Preliminary

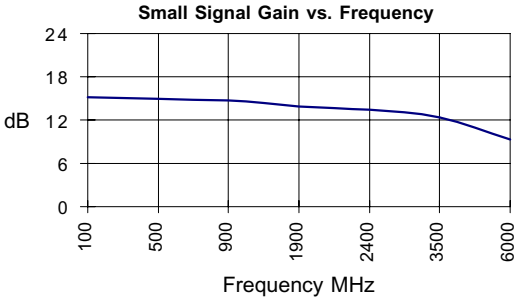
SGA-2263

DC-3500 MHz Silicon Germanium HBT Cascadeable Gain Block

Product Description

Stanford Microdevices' SGA-2263 is a high performance cascadeable 50-ohm amplifier designed for operation from a 2.2-volt supply. This RFIC uses the latest Silicon Germanium Heterostructure Bipolar Transistor (SiGe HBT) process featuring 1 micron emitters with F_T up to 50 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-2263 requires only DC blocking and bypass capacitors for external components.



Product Features

- **DC-3500 MHz Operation**
- **2.2V Single Voltage Supply**
- **High Output Intercept: +20dBm typ. at 850 MHz**
- **Low Power Consumption: 20mA**
- **Low Bias Operation: Can operate with 2V supply**

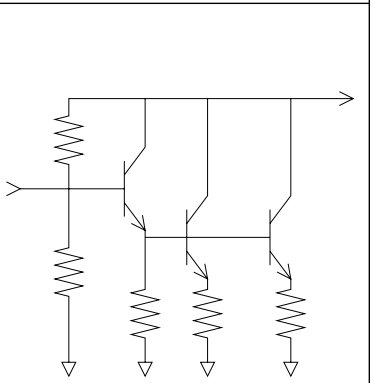
Applications

- **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 = 25°C		Units	Min.	Typ.	Max.
P_{1dB}	Output Power at 1dB Compression	f = 850 MHz f = 1950 MHz	dBm dBm		7.5 6.1	
S_{21}	Small Signal Gain	f = DC - 1000 MHz f = 1000 - 2000 MHz f = 2000 - 3500 MHz	dB dB dB	13.4	14.9 14.2 12.3	
S_{12}	Reverse Isolation	f = DC - 1000 MHz f = 1000 - 2000 MHz f = 2000 - 3500 MHz	dB dB dB		18.5 18.9 19.0	
S_{11}	Input VSWR	f = DC - 2400 MHz f = 2400 - 3500 MHz	-		1.3:1 1.4:1	
S_{22}	Output VSWR	f = DC - 2400 MHz f = 2400 - 3500 MHz	-		1.1:1 1.1:1	
IP_3	Third Order Intercept Point Power out per Tone = -10 dBm	f = 850 MHz f = 1950 MHz	dBm dBm		20.2 19.5	
NF	Noise Figure	f = DC - 1000 MHz f = 1000 - 2400 MHz	dB dB		3.2 4.0	
T_D	Group Delay	f = 1000 MHz	pS		100	
V_D	Device Voltage		V	1.9	2.2	2.5

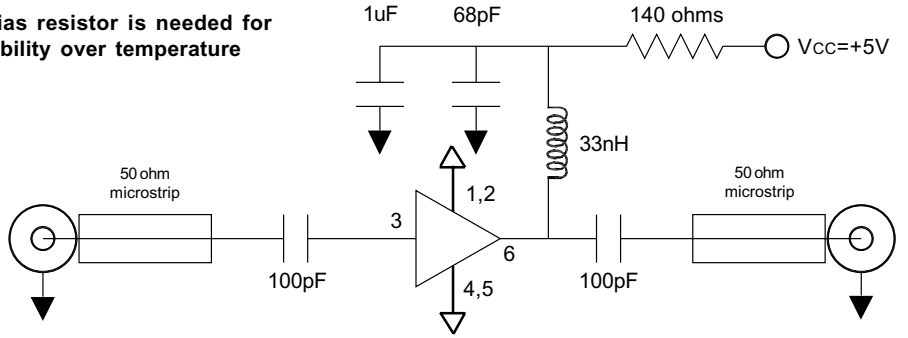
522 Almanor Ave., Sunnyvale, CA 94086 Phone: (800) SMI-MMIC http://www.stanfordmicro.com

Parameter	Specification				Test Condition
	Min	Typ.	Max.	Unit	
Device Bias					T= 25C
Operating Voltage		2.2		V	
Operating Current		20.0		mA	
500 MHz					T= 25C
Gain		14.9		dB	
Noise Figure		3.3		dB	
Output IP3		20.4		dBm	
Output P1dB		7.6		dBm	
Input Return Loss		20.8		dB	
Isolation		18.3		dB	
850 MHz					T= 25C
Gain		14.7		dB	
Noise Figure		3.2		dB	
Output IP3		20.2		dBm	
Output P1dB		7.5		dBm	
Input Return Loss		19.5		dB	
Isolation		18.4		dB	
1950 MHz					T= 25C
Gain		13.8		dB	
Noise Figure		4.0		dB	
Output IP3		19.5		dBm	
Output P1dB		6.1		dBm	
Input Return Loss		16.5		dB	
Isolation		18.9		dB	
2400 MHz					T= 25C
Gain		13.4		dB	
Noise Figure		4.0		dB	
Output IP3		16.9		dBm	
Output P1dB		5.4		dBm	
Input Return Loss		15.1		dB	
Isolation		19.1		dB	

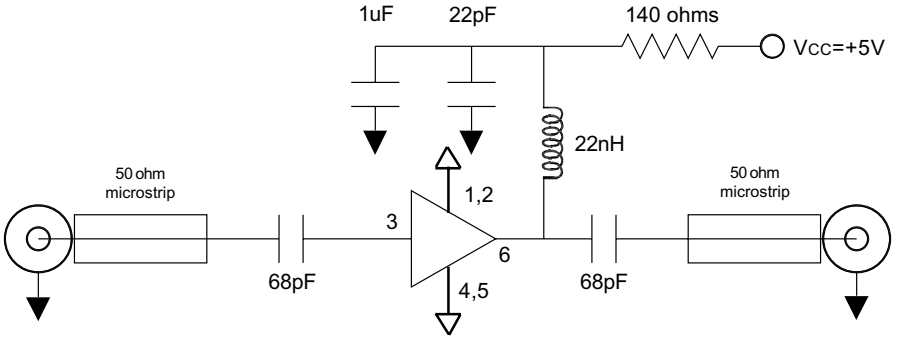
Pin #	Function	Description	Device Schematic
1	GND	Connection to ground. Use via holes for best performance to reduce lead inductance as close to ground leads as possible.	
2	GND	Sames as Pin 1	
3	RF IN	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.	
4	GND	Sames as Pin 1	
5	GND	Sames as Pin 1	
6	RF OUT	RF output and bias pin. DC voltage is present on this pin, therefore a DC blocking capacitor is necessary for proper operation.	

Application Schematic for +5V Operation at 900 MHz

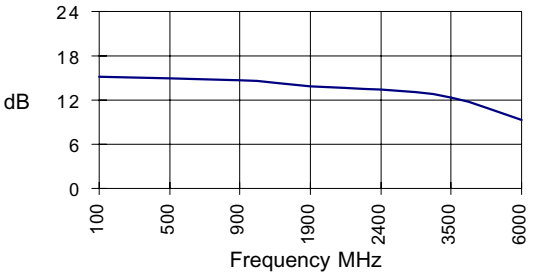
Note: A bias resistor is needed for stability over temperature



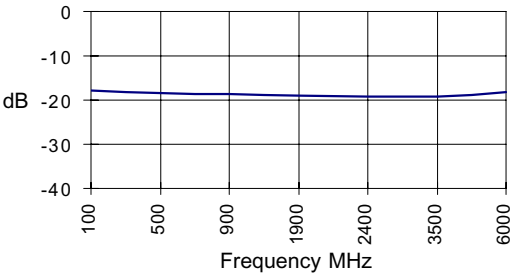
Application Schematic for +5V Operation at 1900 MHz



S21, Id =20mA, T=+25C



S12, Id =20mA, T=+25C



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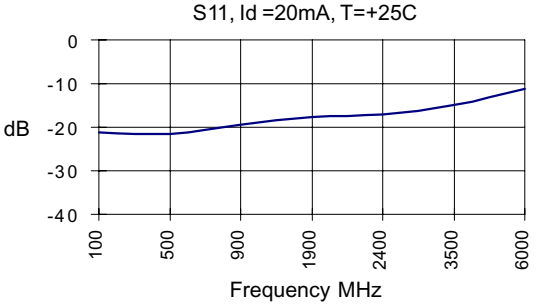
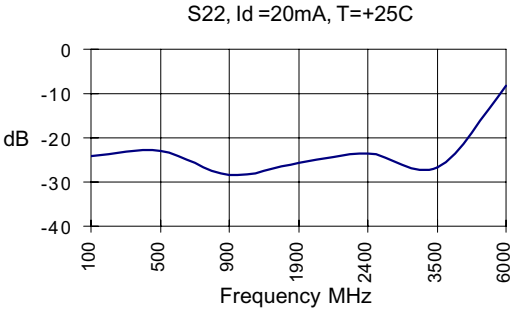
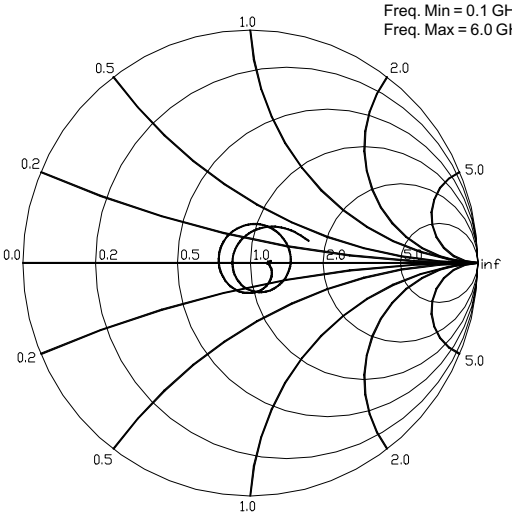


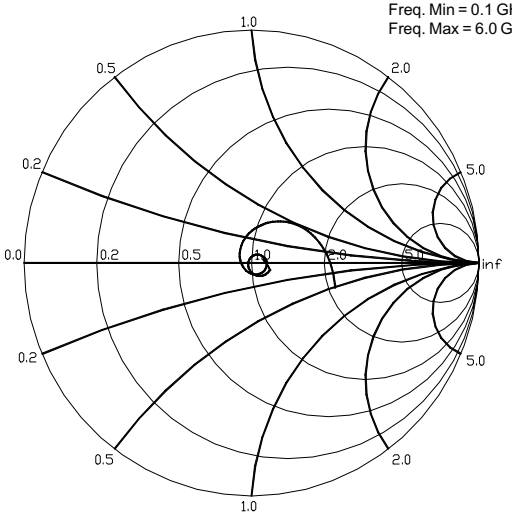
S22, Id =20mA, T=+25C



S11, Id=20mA, Ta= +25C



S22, Id=20mA, Ta= +25C



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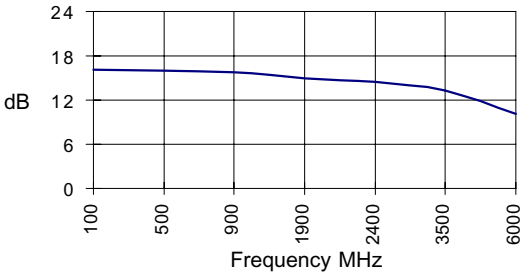
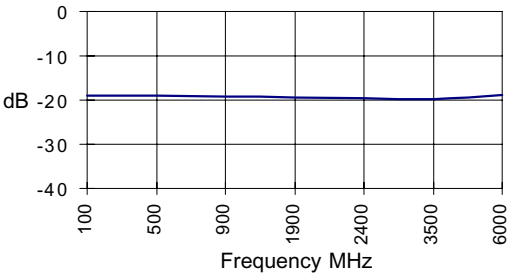
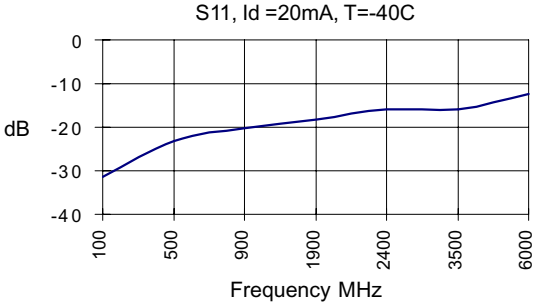


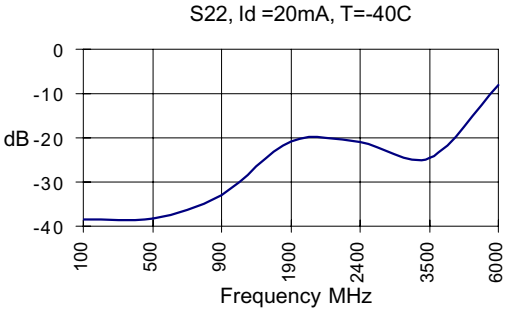
S12, Id =20mA, T=-40C



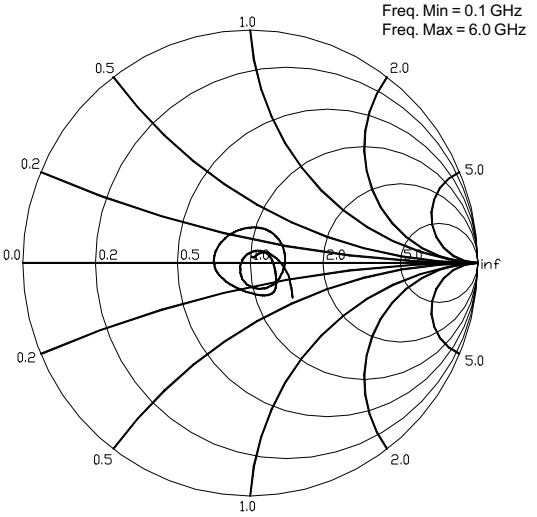
S11, Id =20mA, T=-40C



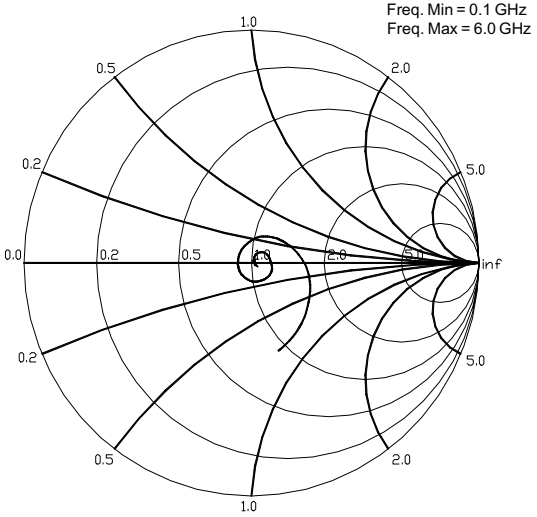
S22, Id =20mA, T=-40C



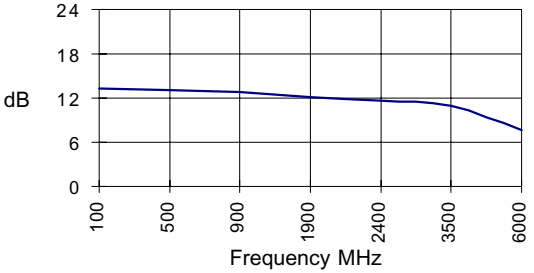
S11, Id=20mA, T=-40C



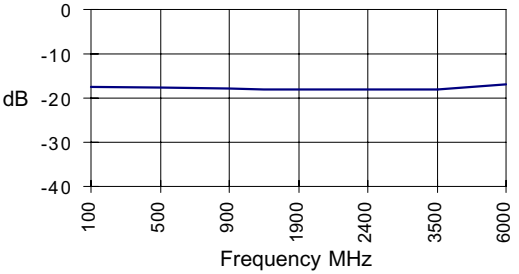
S22, Id=20mA, T=-40C



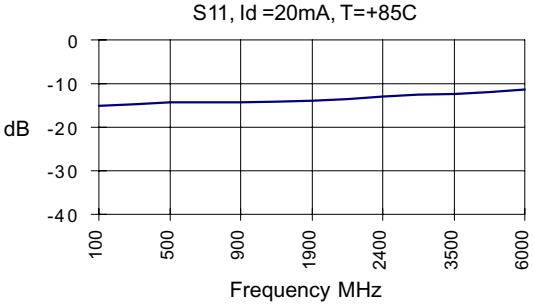
S21, Id =20mA, T=+85C



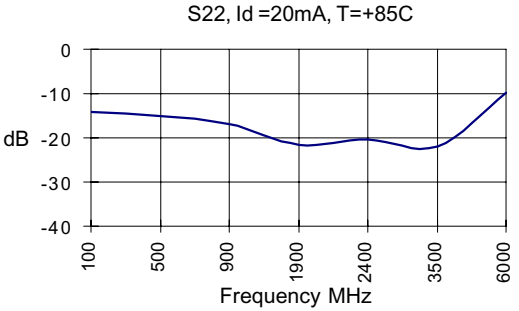
S12, Id =20mA, T=+85C



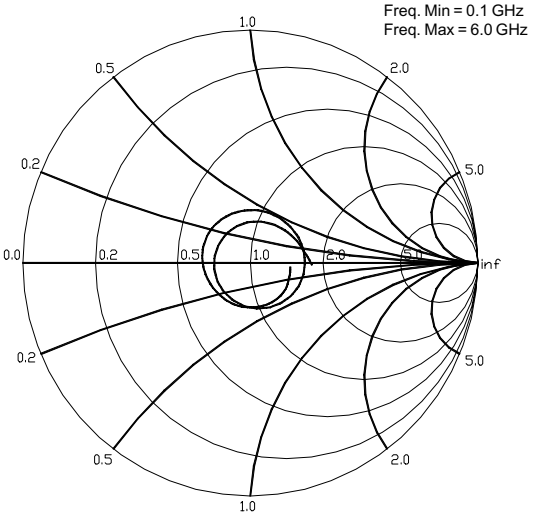
S11, Id =20mA, T=+85C



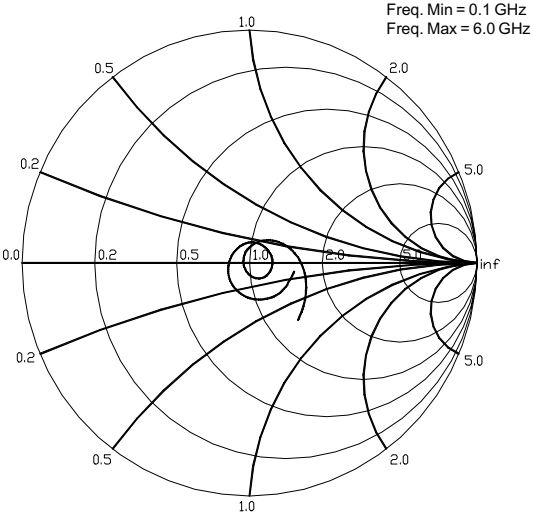
S22, Id =20mA, T=+85C



S11, Id=20mA, T=+85C



S22, Id=20mA, T=+85C



SGA-2263 DC-3500 MHz 2.2V SiGe Amplifier

Absolute Maximum Ratings

Parameter	Value	Unit
Supply Current	40	mA
Operating Temperature	-40 to +85	C
Maximum Input Power	+2	dBm
Storage Temperature Range	-40 to +85	C
Operating Junction Temperature	+125	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.

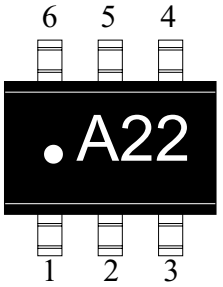
Thermal Resistance (Lead-Junction): 255° C/W

Part Number Ordering Information

Part Number	Reel Size	Devices/Reel
SGA-2263-TR1	7"	3000

Recommended Bias Resistor Values					
Supply Voltage(Vs)	3V	5V	7.5V	9V	12V
Rbias (Ohms)	40	140	265	340	490

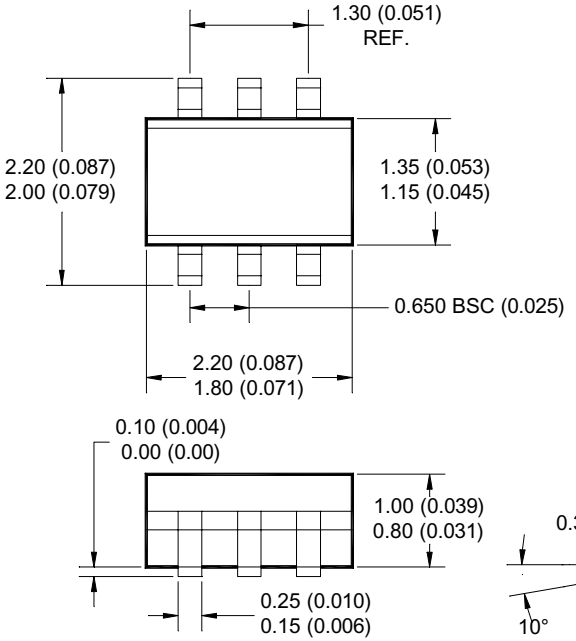
Package Marking



Pin Designation	
1	GND
2	GND
3	RF in
4	GND
5	GND
6	RF out

Note: Pin 1 is on lower left when you can read package marking

Package Dimensions



Pad Layout