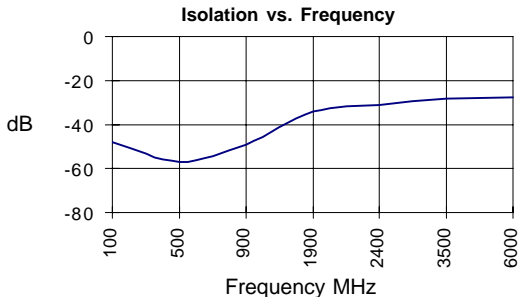


## Product Description

Stanford Microdevices' SGA-1163 is a Silicon Germanium HBT Heterostructure Bipolar Transistor (SiGe HBT) amplifier that offers excellent isolation and flat gain response for applications to 6 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  $V_{ce0} > 7V$ .

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



## SGA-1163

### DC-6000 MHz Silicon Germanium HBT Cascadeable Gain Block



### Product Features

- DC-6000 MHz Operation
- Excellent Isolation, >50 dB at 900 MHz
- Single Supply Voltage
- Unconditionally Stable
- 50 Ohms In/Out, Broadband Match for Operation from DC - 6 GHz

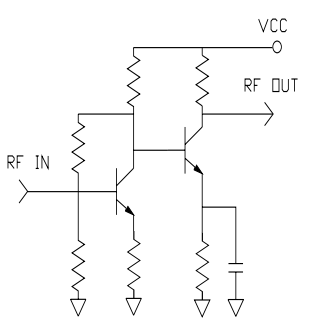
### Applications

- Buffer Amplifier for Oscillator Applications
- Broadband, High Isolation

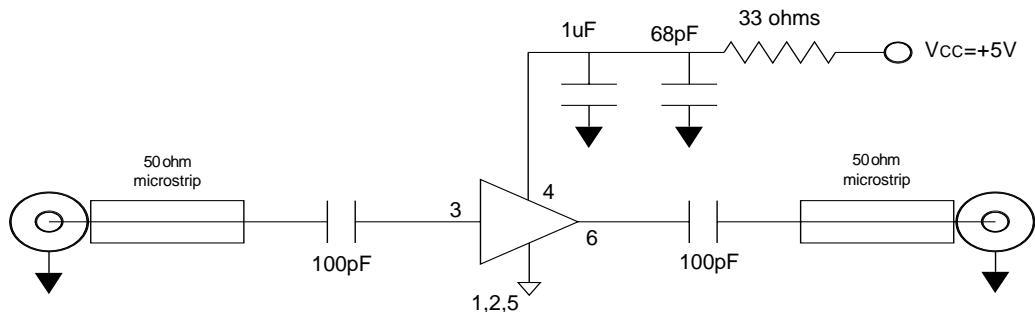
Symbol	Parameters: Test Conditions: $Z_0 = 50 \text{ Ohms}$ , $I_d = 12 \text{ mA}$ , $T = 25^\circ\text{C}$		Units	Min.	Typ.	Max.
$P_{1dB}$	Output Power at 1dB Compression	$f = 850 \text{ MHz}$ $f = 1950 \text{ MHz}$	dBm dBm		-3.3 -4.6	
$S_{21}$	Small Signal Gain	$f = \text{DC} - 1000 \text{ MHz}$ $f = 1000 - 2000 \text{ MHz}$ $f = 2000 - 6000 \text{ MHz}$	dB dB dB	10.5	11.7 11.2 9.5	
$S_{12}$	Reverse Isolation	$f = \text{DC} - 1000 \text{ MHz}$ $f = 1000 - 2000 \text{ MHz}$ $f = 2000 - 6000 \text{ MHz}$	dB dB dB		53.3 38.3 28.5	
$S_{11}$	Input VSWR	$f = \text{DC} - 2400 \text{ MHz}$ $f = 2400 - 6000 \text{ MHz}$	-		1.3:1 1.8:1	
$S_{22}$	Output VSWR	$f = \text{DC} - 2400 \text{ MHz}$ $f = 2400 - 6000 \text{ MHz}$	-		2.1:1 2.2:1	
$IP_3$	Third Order Intercept Point Power out per Tone = -20 dBm	$f = 850 \text{ MHz}$ $f = 1950 \text{ MHz}$	dBm dBm		7.9 6.3	
NF	Noise Figure	$f = \text{DC} - 1000 \text{ MHz}$ $f = 1000 - 2400 \text{ MHz}$	dB dB		3.1 3.4	
$T_D$	Group Delay	$f = 1000 \text{ MHz}$	pS		118	
$V_D$	Device Voltage		V	4.2	4.6	5.0

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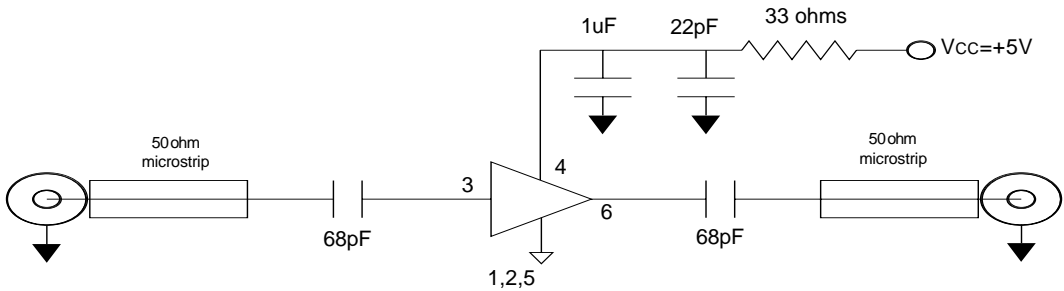
Parameter	Specification			Unit	Test Condition
	Min	Typ.	Max.		
<b>Bandwidth</b> Frequency Range	DC		6000	MHz	T= 25C
<b>Device Bias</b> Operating Voltage Operating Current		4.6 12		V mA	T= 25C
<b>500 MHz</b> Gain Noise Figure Output IP3 Output P1dB Input Return Loss Isolation		11.8 3.1 8.7 -3.8 31.9 62.3		dB dB dBm dBm dB dB	T= 25C
<b>850 MHz</b> Gain Noise Figure Output IP3 Output P1dB Input Return Loss Isolation		11.5 3.1 7.9 -3.3 33.1 47.6		dB dB dBm dBm dB dB	T= 25C
<b>1950 MHz</b> Gain Noise Figure Output IP3 Output P1dB Input Return Loss Isolation		11.2 3.4 6.3 -4.6 15.7 34.3		dB dB dBm dBm dB dB	T= 25C
<b>2400 MHz</b> Gain Noise Figure Output IP3 Output P1dB Input Return Loss Isolation		11.4 3.4 5.7 -4.4 17.8 30.2		dB dB dBm dBm dB dB	T= 25C

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.	

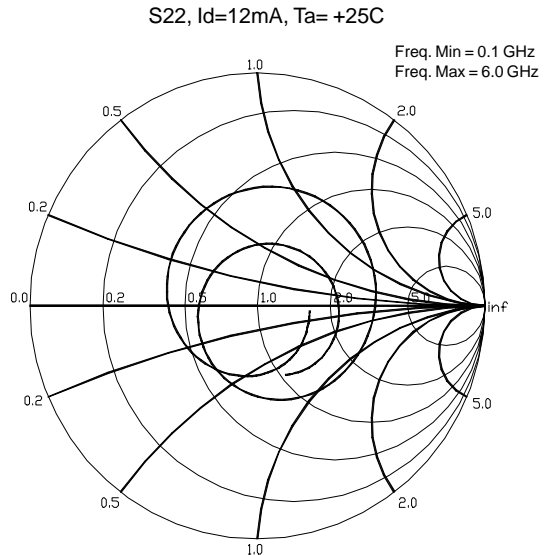
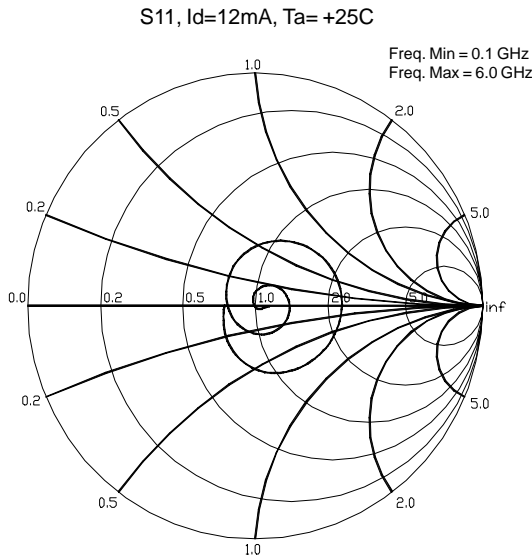
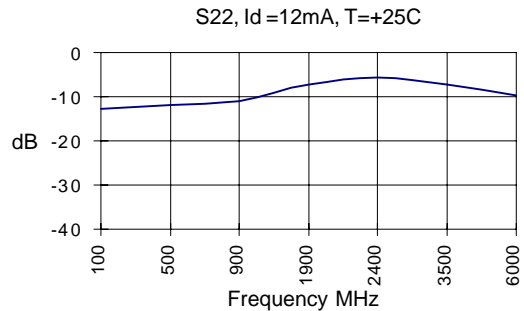
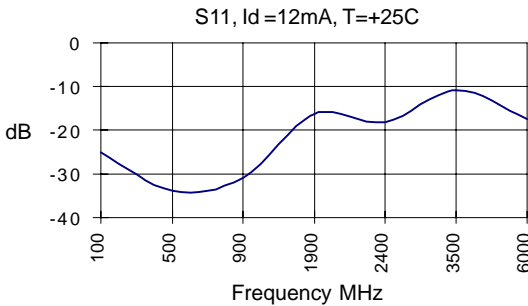
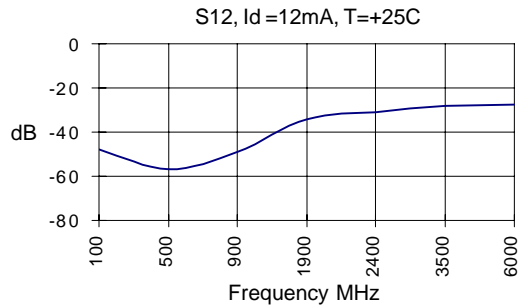
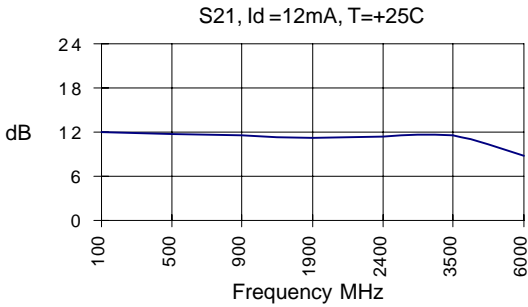
**Application Schematic for +5V Operation at 900 MHz**



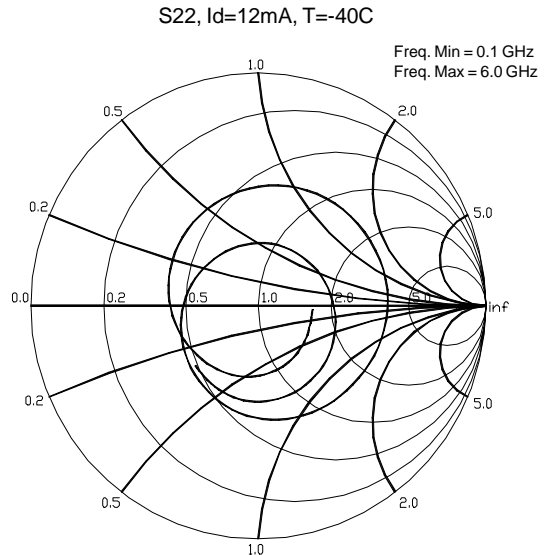
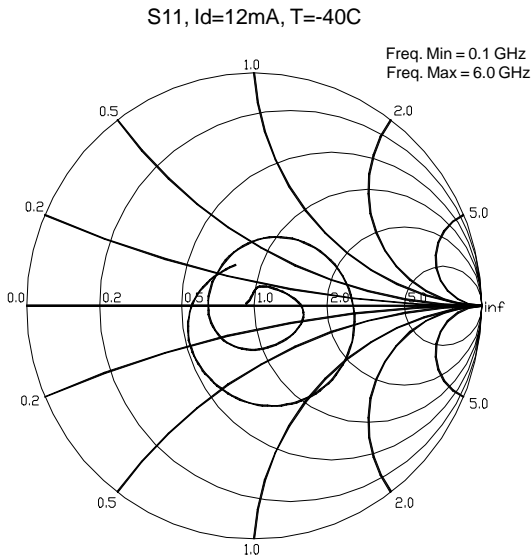
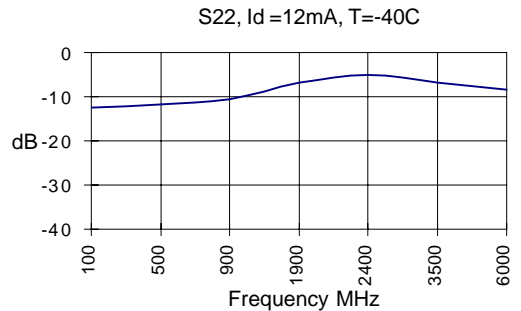
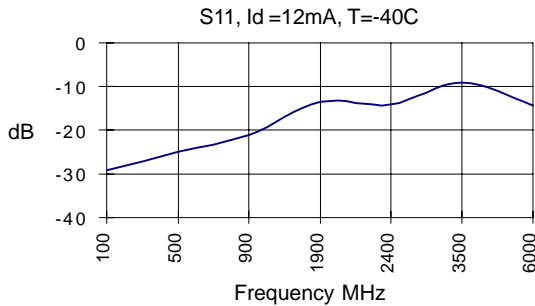
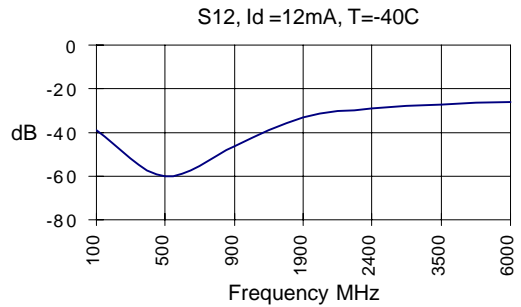
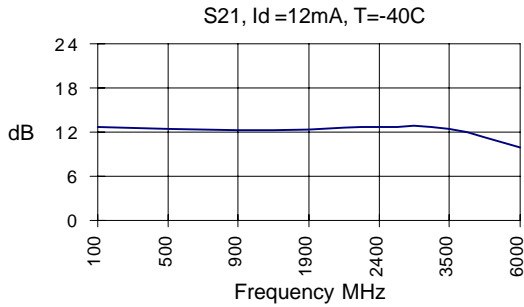
**Application Schematic for +5V Operation at 1900 MHz**



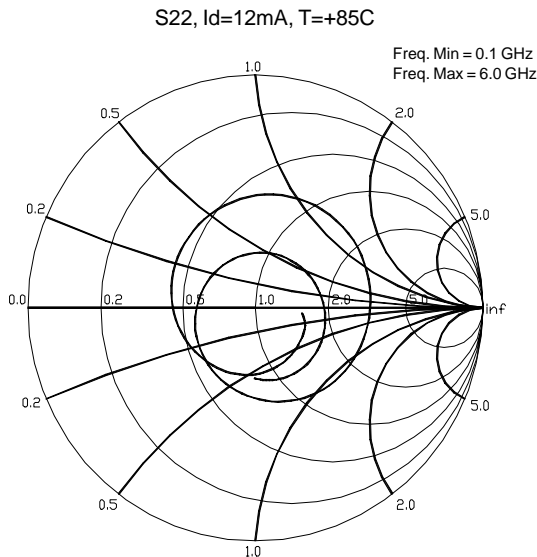
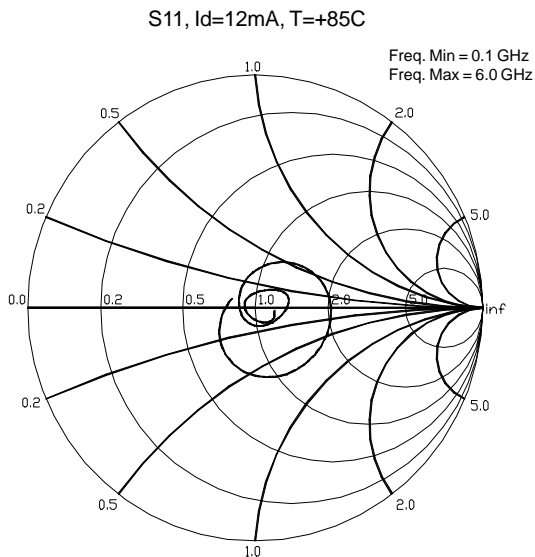
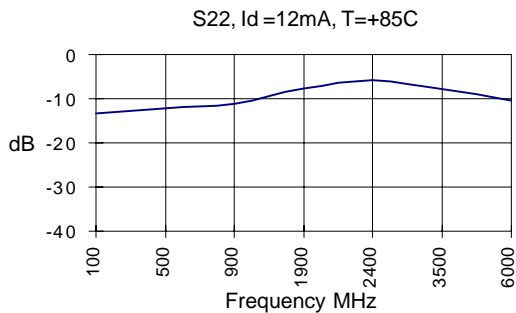
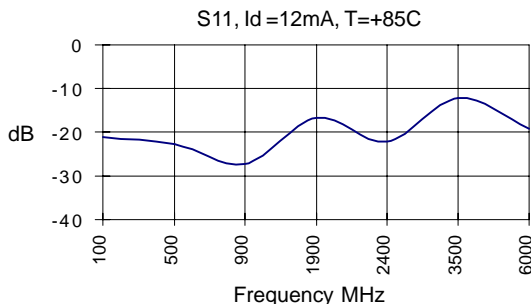
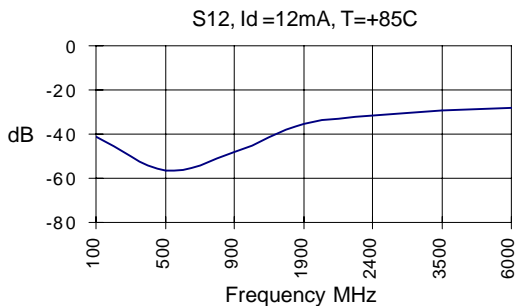
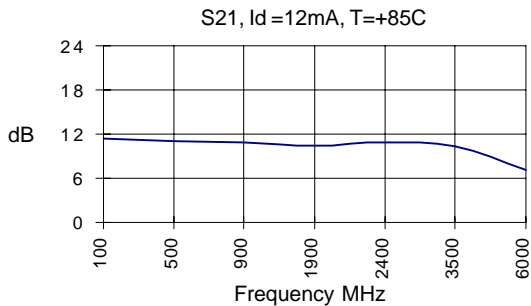
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### Absolute Maximum Ratings

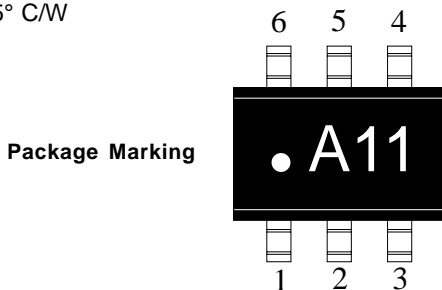
Parameter	Value	Unit
Supply Current	24	mA
Operating Temperature	-40 to +85	C
Maximum Input Power	-9	dBm
Storage Temperature Range	-40 to +85	C
Operating Junction Temperature	+125	C

#### 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-1163-TR1	7"	3000

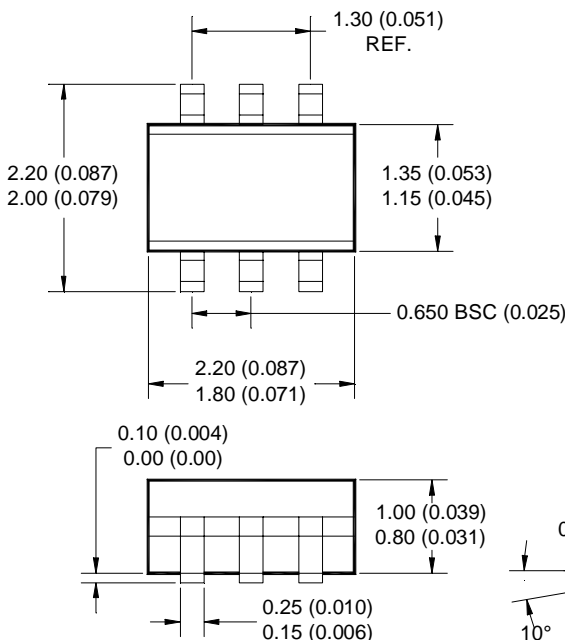
#### Recommended Bias Resistor Values

Supply Voltage(Vs)	5V	6V	7.5V	9V	12V
Rbias (Ohms)	33	117	242	367	617

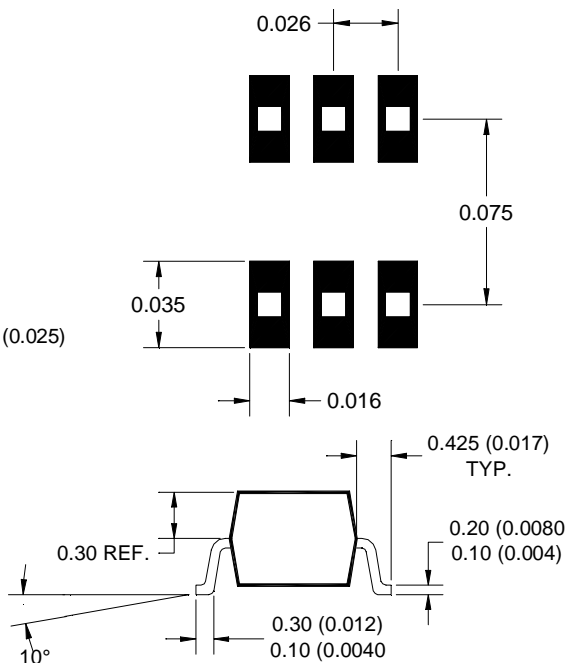
Pin Designation	
1	GND
2	GND
3	RF in
4	Vcc
5	GND
6	RF out

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

### Package Dimensions



### Pad Layout



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