STANFORD MICRODEVICES

Preliminary

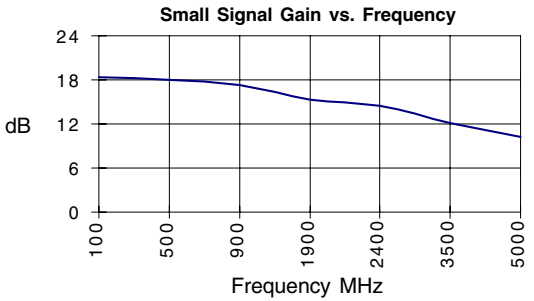
SGA-2386

DC-2800 MHz Silicon Germanium HBT Cascadeable Gain Block

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.



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

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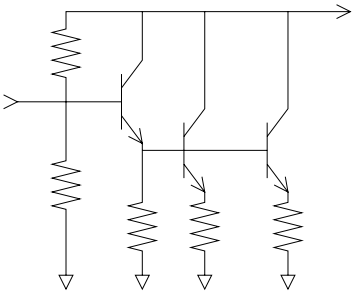
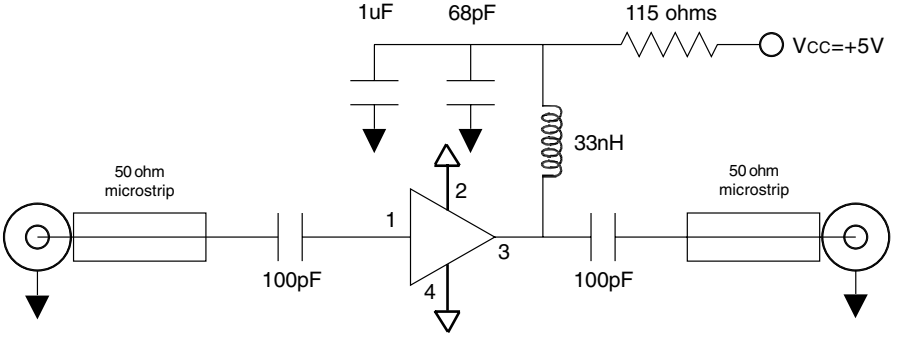
SGA-2386 DC-2800 MHz 2.7V SiGe Amplifier

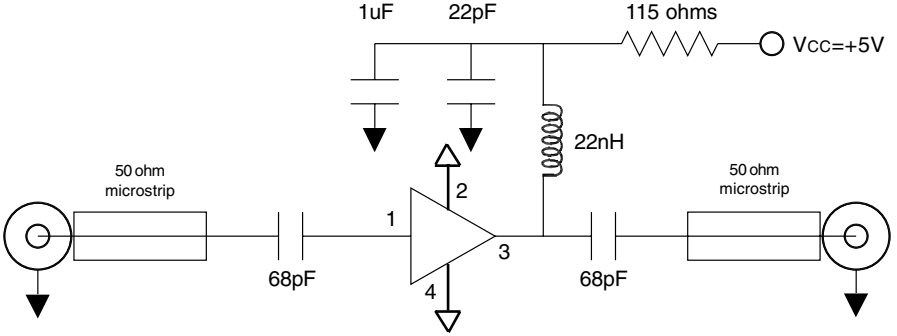
Parameter	Specification				Test Condition
	Min	Typ.	Max.	Unit	
Device Bias					T= 25C
Operating Voltage		2.7		V	
Operating Current		20.0		mA	
500 MHz					T= 25C
Gain		18.0		dB	
Noise Figure		2.9		dB	
Output IP3		20.3		dBm	
Output P1dB		8.2		dBm	
Input Return Loss		19.6		dB	
Isolation		21.1		dB	
850 MHz					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	
1950 MHz					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	
2400 MHz					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	

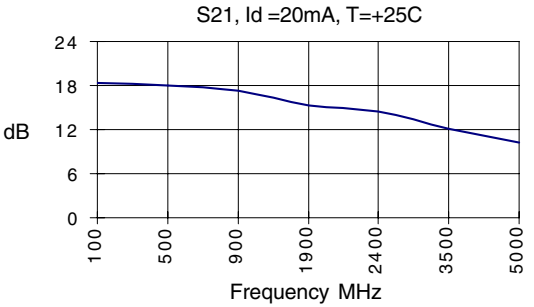
Application Schematic for +5V Operation at 900 MHz

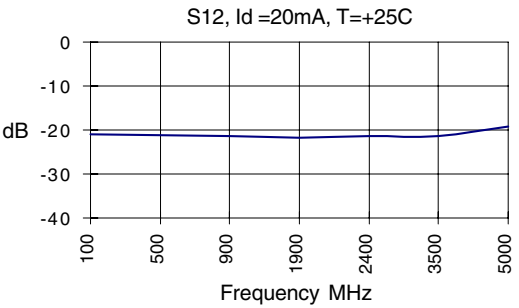


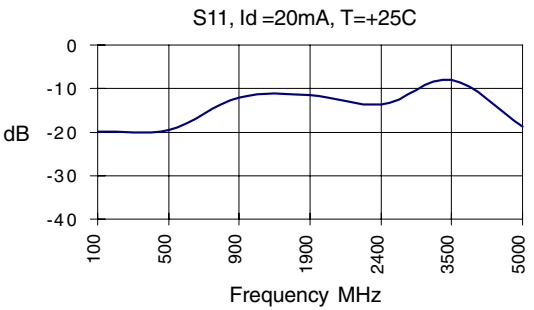
Application Schematic for +5V Operation at 1900 MHz

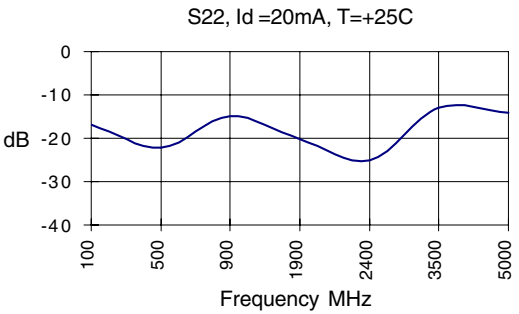


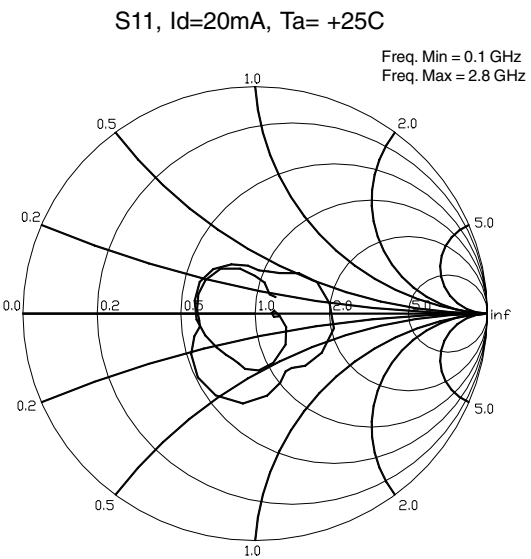
SGA-2386 DC-2800 MHz 2.7V SiGe Amplifier

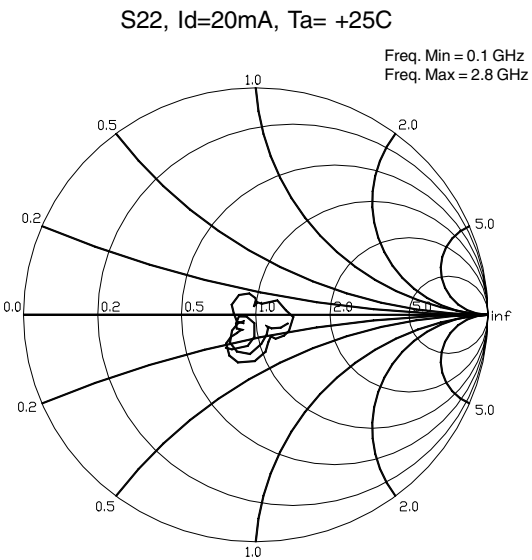












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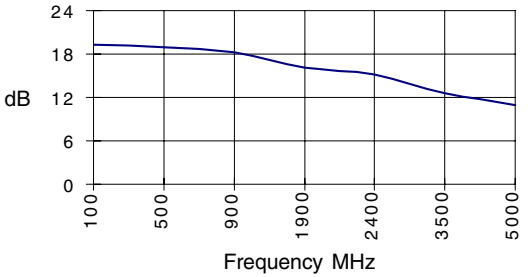
SGA-2386 DC-2800 MHz 2.7V SiGe Amplifier

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



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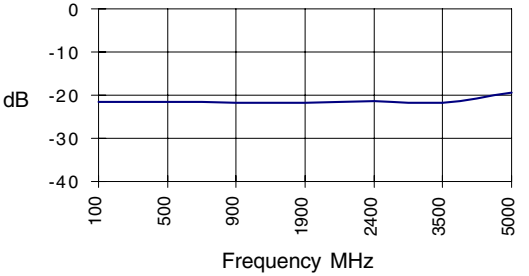
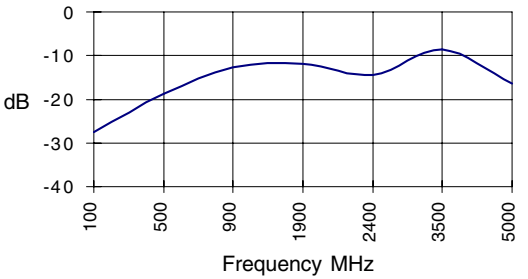
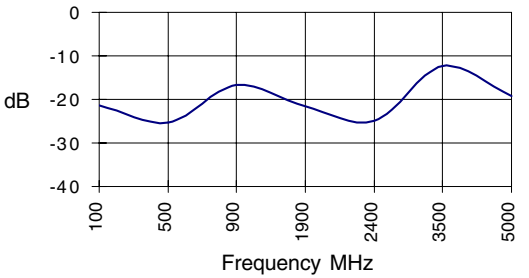


S11, Id =20mA, T=-40C



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



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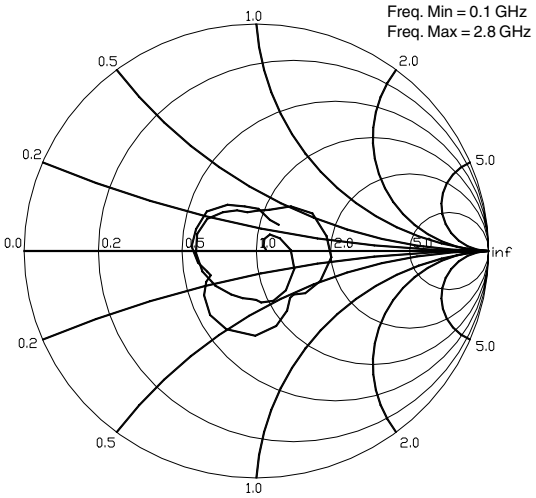

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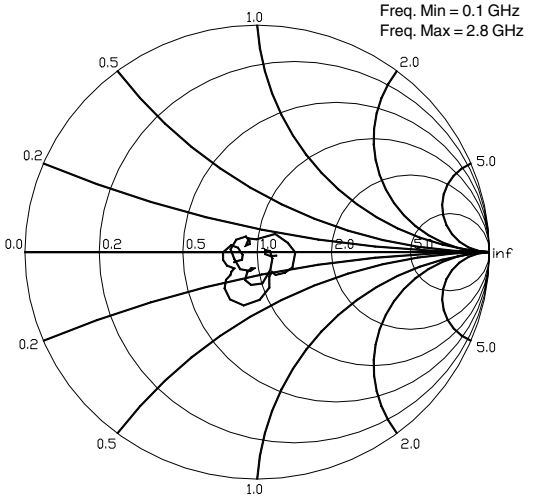

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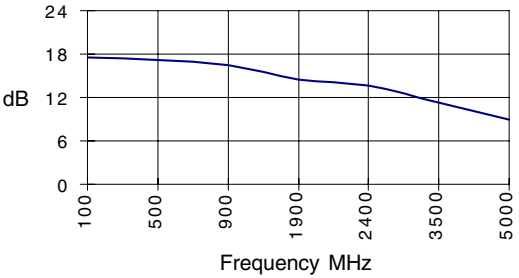
SGA-2386 DC-2800 MHz 2.7V SiGe Amplifier

S21, Id =20mA, T=85C



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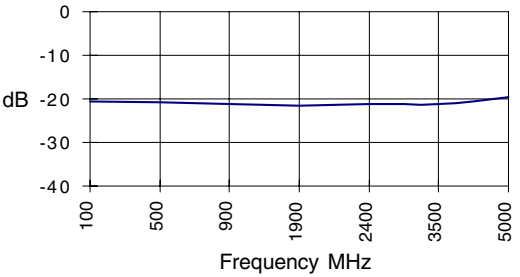

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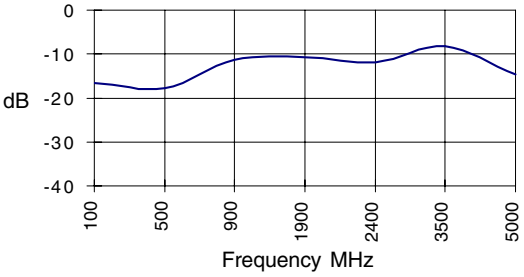

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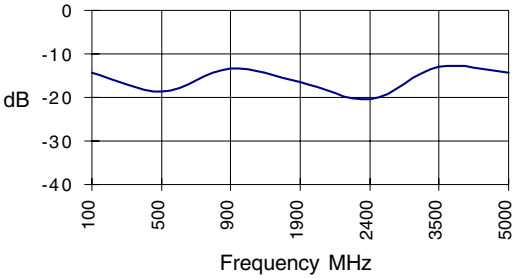
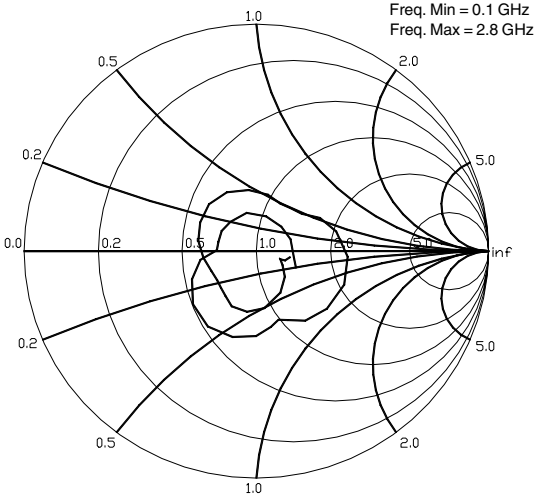
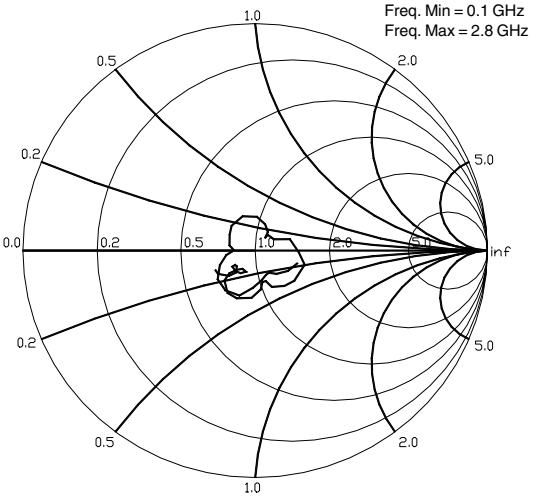


S11, Id=20mA, Ta= 85C



S22, Id=20mA, Ta= 85C



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SGA-2386 DC-2800 MHz 2.7V SiGe Amplifier

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

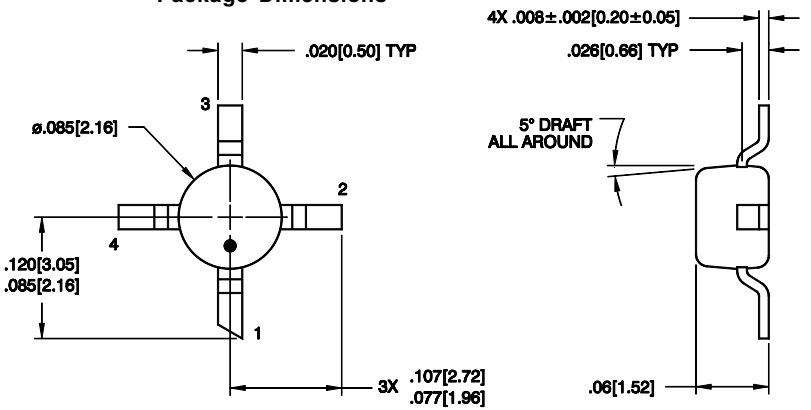
Part Number Ordering Information

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

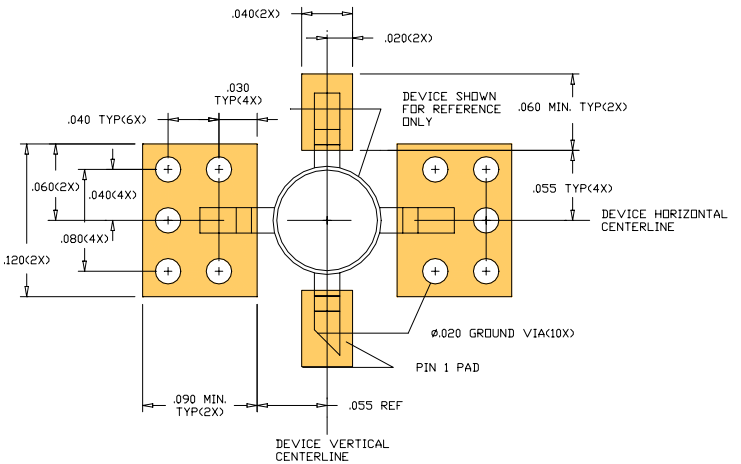
Recommended Bias Resistor Values					
Supply Voltage(Vs)	3V	5V	7.5V	9V	12V
Rbias (Ohms)	15	115	240	315	465

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

Package Dimensions



PCB Pad Layout



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