Preliminary

SGA-5425

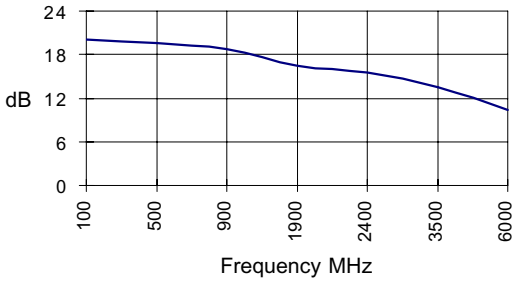
DC-2400 MHz Silicon Germanium HBT Cascadeable Gain Block

Product Description

Stanford Microdevices' SGA-5425 is a high performance cascadeable 50-ohm amplifier housed in an low-cost surface-mountable SOT23-5 plastic package. Designed for operation at voltages as low as 3.3V, 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-5425 requires only DC blocking and bypass capacitors for external components.

Small Signal Gain vs. Frequency



Product Features

- **DC-2400 MHz Operation**
- **Single Voltage Supply**
- **High Output Intercept: +31.0dBm typ. at 850 MHz**
- **Low Current Draw: 60mA at 3.3V typ.**
- **Low Noise Figure: 3.4dB typ. at 850 MHz**

Applications

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

Symbol	Parameters: Test Conditions: Z0 = 50 Ohms, Id = 60 mA, T = 25°C		Units	Min.	Typ.	Max.
P_{1dB}	Output Power at 1dB Compression	f = 850 MHz f = 1950 MHz	dBm dBm		16.1 14.8	
S_{21}	Small Signal Gain	f = DC - 1000 MHz f = 1000 - 2000 MHz f = 2000 - 5000 MHz	dB dB dB	18.4	19.4 17.3 13.7	
S_{12}	Reverse Isolation	f = DC - 1000 MHz f = 1000 - 2000 MHz f = 2000 - 5000 MHz	dB dB dB		22.8 23.1 18.7	
S_{11}	Input VSWR	f = DC - 2400 MHz f = 2400 - 5000 MHz	-		1.4 1.7	
S_{22}	Output VSWR	f = DC - 2400 MHz f = 2400 - 5000 MHz	-		1.1 1.4	
IP_3	Third Order Intercept Point	f = 850 MHz f = 1950 MHz	dBm dBm		31.0 28.2	
NF	Noise Figure	f = DC - 1000 MHz f = 1000 - 2400 MHz	dB dB		3.4 3.4	
T_D	Group Delay	f = 1000 MHz	pS		93	
V_D	Device Voltage		V	2.9	3.3	3.7

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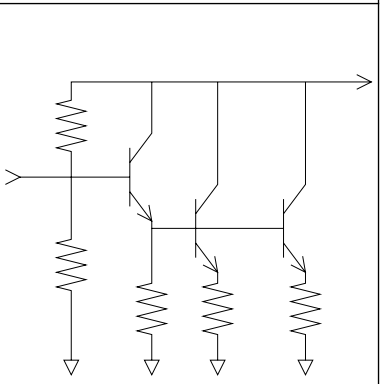
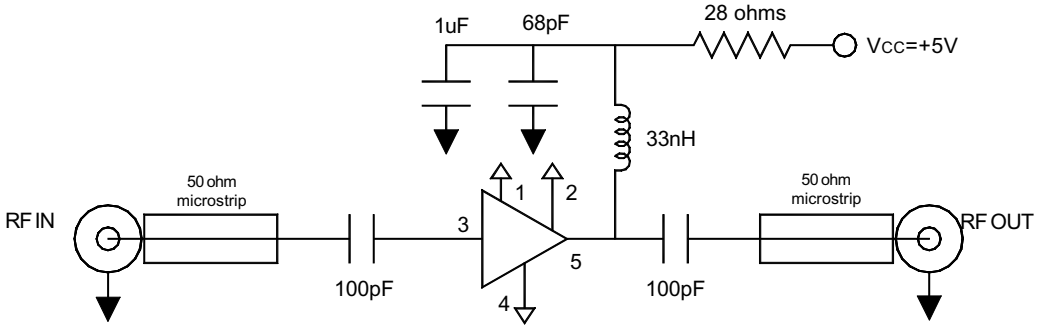
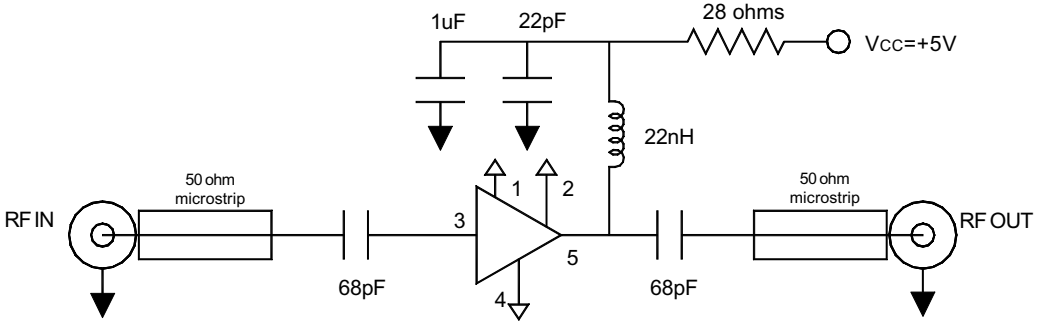
Parameter	Specification				Test Condition
	Min	Typ.	Max.	Unit	
Bandwidth					T= 25C
Frequency Range	DC		2400	MHz	
Device Bias					T= 25C
Operating Voltage		3.3		V	
Operating Current		60.0		mA	
500 MHz					T= 25C
Gain		20.0		dB	
Noise Figure		3.4		dB	
Output IP3		31.6		dBm	
Output P1dB		16.3		dBm	
Input Return Loss		18.9		dB	
Isolation		23.3		dB	
850 MHz					T= 25C
Gain		19.1		dB	
Noise Figure		3.4		dB	
Output IP3		31.0		dBm	
Output P1dB		16.1		dBm	
Input Return Loss		16.4		dB	
Isolation		23.5		dB	
1950 MHz					T= 25C
Gain		16.9		dB	
Noise Figure		3.4		dB	
Output IP3		28.2		dBm	
Output P1dB		14.8		dBm	
Input Return Loss		15.7		dB	
Isolation		23.2		dB	
2400 MHz					T= 25C
Gain		15.8		dB	
Noise Figure		3.5		dB	
Output IP3		26.4		dBm	
Output P1dB		13.4		dBm	
Input Return Loss		14.8		dB	
Isolation		22.5		dB	

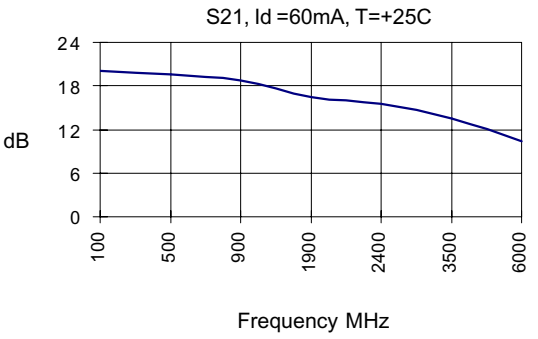
Pin #	Function	Description	Device Schematic
1	GND	Connection to ground. Use via holes for best performance to reduce lead inductance as close to ground leads as possible.	
2	GND	Same as Pin 1	
3	RF IN	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.	
4	GND	Same as Pin 1	
5	RF OUT/Vcc	RF output and bias pin. Bias should be supplied to this pin through an external series resistor and RF choke inductor. Because DC biasing is present on this pin, a DC blocking capacitor should be used in most applications (see application schematic). The supply side of the bias network should be well bypassed.	

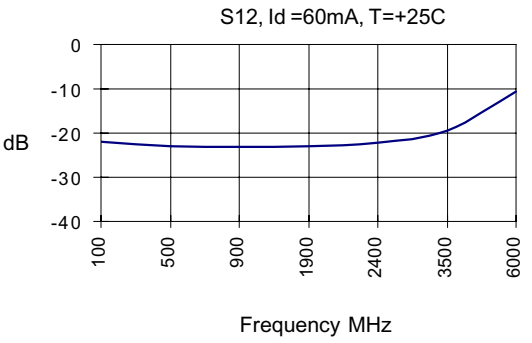
Application Schematic for +5V Operation at 900 MHz

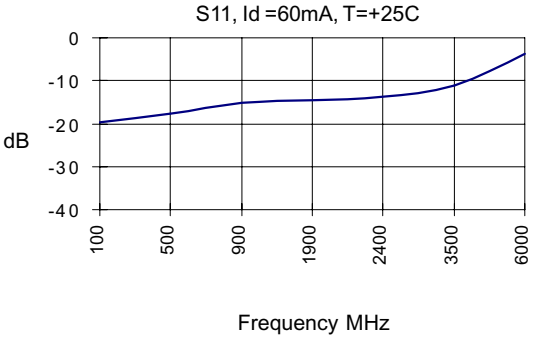


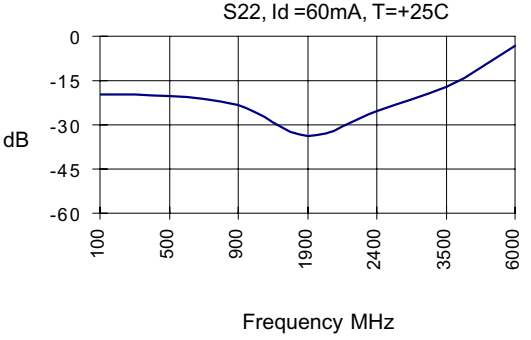
Application Schematic for +5V Operation at 1900 MHz

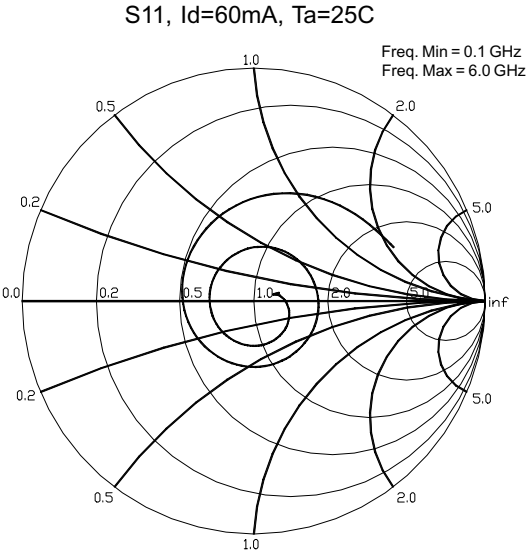


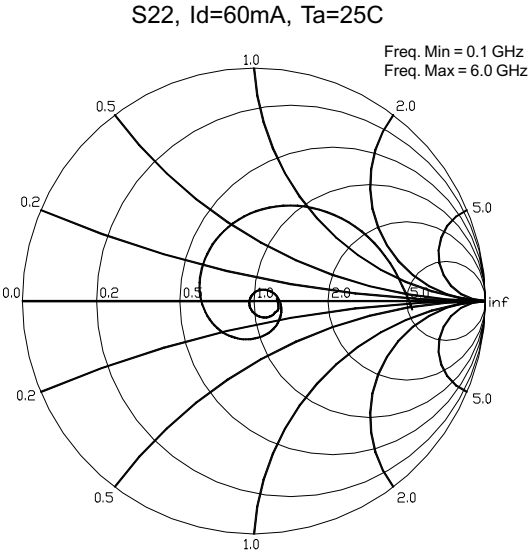


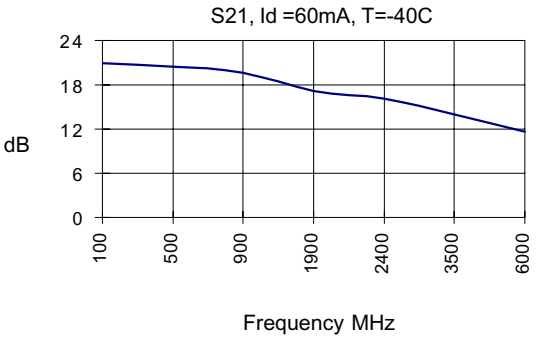


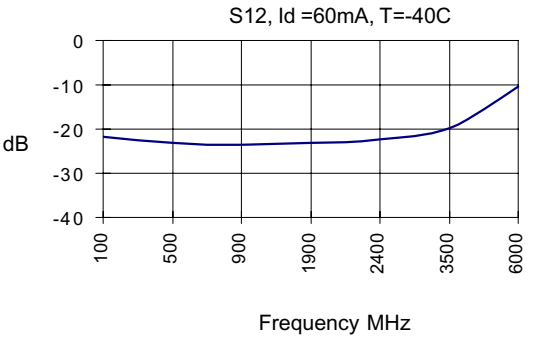


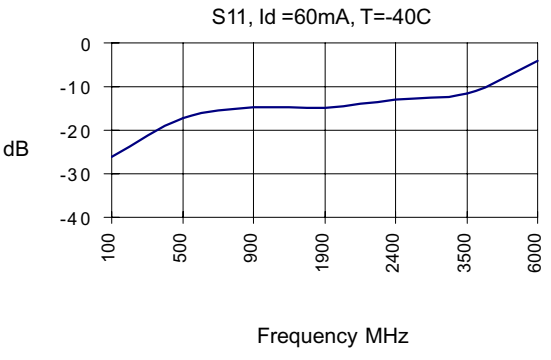


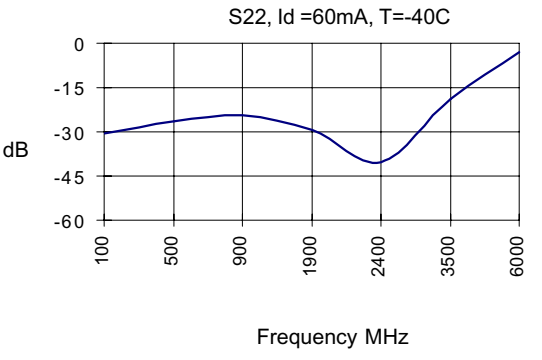


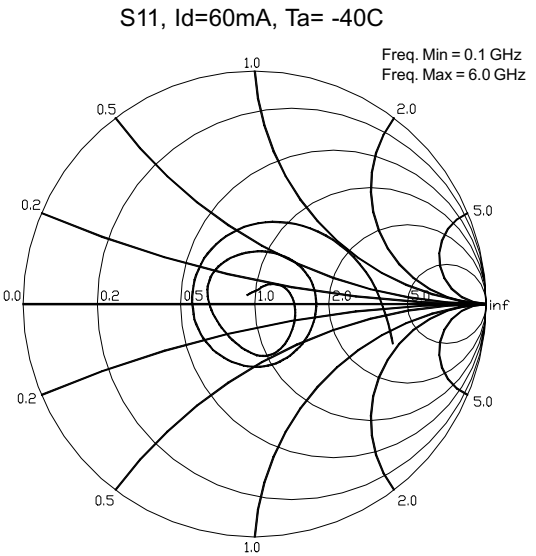


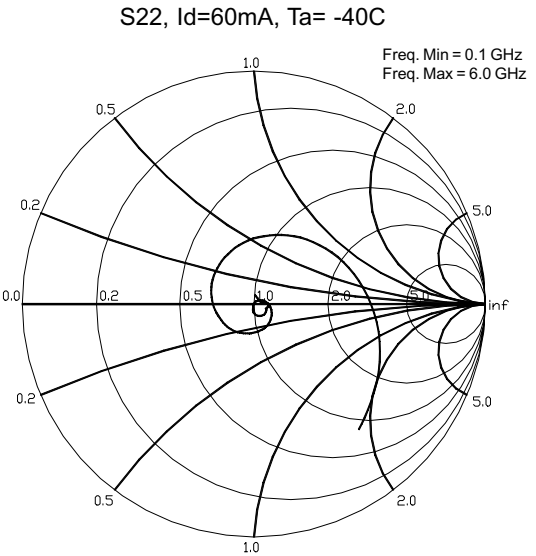


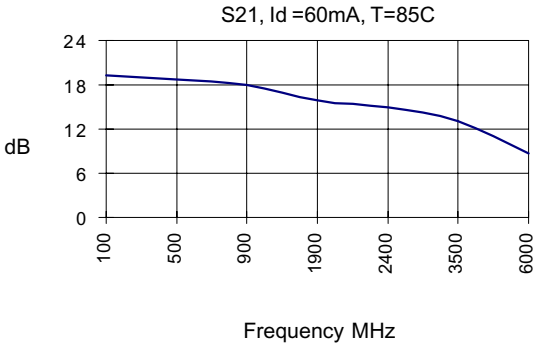


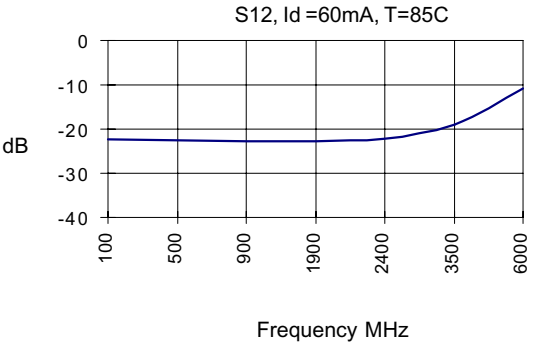


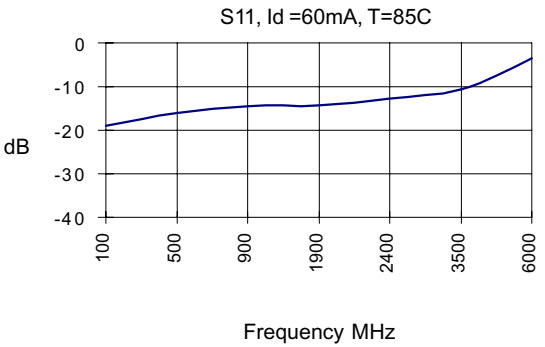


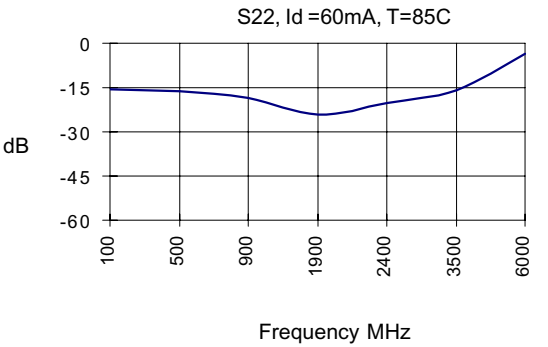


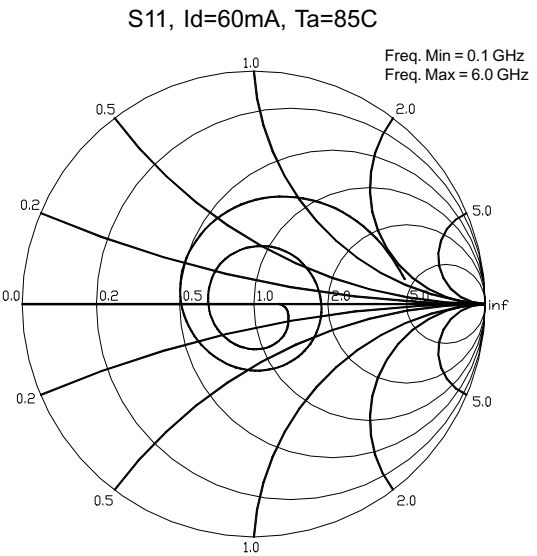


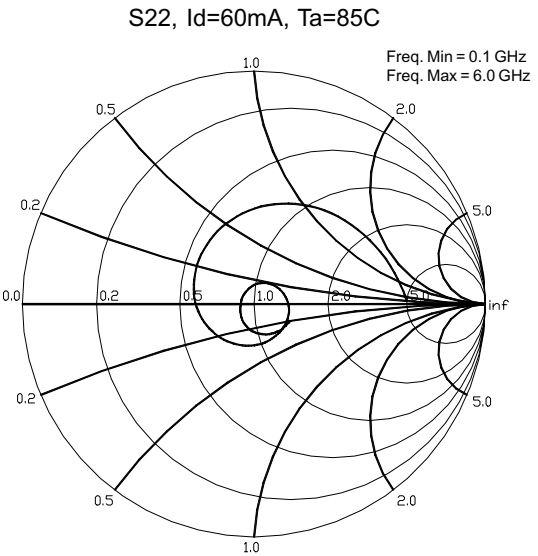












SGA-5425 DC-2400 MHz 3.3V SiGe Amplifier

Absolute Maximum Ratings

Parameter	Value	Unit
Supply Current	120	mA
Device Voltage	6.0	V
Operating Temperature	-40 to +85	C
Maximum Input Power	+13	dBm
Storage Temperature Range	-40 to +150	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): 100° C/W

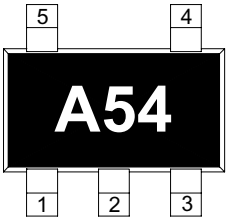
Part Number Ordering Information

Part Number	Reel Size	Devices/Reel
SGA-5425	7"	3000

Recommended Bias Resistor Values				
Supply Voltage(Vs)	5V	7.5V	9V	12V
Rbias (Ohms)	28	70	95	145

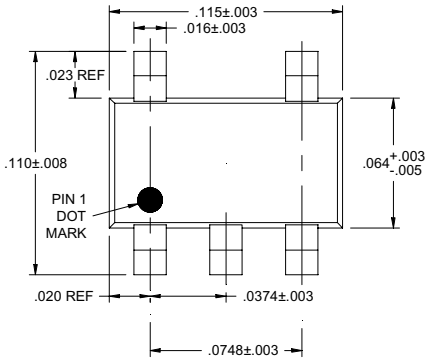
For 7.5V operation or higher, a resistor with a power handling capability of 1/2W or greater is recommended.

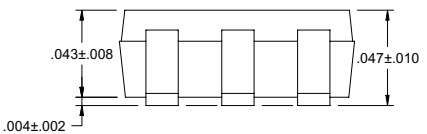
Package Marking



Pin Designation	
1	GND
2	GND
3	RF IN
4	GND
5	RF OUT/VCC

Package Dimensions





Pad Layout