STANFORD MICRODEVICES

Preliminary

SGA-1263

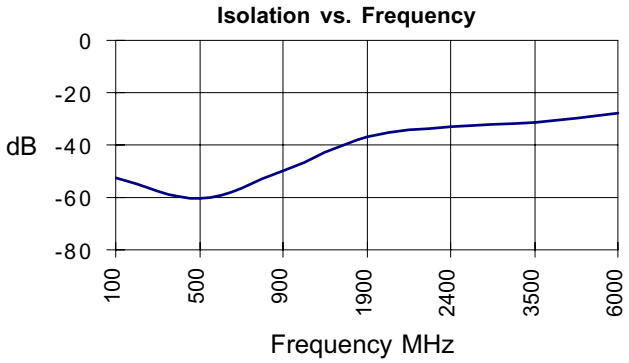
DC-4000 MHz Silicon Germanium HBT Cascadeable Gain Block

Product Description

Stanford Microdevices' SGA-1263 is a Silicon Germanium HBT Heterostructure Bipolar Transistor (SiGe HBT) amplifier that offers excellent isolation and flat gain response for applications to 4 GHz.

This RFIC is a 2-stage design that provides high isolation of up to 40dB at 2 GHz and is fabricated using the latest SiGe HBT 50 GHz F_T process, featuring 1 micron emitters with Vceo > 7V.

These unconditionally stable amplifiers have less than 1dB gain drift over 125ºC operating range (-40C to +85C) and are ideal for use as buffer amplifiers in oscillator applications covering cellular, ISM and narrowband PCS bands.



Product Features

- **DC-4000 MHz Operation**
- **Single Supply Voltage**
- **Excellent Isolation, >50 dB at 900 MHz**
- **50 Ohms In/Out, Broadband Match for Operation from DC-4 GHz**
- **Unconditionally Stable**

Applications

- **Buffer Amplifier for Oscillator Applications**
- **Broadband Gain Blocks**
- **IF Amp**

Symbol	Parameters: Test Conditions: Z_0 = 50 Ohms, Id = 8 mA, T = 25ºC		Units	Min.	Typ.	Max.
P_{1dB}	Output Power at 1dB Compression	f = 850 MHz f = 1950 MHz	dBm dBm		-7.8 -7.4	
S_{21}	Small Signal Gain	f = DC - 1000 MHz f = 1000 - 2000 MHz f = 2000 - 4000 MHz	dB dB dB	14.3	15.9 15.2 12.3	
S_{12}	Reverse Isolation	f = DC - 1000 MHz f = 1000 - 2000 MHz f = 2000 - 4000 MHz	dB dB dB		56.3 40.6 30.8	
S_{11}	Input VSWR	f = DC - 2400 MHz f = 2400 - 4000 MHz	- -		1.8:1 1.3:1	
S_{22}	Output VSWR	f = DC - 2400 MHz f = 2400 - 4000 MHz	- -		1.8:1 1.9:1	
IP_3	Third Order Intercept Point Power out per Tone = -20 dBm	f = 850 MHz f = 1950 MHz	dBm dBm		2.6 2.8	
NF	Noise Figure	f = DC - 1000 MHz f = 1000 - 2400 MHz	dB dB		2.7 2.9	
T_D	Group Delay	f = 1000 MHz	pS		82	
V_D	Device Voltage		V	2.5	2.8	3.1

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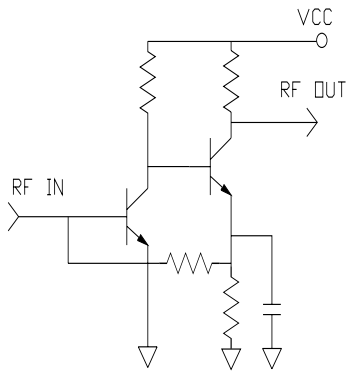
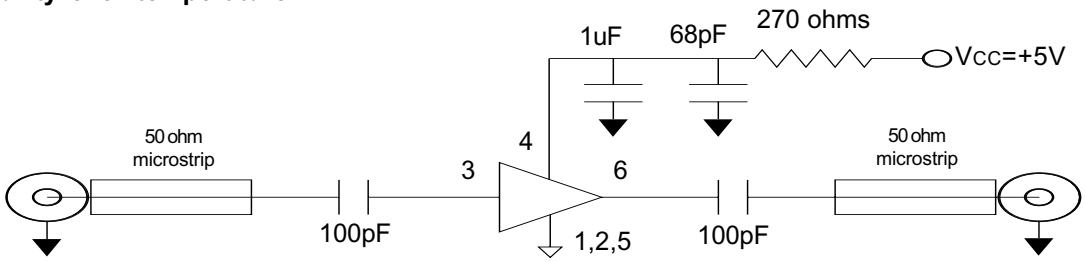
SGA-1263 DC-4000 MHz 2.8V SiGe Amplifier

Parameter	Specification				Test Condition
	Min	Typ.	Max.	Unit	
Bandwidth					T= 25C
Frequency Range	DC		4000	MHz	
Device Bias					T= 25C
Operating Voltage		2.8		V	
Operating Current		8		mA	
500 MHz					T= 25C
Gain		16.0		dB	
Noise Figure		2.7		dB	
Output IP3		4.0		dBm	
Output P1dB		-6.9		dBm	
Input Return Loss		8.5		dB	
Isolation		61.6		dB	
850 MHz					T= 25C
Gain		15.7		dB	
Noise Figure		2.7		dB	
Output IP3		2.6		dBm	
Output P1dB		-7.8		dBm	
Input Return Loss		8.9		dB	
Isolation		48.4		dB	
1950 MHz					T= 25C
Gain		14.7		dB	
Noise Figure		3.0		dB	
Output IP3		2.8		dBm	
Output P1dB		-7.4		dBm	
Input Return Loss		8.8		dB	
Isolation		35.6		dB	
2400 MHz					T= 25C
Gain		14.2		dB	
Noise Figure		2.8		dB	
Output IP3		0.2		dBm	
Output P1dB		-7.0		dBm	
Input Return Loss		8.4		dB	
Isolation		33.6		dB	

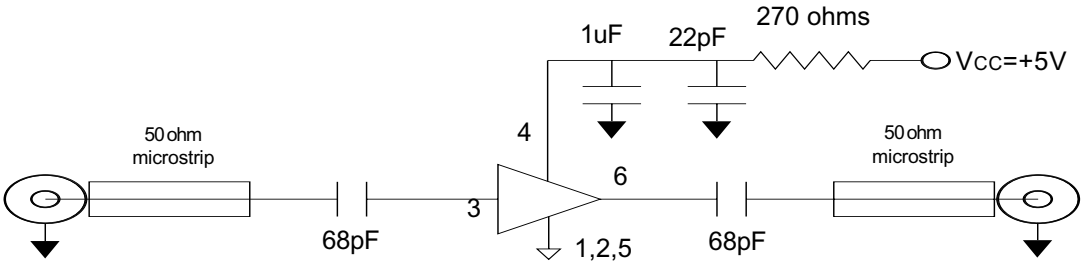
Pin #	Function	Description	Device Schematic
1	GND	Connection to ground. Use via holes for best performance to reduce lead inductance as close to ground leads as possible.	
2	GND	Sames as Pin 1	
3	RF IN	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.	
4	Vcc	Supply Connection. This pin should be bypassed with a suitable capacitor(s).	
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

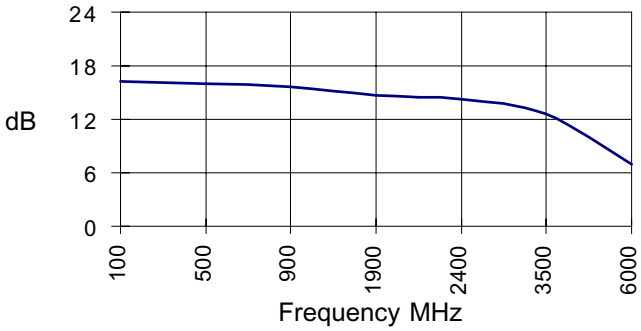
Note: A bias resistor is needed for stability over temperature



Application Schematic for +5V Operation at 1900 MHz



S21, Id =10mA, T=+25C



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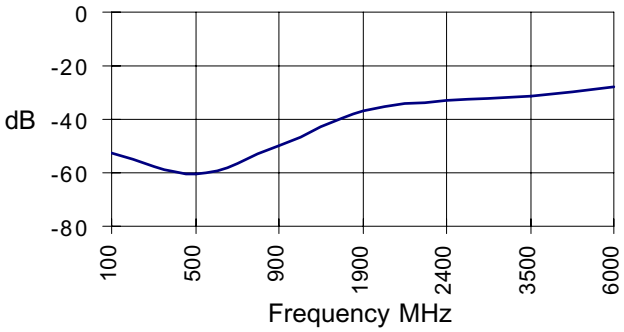
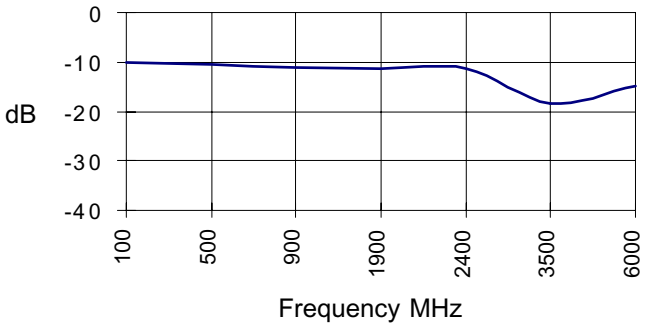
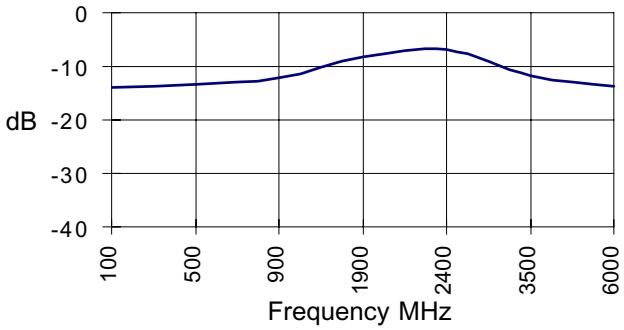


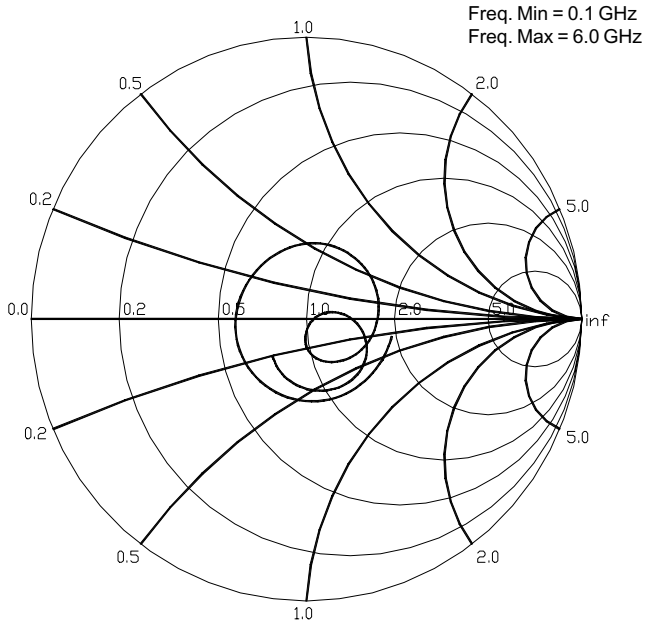
S11, Id =10mA, T=+25C



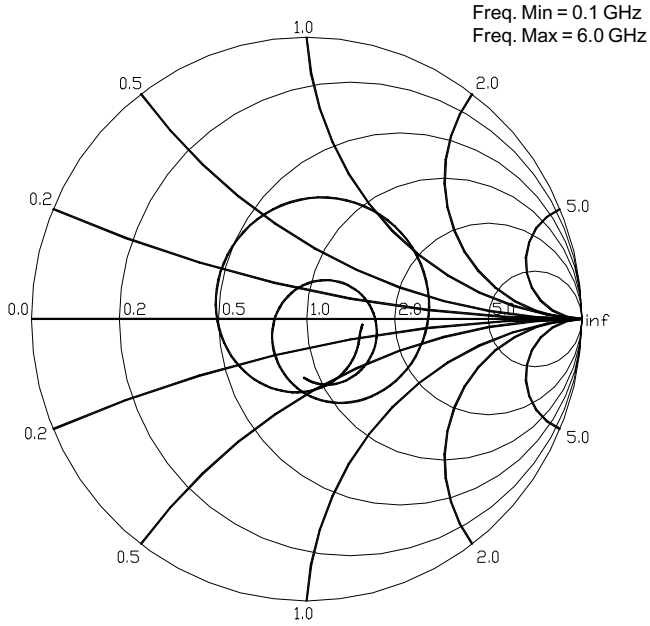
S22, Id =10mA, T=+25C



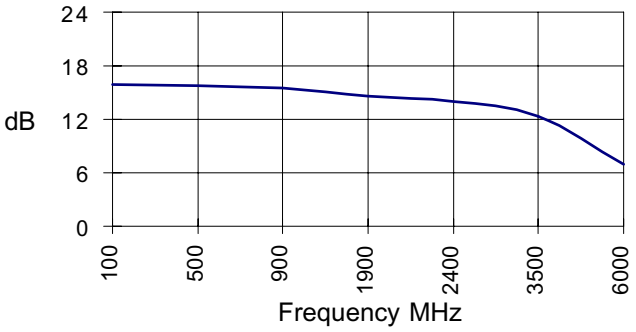
S11, Id=10mA, Ta= +25C



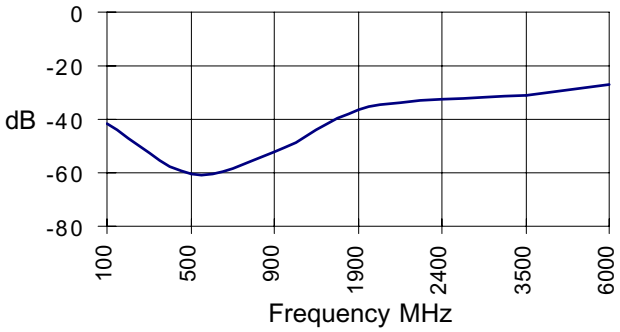
S22, Id=10mA, Ta= +25C



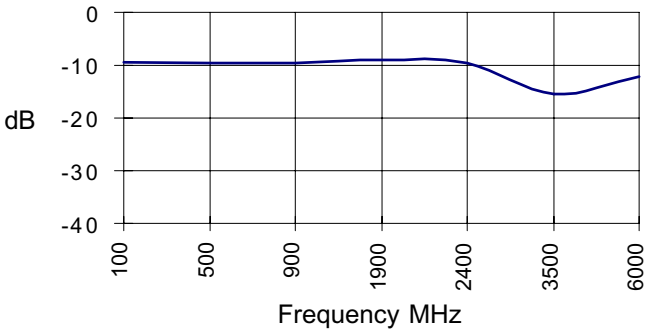
S21, Id =10mA, T=-40C



S12, Id =10mA, T=-40C



S11, Id =10mA, T=-40C



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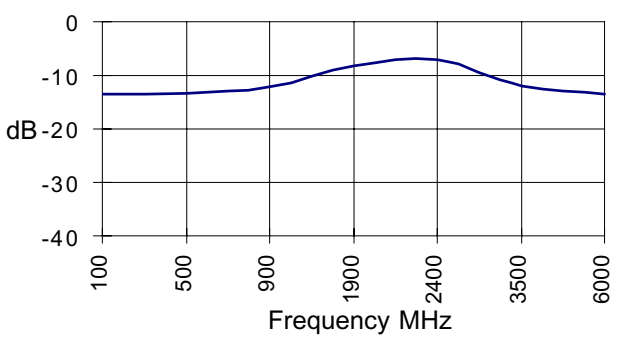

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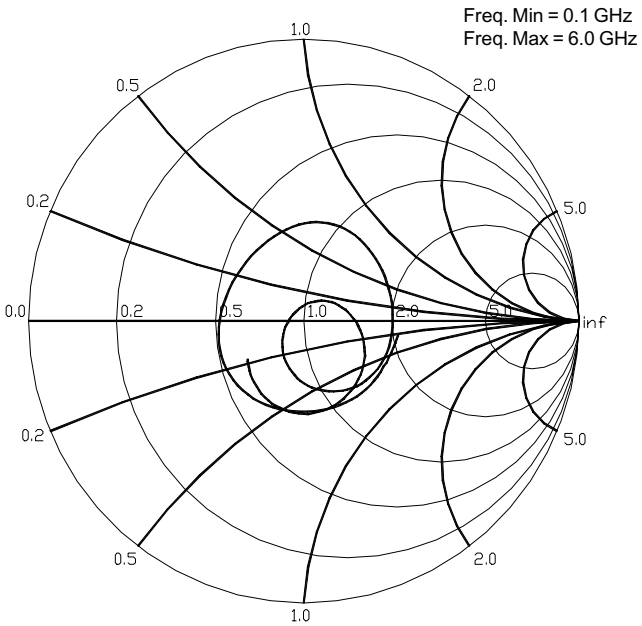
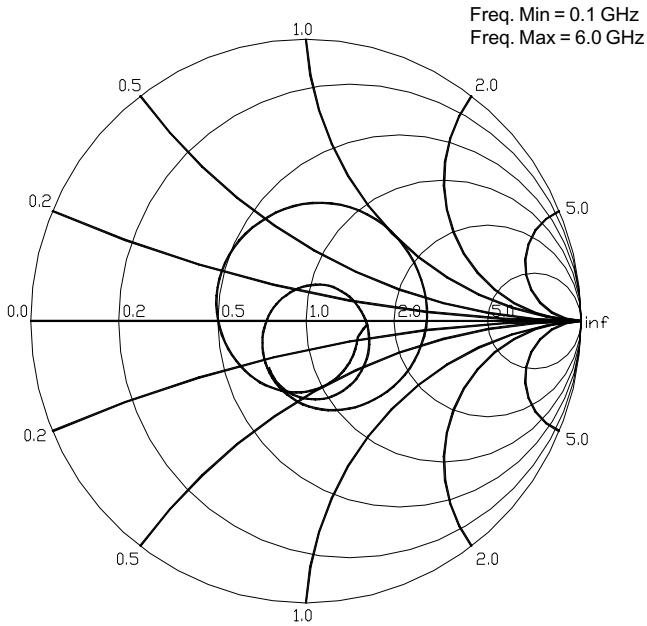
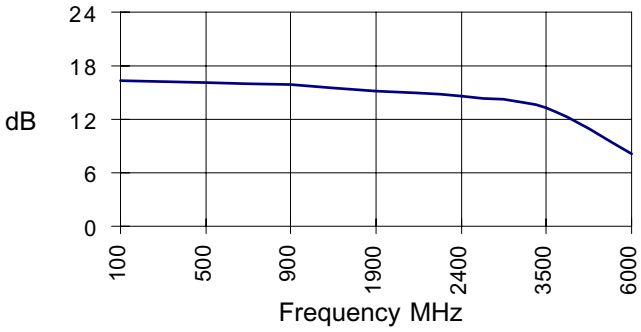


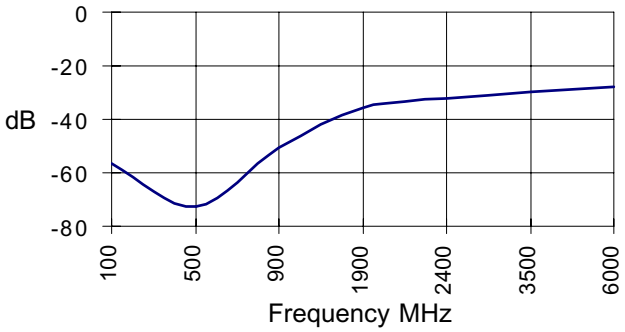
S22, Id=10mA, T=-40C



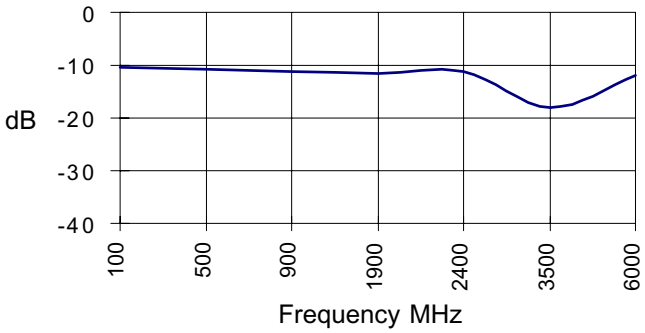
S21, Id =10mA, T=+85C



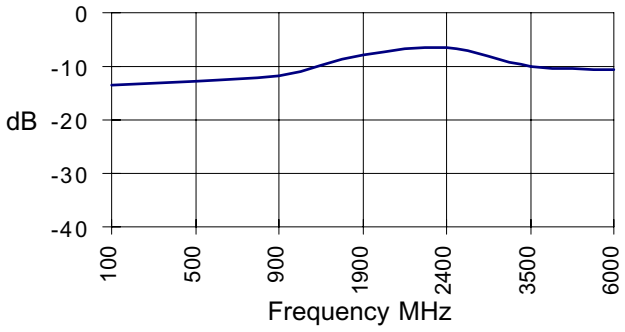
S12, Id =10mA, T=+85C



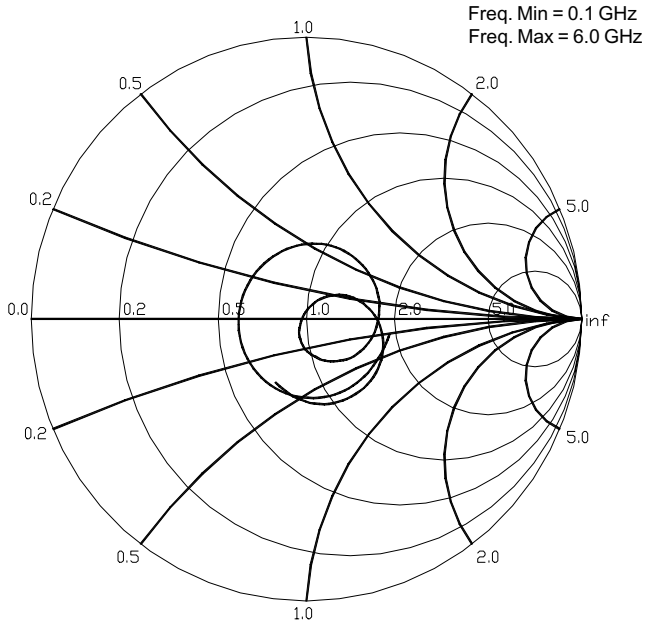
S11, Id =10mA, T=+85C



S22, Id =10mA, T=+85C



S11, Id=10mA, T=+85C



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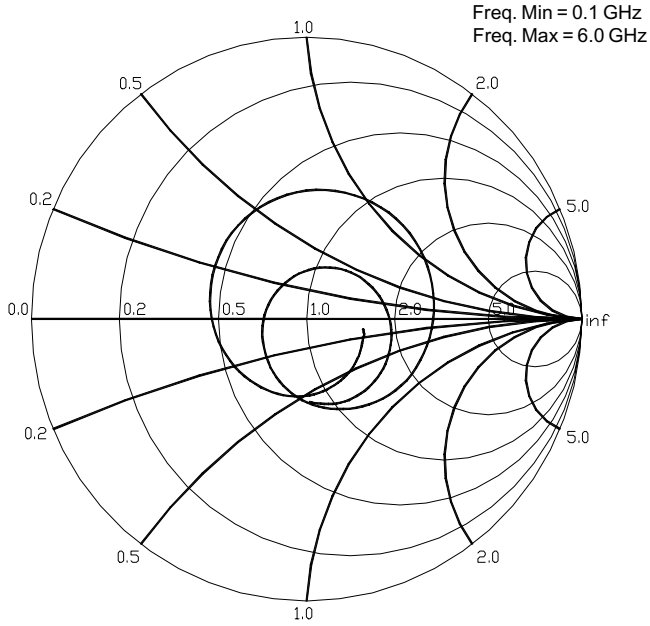


SGA-1263 DC-4000 MHz 2.8V SiGe Amplifier

Absolute Maximum Ratings

Parameter	Value	Unit
Supply Current	20	mA
Operating Temperature	-40 to +85	C
Maximum Input Power	-12	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.

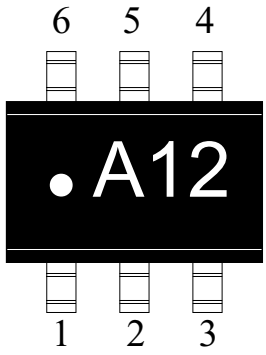
Thermal Resistance (Lead-Junction): 255° C/W

Part Number Ordering Information

Part Number	Reel Size	Devices/Reel
SGA-1263-TR1	7"	3000

Recommended Bias Resistor Values					
Supply Voltage(Vs)	3.6V	5V	7.5V	9V	12V
Rbias (Ohms)	100	275	588	775	1150

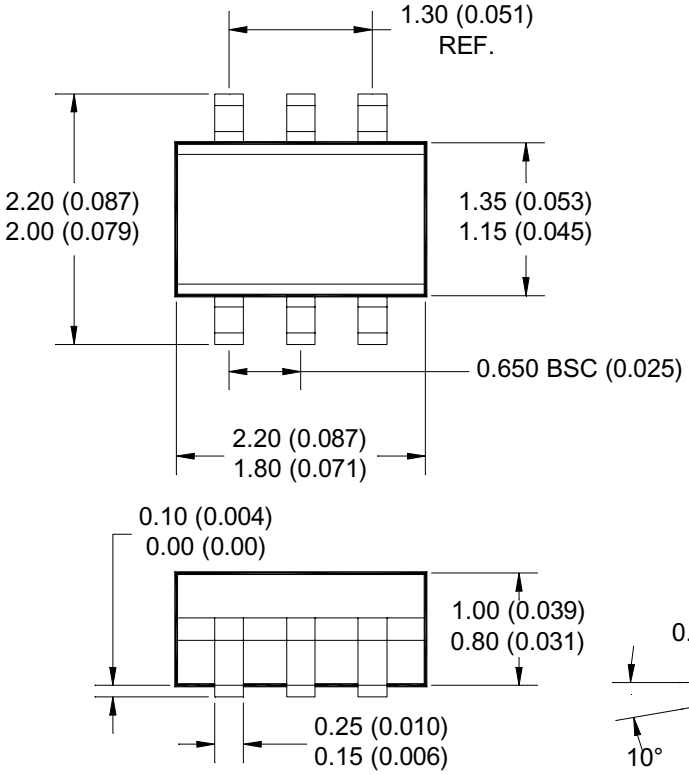
Package Marking



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

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

Package Dimensions



Pad Layout