Preliminary

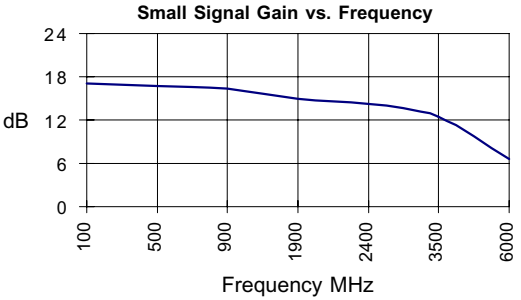
SGA-4363

DC-2500 MHz Silicon Germanium HBT Cascadeable Gain Block

Product Description

Stanford Microdevices' SGA-4363 is a high performance cascadeable 50-ohm amplifier designed for operation at voltages as low as 3.2V. 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-4363 requires only DC blocking and bypass capacitors for external components.



Product Features

- **DC-2500 MHz Operation**
- **Single Voltage Supply**
- **High Output Intercept: +28.7dBm typ. at 850 MHz**
- **Low Current Draw: 45mA at 3.2V typ.**
- **Excellent Noise Figure: 2.7dB typ. at 850 MHz**

Applications

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

Symbol	Parameters: Test Conditions: Z_0 = 50 Ohms, Id = 45 mA, T = 25ºC		Units	Min.	Typ.	Max.
P_{1dB}	Output Power at 1dB Compression	f = 850 MHz f = 1950 MHz	dBm dBm		14.3 13.0	
S_{21}	Small Signal Gain	f = DC - 1000 MHz f = 1000 - 2000 MHz f = 2000 - 2500 MHz	dB dB dB	14.8	16.5 15.5 14.4	
S_{12}	Reverse Isolation	f = DC - 1000 MHz f = 1000 - 2000 MHz f = 2000 - 2500 MHz	dB dB dB		21.2 21.1 20.2	
S_{11}	Input VSWR	f = DC - 2000 MHz f = 2000 - 2500 MHz	-		1.6:1 1.5:1	
S_{22}	Output VSWR	f = DC - 2500 MHz	-		1.7	
IP_3	Third Order Intercept Point Power out per Tone = 0 dBm	f = 850 MHz f = 1950 MHz	dBm dBm		28.7 25.7	
NF	Noise Figure	f = DC - 1000 MHz f = 1000 - 2400 MHz	dB dB		2.7 3.1	
T_D	Group Delay	f = 1000 MHz	pS		119	
V_D	Device Voltage		V	2.9	3.2	3.5

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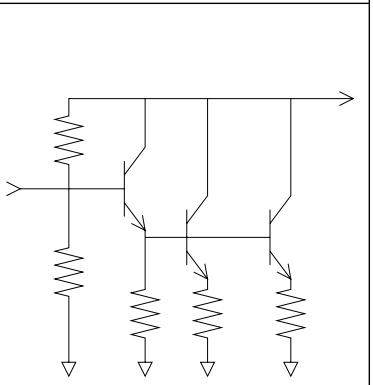
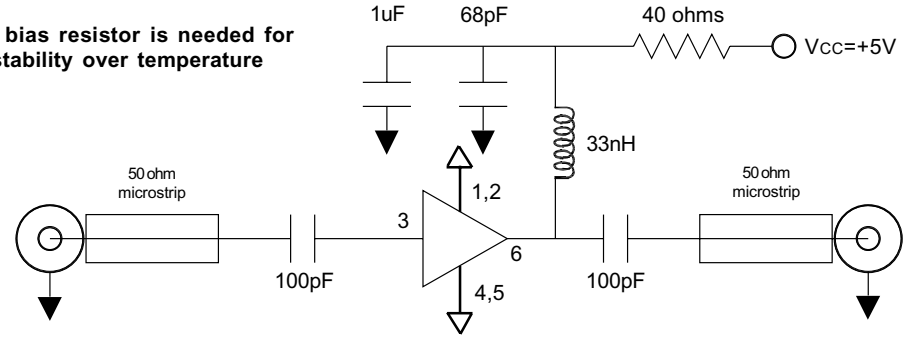
Parameter	Specification				Test Condition
	Min	Typ.	Max.	Unit	
Bandwidth					T= 25C
Frequency Range	DC		2500	MHz	
Device Bias					T= 25C
Operating Voltage		3.2		V	
Operating Current		45		mA	
500 MHz					T= 25C
Gain		16.7		dB	
Noise Figure		2.8		dB	
Output IP3		29.4		dBm	
Output P1dB		14.3		dBm	
Input Return Loss		13.0		dB	
Isolation		21.3		dB	
850 MHz					T= 25C
Gain		16.4		dB	
Noise Figure		2.7		dB	
Output IP3		28.7		dBm	
Output P1dB		14.3		dBm	
Input Return Loss		13.7		dB	
Isolation		21.2		dB	
1950 MHz					T= 25C
Gain		14.8		dB	
Noise Figure		3.1		dB	
Output IP3		25.7		dBm	
Output P1dB		13.0		dBm	
Input Return Loss		13.1		dB	
Isolation		20.6		dB	
2400 MHz					T= 25C
Gain		14.2		dB	
Noise Figure		3.6		dB	
Output IP3		23.8		dBm	
Output P1dB		11.8		dBm	
Input Return Loss		12.3		dB	
Isolation		20.1		dB	

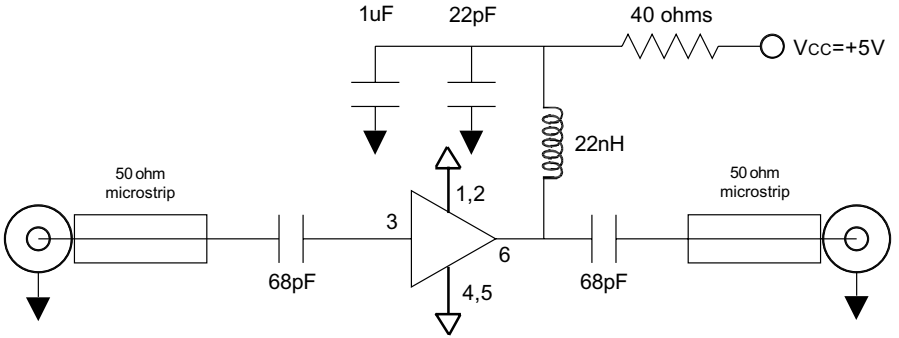
Pin #	Function	Description	Device Schematic
1	GND	Connection to ground. Use via holes for best performance to reduce lead inductance as close to ground leads as possible.	
2	GND	Sames as Pin 1	
3	RF IN	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency 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

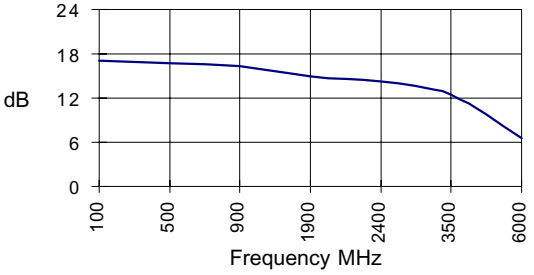
Note: A bias resistor is needed for stability over temperature



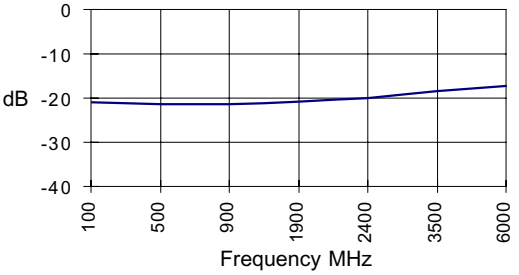
Application Schematic for +5V Operation at 1900 MHz



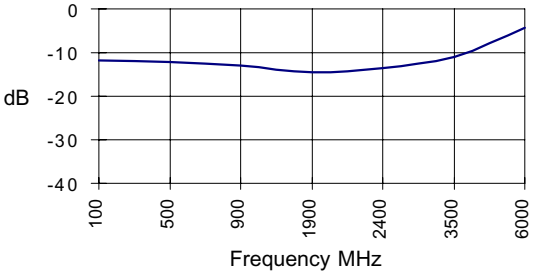
S21, Id =45mA, T=+25C



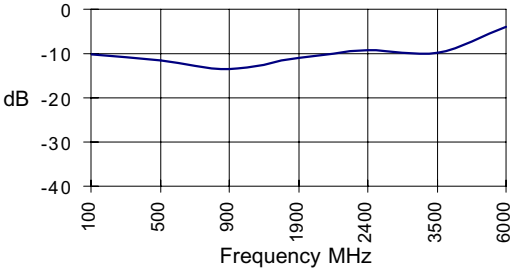
S12, Id =45mA, T=+25C



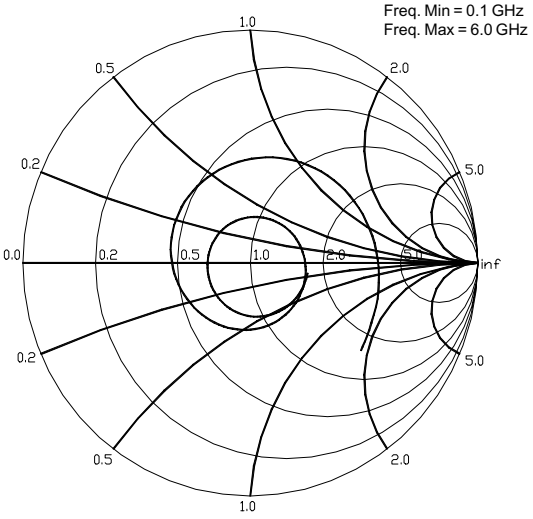
S11, Id =45mA, T=+25C



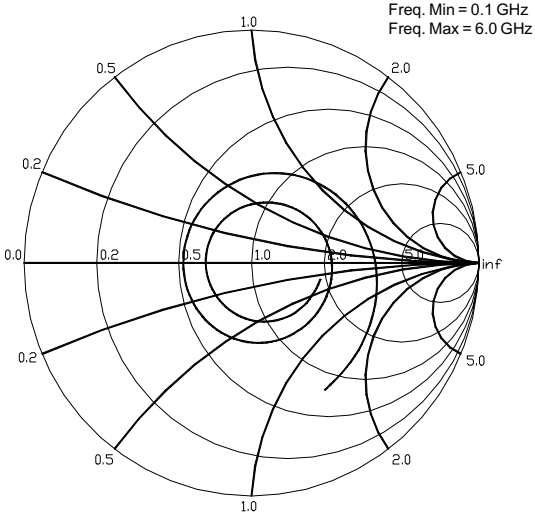
S22, Id =45mA, T=+25C



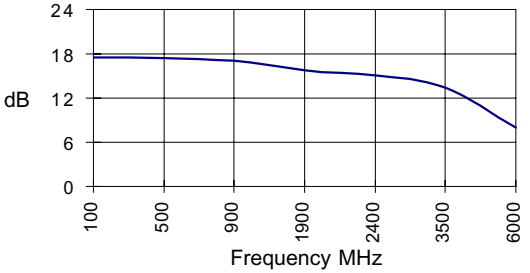
S11, Id=45mA, Ta= +25C



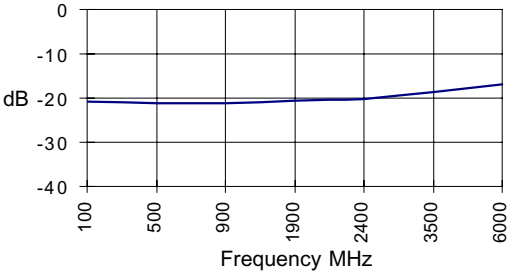
S22, Id=45mA, Ta= +25C



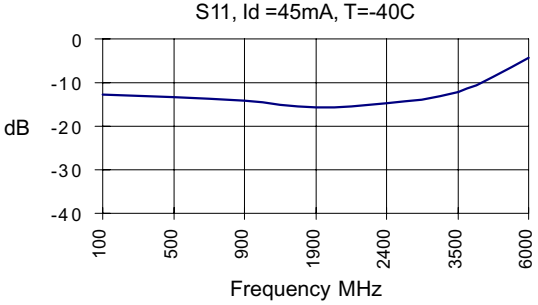
S21, Id =45mA, T=-40C



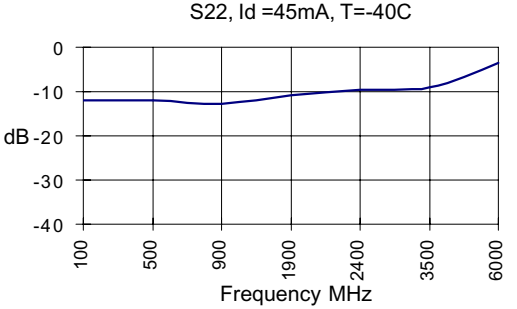
S12, Id =45mA, T=-40C



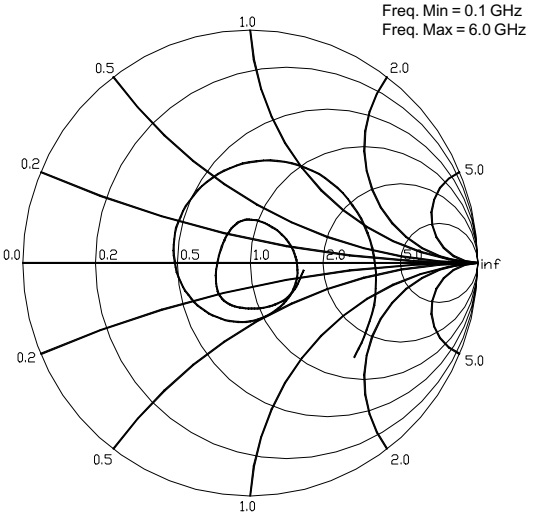
S11, Id =45mA, T=-40C



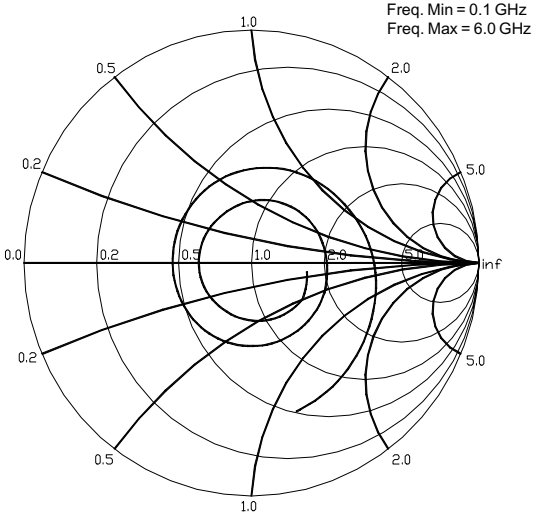
S22, Id =45mA, T=-40C



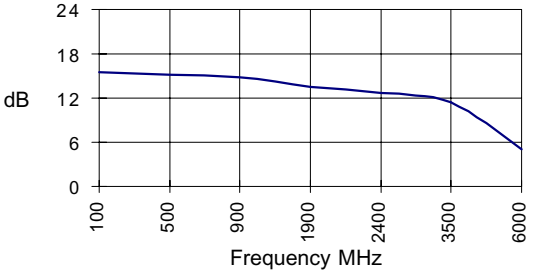
S11, Id=45mA, T=-40C



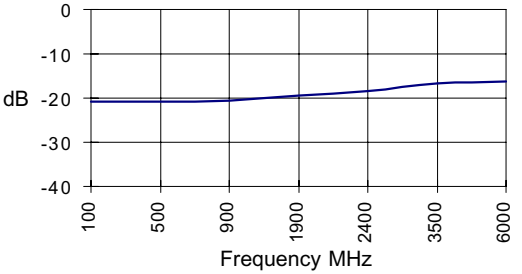
S22, Id=45mA, T=-40C



S21, Id =45mA, T=+85C



S12, Id =45mA, T=+85C



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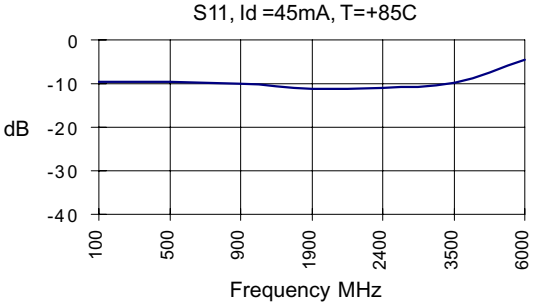
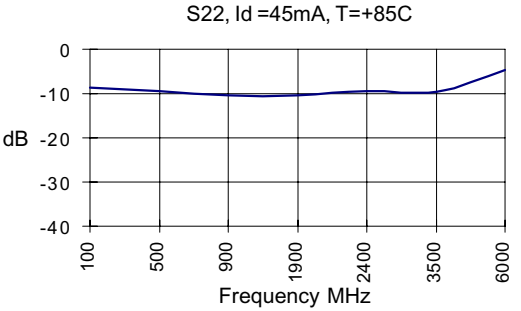
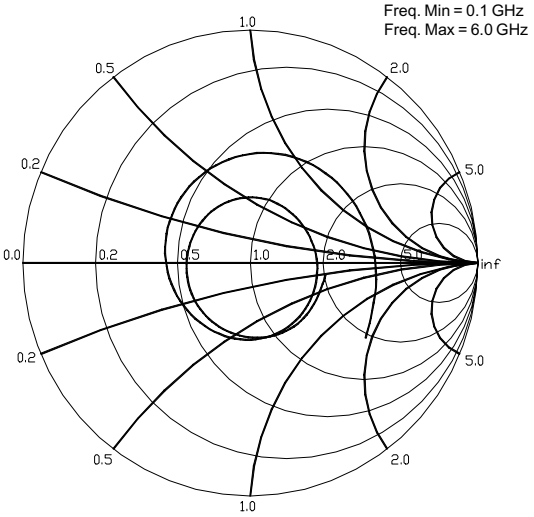


S22, Id =45mA, T=+85C



S11, Id=45mA, T=+85C



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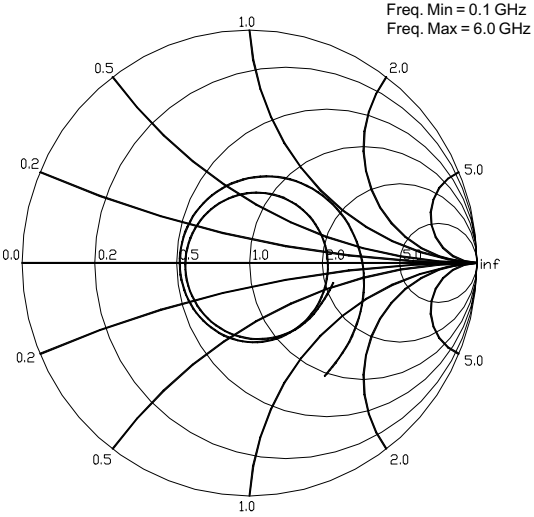


SGA-4363 DC-2500 MHz 3.2V SiGe Amplifier

Absolute Maximum Ratings

Parameter	Value	Unit
Supply Current	90	mA
Operating Temperature	-40 to +85	C
Maximum Input Power	+8	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.

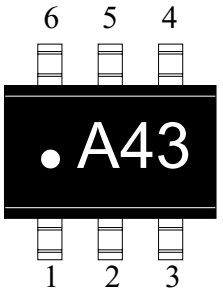
Thermal Resistance (Lead-Junction):
255 °C/W

Part Number Ordering Information

Part Number	Reel Size	Devices/Reel
SGA-4363-TR1	7"	3000

Recommended Bias Resistor Values					
Supply Voltage(Vs)	4V	5V	7.5V	9V	12V
Rbias (Ohms)	18	40	96	129	196

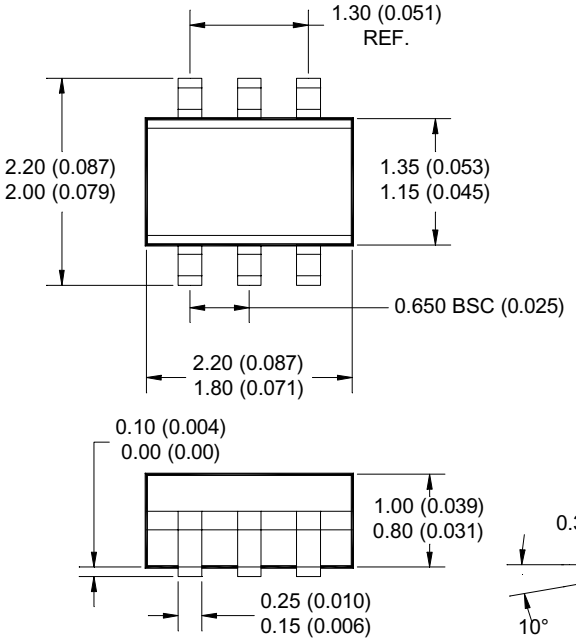
Package Marking



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