Stanford Microdevices

Preliminary

SGA-3386

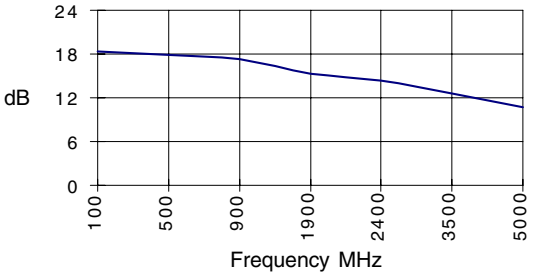
DC-3600 MHz Silicon Germanium Cascadeable Gain Block

Product Description

Stanford Microdevices' SGA-3386 is a high performance cascadeable 50-ohm amplifier designed for operation at voltages as low as 2.5V. 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-3386 requires only DC blocking and bypass capacitors for external components.

Small Signal Gain vs. Frequency



Product Features

- **DC-3600 MHz Operation**
- **Single Voltage Supply**
- **High Output Intercept: +24.3dBm typ. at 850 MHz**
- **Low Current Draw: 35mA at 2.5V typ.**
- **Low Noise Figure: 3.2dB 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, Id = 35 mA, T = 25ºC		Units	Min.	Typ.	Max.
P_{1dB}	Output Power at 1dB Compression	f = 850 MHz f = 1950 MHz	dBm dBm		12.3 10.7	
S_{21}	Small Signal Gain	f = DC - 1000 MHz f = 1000 - 2000 MHz f = 2000 - 3600 MHz	dB dB dB	15.7	17.4 15.3 13.0	
S_{12}	Reverse Isolation	f = DC - 3600 MHz	dB		20.0	
S_{11}	Input VSWR	f = DC-2400 MHz f = 2400 - 3600 MHz	-		1.33:1 1.58:1	
S_{22}	Output VSWR	f = DC - 3600 MHz	-		1.17:1	
IP_3	Third Order Intercept Point	f = 850 MHz f = 1950 MHz	dBm dBm		24.3 23.8	
NF	Noise Figure	f = DC-1000 MHz f = 1000 - 2400 MHz	dB dB		3.2 3.8	
T_D	Group Delay	f = 1000 MHz	pS		119.0	
V_D	Device Voltage		V	2.2	2.5	2.8

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Parameter	Specification				Test Condition
	Min	Typ.	Max.	Unit	
Device Bias					T= 25C
Operating Voltage		2.5		V	
Operating Current		35.0		mA	
500 MHz					T= 25C
Gain		17.9		dB	
Noise Figure		3.1		dB	
Output IP3		25.8		dBm	
Output P1dB		12.2		dBm	
Input Return Loss		19.8		dB	
Isolation		23.7		dB	
850 MHz					T= 25C
Gain		17.4		dB	
Noise Figure		3.2		dB	
Output IP3		24.3		dBm	
Output P1dB		12.3		dBm	
Input Return Loss		16.3		dB	
Isolation		21.0		dB	
1950 MHz					T= 25C
Gain		15.3		dB	
Noise Figure		3.7		dB	
Output IP3		23.8		dBm	
Output P1dB		10.7		dBm	
Input Return Loss		15.9		dB	
Isolation		25.6		dB	
2400 MHz					T= 25C
Gain		14.4		dB	
Noise Figure		3.8		dB	
Output IP3		23.6		dBm	
Output P1dB		9.9		dBm	
Input Return Loss		17.4		dB	
Isolation		20.6		dB	

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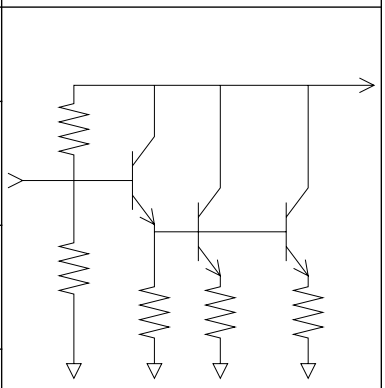
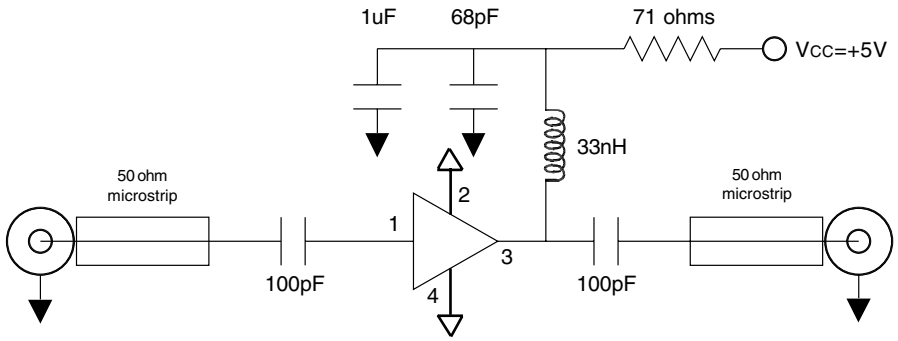
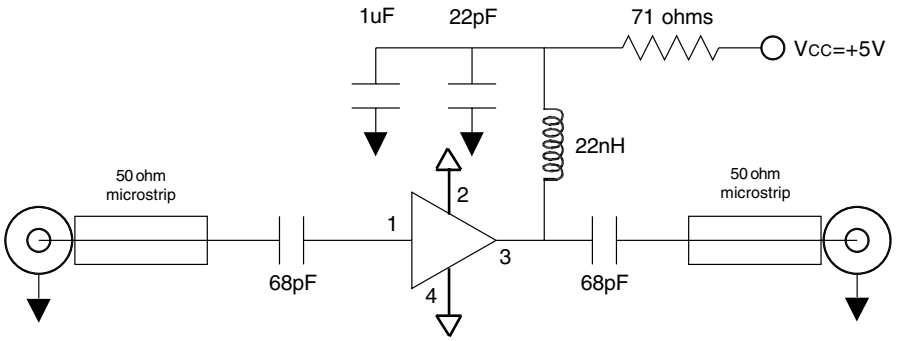
Pin #	Function	Description	Device Schematic
1	RF IN	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.	
2	GND	Connection to ground. Use via holes for best performance to reduce lead inductance as close to ground leads as possible.	
3	RF 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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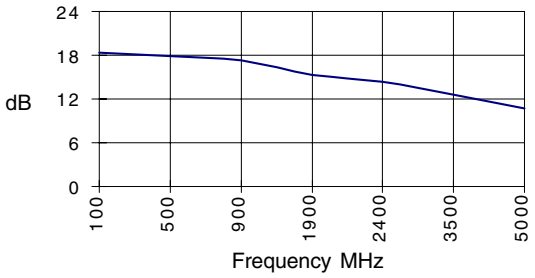
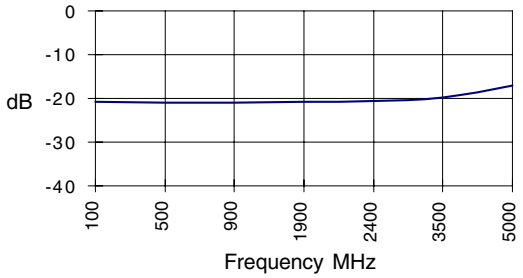
SGA-3386 DC-3600 MHz 2.5V SiGe Amplifier

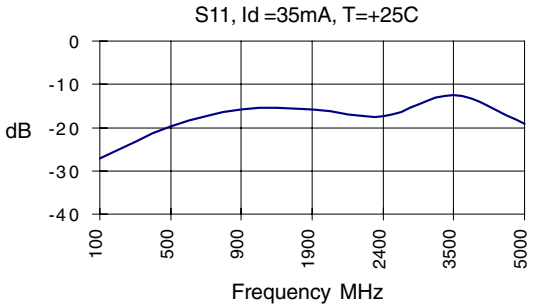
S21, Id =35mA, T=+25C



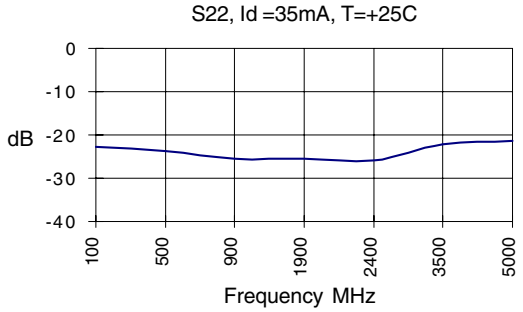
S12, Id =35mA, T=+25C



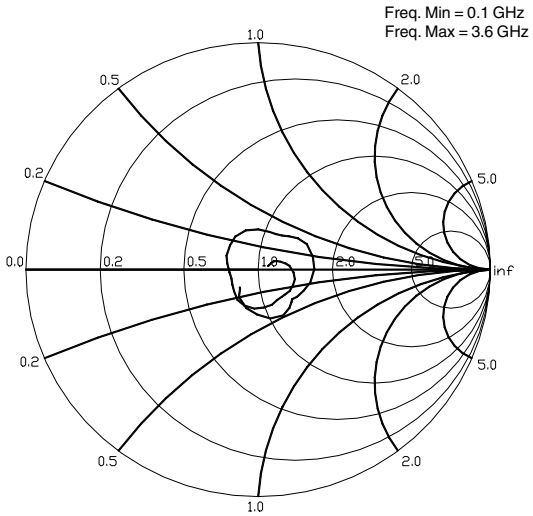
S11, Id =35mA, T=+25C



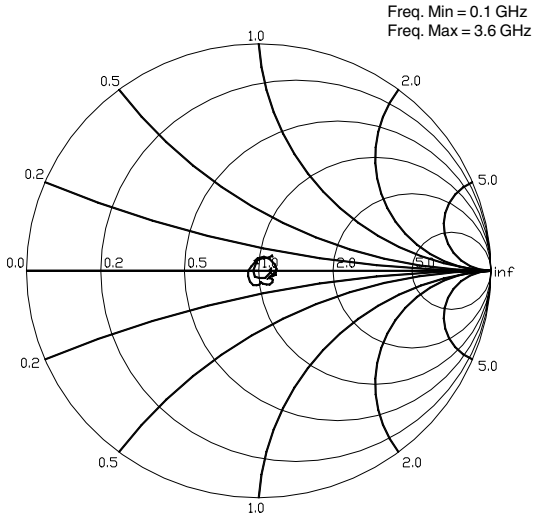
S22, Id =35mA, T=+25C



S11, Id=35mA, Ta= +25C



S22, Id=35mA, Ta= +25C



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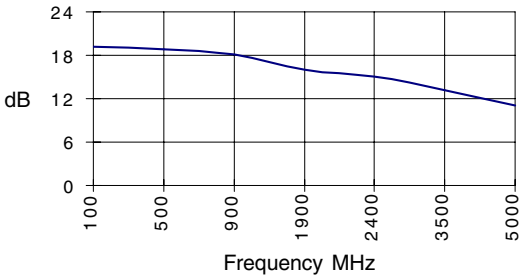
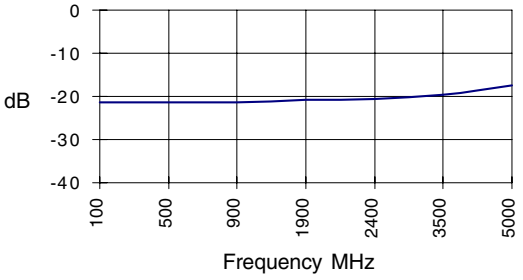
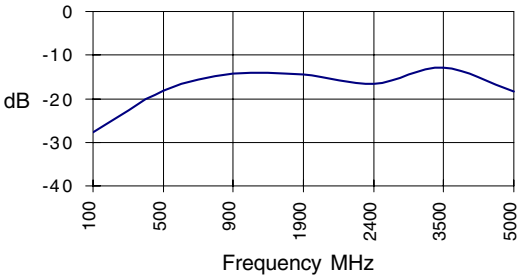
S21, Id =35mA, T=-40C



S12, Id =35mA, T=-40C



S11, Id =35mA, T=-40C



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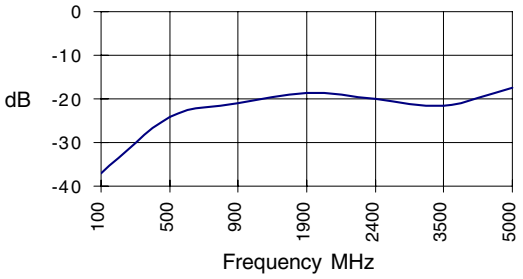
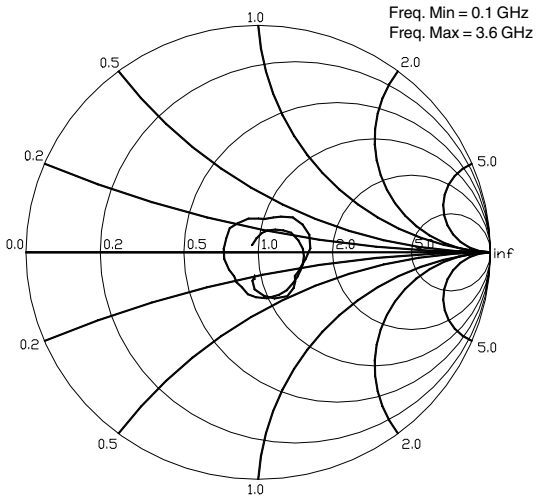
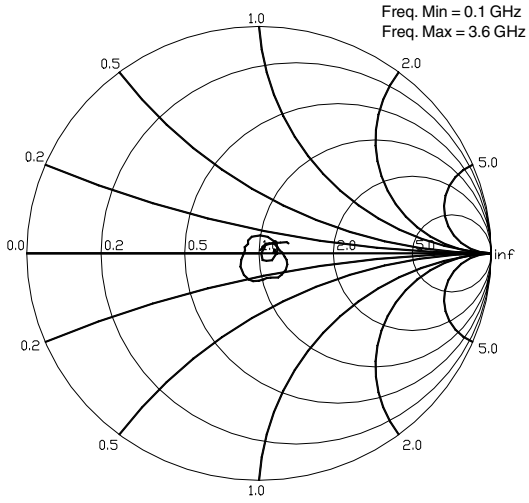


S11, Id=35mA, Ta= -40C



S22, Id=35mA, Ta= -40C



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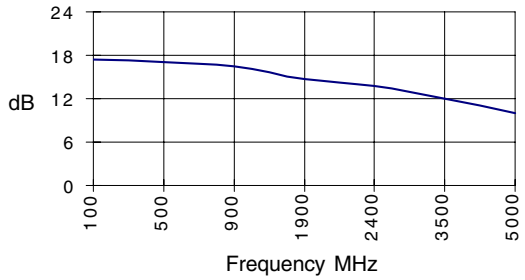
S21, Id =35mA, T=85C



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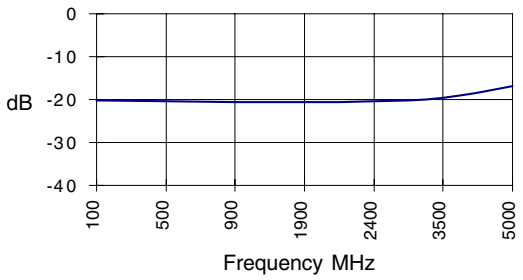

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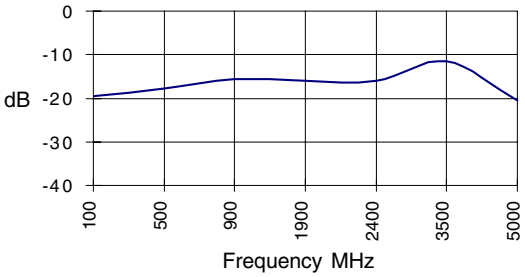

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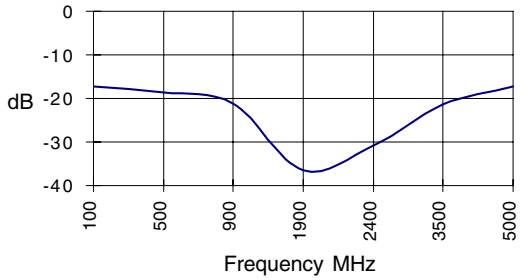

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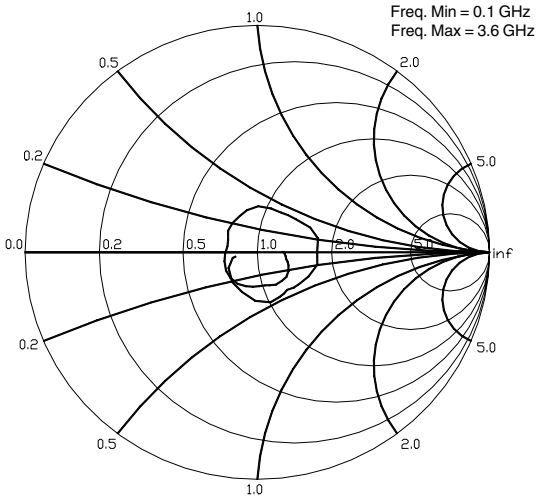
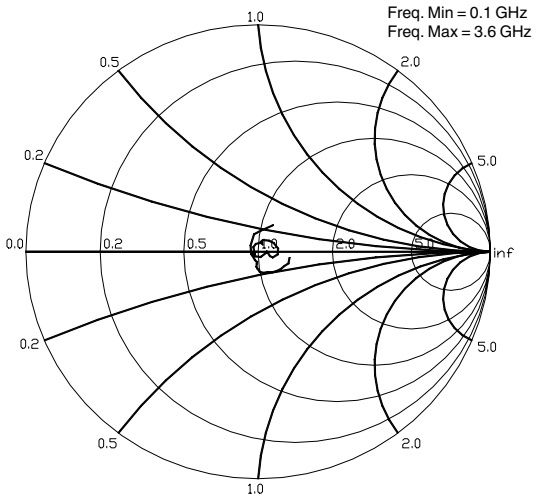


S22, Id=35mA, Ta= 85C



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Absolute Maximum Ratings

Parameter	Value	Unit
Supply Current	70	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

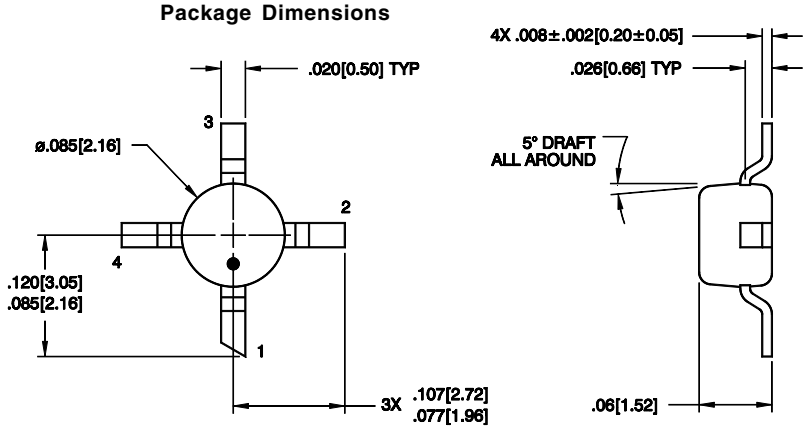
Part Number Ordering Information

Part Number	Reel Size	Devices/Reel
SGA-3386-TR1	7"	1000
SGA-3386-TR2	13"	3000

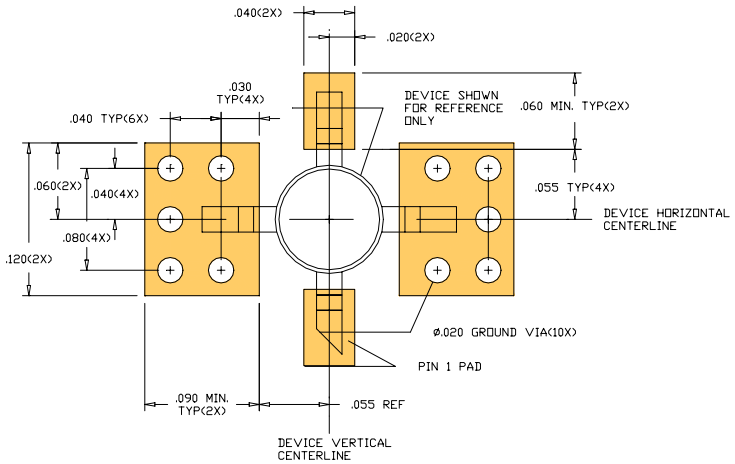
Recommended Bias Resistor Values					
Supply Voltage(Vs)	4V	5V	7.5V	9V	12V
Rbias (Ohms)	31	60	131	174	260

Package Dimensions

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



PCB Pad Layout



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