =60mA, T=85C



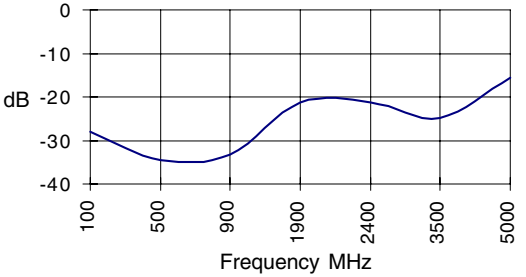
S12, Id =60mA, T=85C



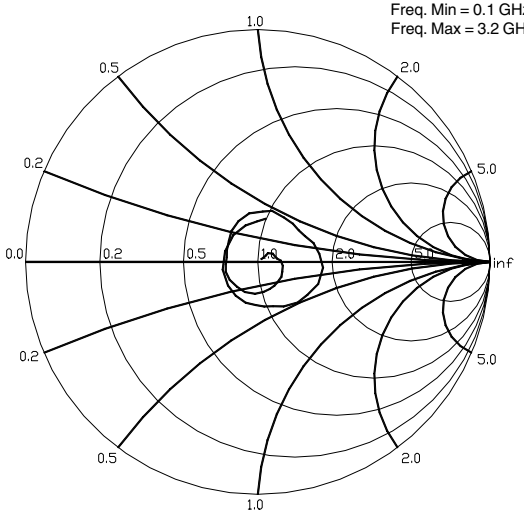
S11, Id =60mA, T=85C



S22, Id =60mA, T=85C



S11, Id=60mA, Ta= 85C



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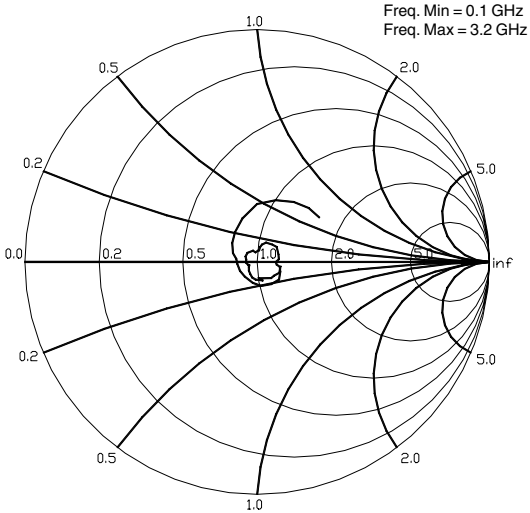


SGA-5386 DC-3200 MHz 3.5V SiGe Amplifier

Absolute Maximum Ratings

Parameter	Value	Unit
Supply Current	120	mA
Operating Temperature	-40 to +85	C
Maximum Input Power	+10	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

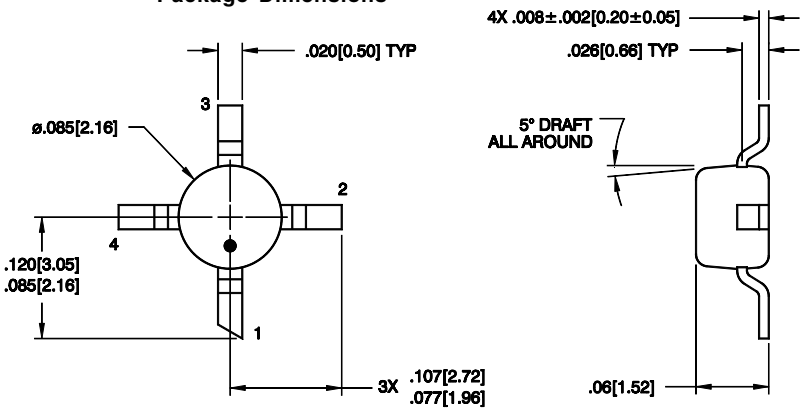
Part Number	Reel Size	Devices/Reel
SGA-5386-TR1	7"	1000
SGA-5386-TR2	13"	3000

Recommended Bias Resistor Values					
Supply Voltage(Vs)	4V	5V	7.5V	9V	12V
Rbias (Ohms)	8	25	67	92	142

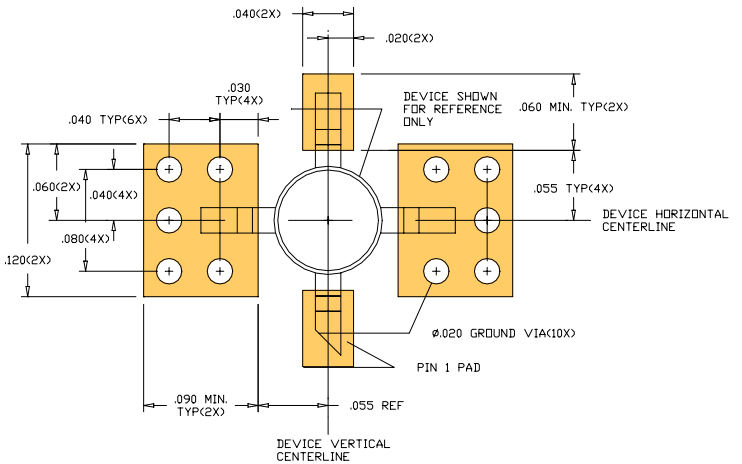
For 7.5V operation or higher, a resistor with a power handling capability of 1/2W or greater is recommended.

Package Dimensions

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



PCB Pad Layout



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