Preliminary

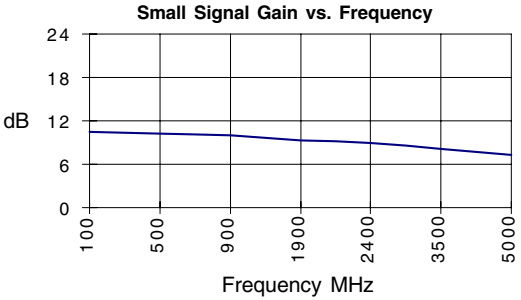
SGA-2186

DC-5000 MHz Silicon Germanium HBT Cascadeable Gain Block

Product Description

Stanford Microdevices' SGA-2186 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 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-2186 requires only DC blocking and bypass capacitors for external components.



Product Features

- **DC-5000 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 = 25ºC		Units	Min.	Typ.	Max.
P_{1dB}	Output Power at 1dB Compression	f = 850 MHz f = 1950 MHz	dBm dBm		7.5 6.7	
S_{21}	Small Signal Gain	f = DC - 1000 MHz f = 1000 - 2000 MHz f = 2000 - 5000 MHz	dB dB dB	9.3	10.3 9.3 8.5	
S_{12}	Reverse Isolation	f = DC - 1000 MHz f = 1000 - 2000 MHz f = 2000 - 5000 MHz	dB dB dB		15.3 16.0 16.5	
S_{11}	Input VSWR	f = DC - 2400 MHz f = 2400 - 5000 MHz	-		1.35:1 1.53:1	
S_{22}	Output VSWR	f = DC - 2400 MHz f = 2400 - 5000 MHz	-		1.20:1 1.30:1	
IP_3	Third Order Intercept Point	f = 850 MHz f = 1950 MHz	dBm dBm		20.0 19.6	
NF	Noise Figure	f = DC - 1000 MHz f = 1000 - 2400 MHz	dB dB		4.3 4.7	
T_D	Group Delay	f = 1000 MHz	pS		119.0	
V_D	Device Voltage		V	1.9	2.2	2.5

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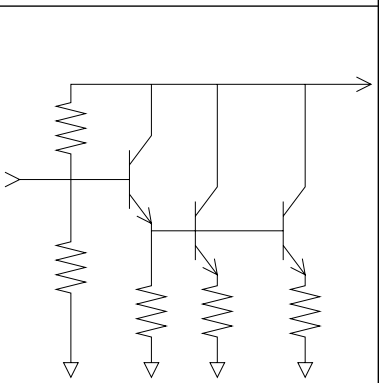
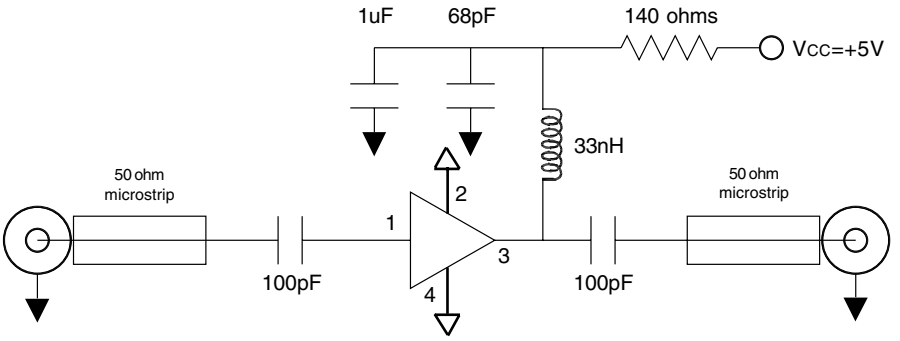
SGA-2186 DC-5000 MHz 2.2V SiGe Amplifier

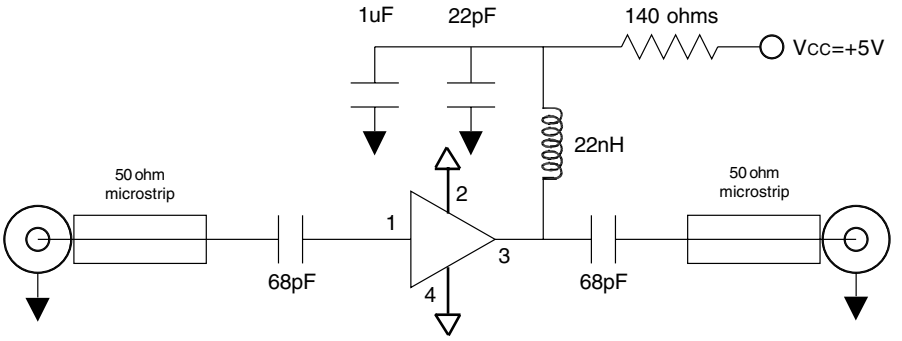
Parameter	Specification				Test Condition
	Min	Typ.	Max.	Unit	
Device Bias					T= 25C
Operating Voltage		2.2		V	
Operating Current		20.0		mA	
500 MHz					T= 25C
Gain		10.3		dB	
Noise Figure		4.2		dB	
Output IP3		20.7		dBm	
Output P1dB		7.4		dBm	
Input Return Loss		20.6		dB	
Isolation		15.2		dB	
850 MHz					T= 25C
Gain		10.1		dB	
Noise Figure		4.3		dB	
Output IP3		20.0		dBm	
Output P1dB		7.5		dBm	
Input Return Loss		19.1		dB	
Isolation		15.4		dB	
1950 MHz					T= 25C
Gain		9.3		dB	
Noise Figure		4.7		dB	
Output IP3		19.6		dBm	
Output P1dB		6.7		dBm	
Input Return Loss		17.8		dB	
Isolation		16.2		dB	
2400 MHz					T= 25C
Gain		8.9		dB	
Noise Figure		4.8		dB	
Output IP3		19.4		dBm	
Output P1dB		6.3		dBm	
Input Return Loss		16.6		dB	
Isolation		16.6		dB	

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

Application Schematic for +5V Operation at 900 MHz

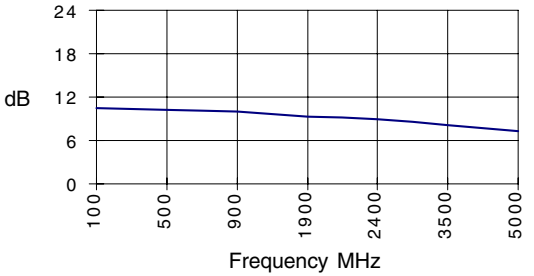


Application Schematic for +5V Operation at 1900 MHz



SGA-2186 DC-5000 MHz 2.2V SiGe Amplifier

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



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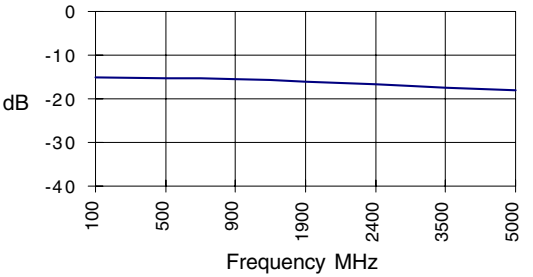
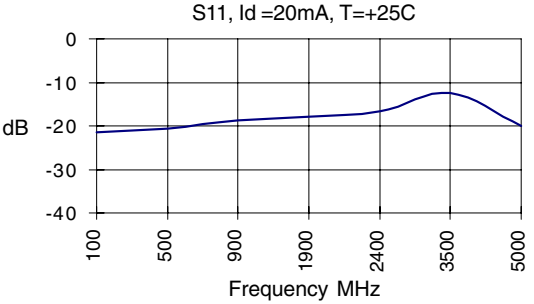
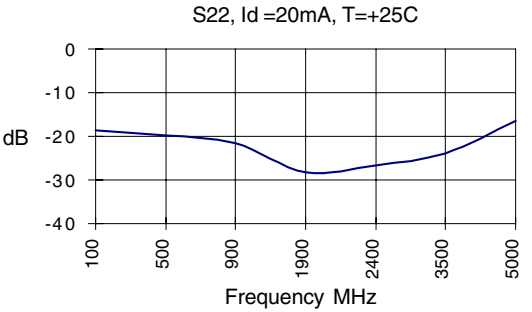


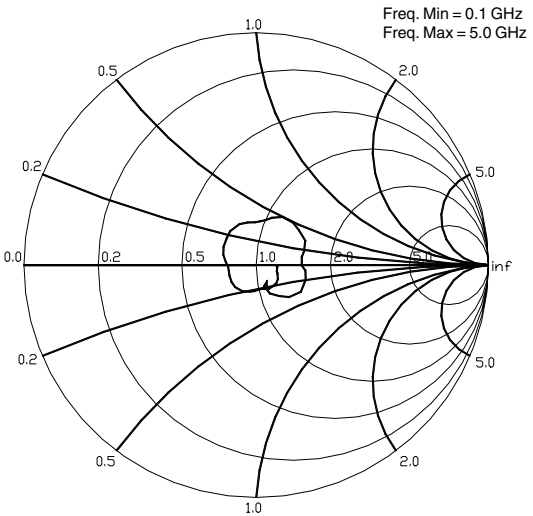
S11, Id =20mA, T=+25C



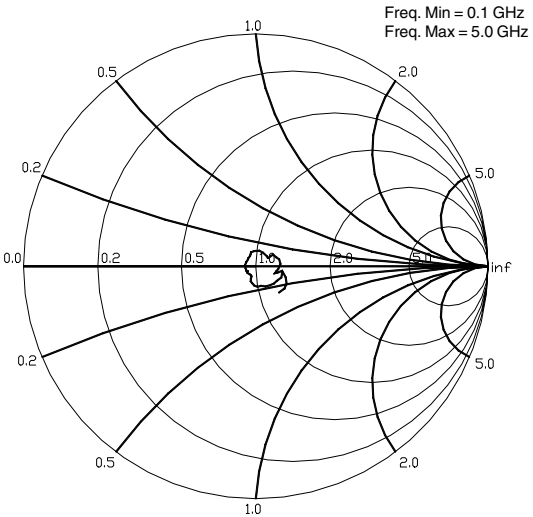
S22, Id =20mA, T=+25C



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

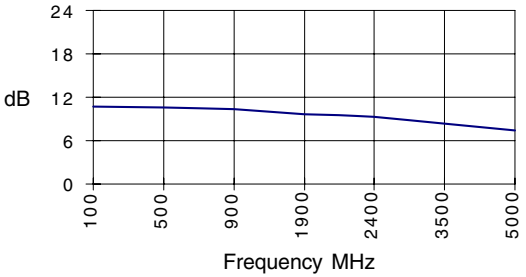


S22, Id=20mA, Ta= +25C

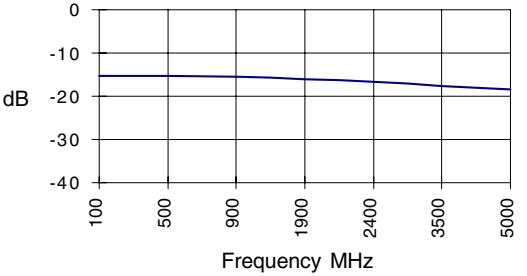


SGA-2186 DC-5000 MHz 2.2V SiGe Amplifier

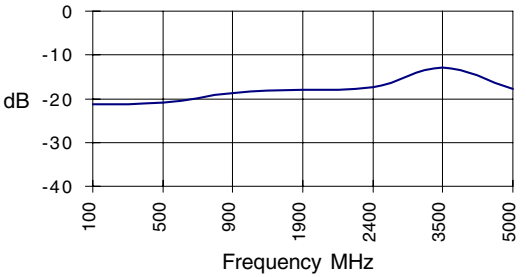
S21, Id =20mA, T=-40C



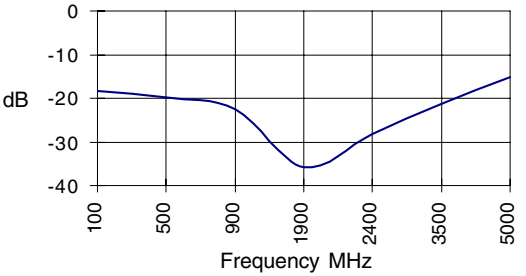
S12, Id =20mA, T=-40C



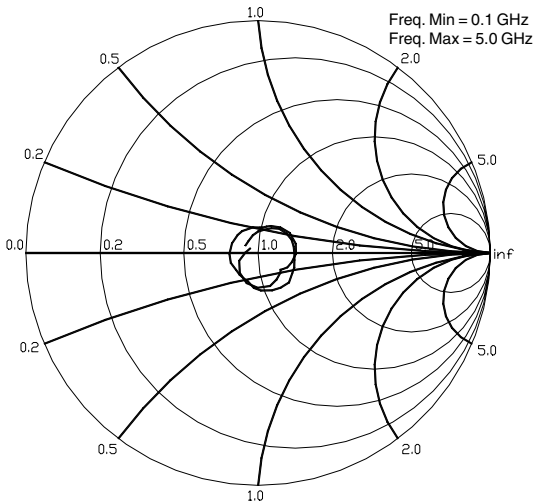
S11, Id =20mA, T=-40C



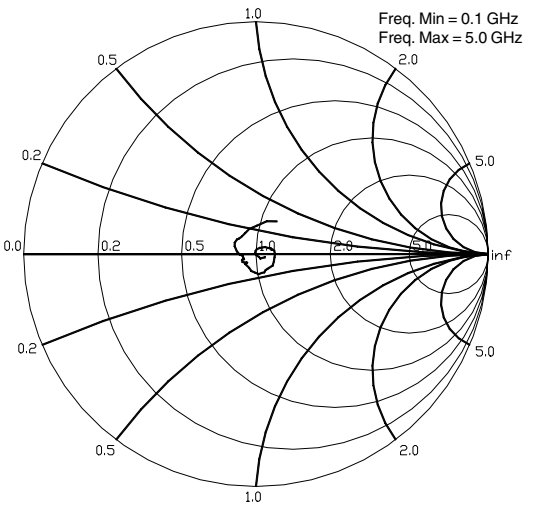
S22, Id =20mA, T=-40C



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



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



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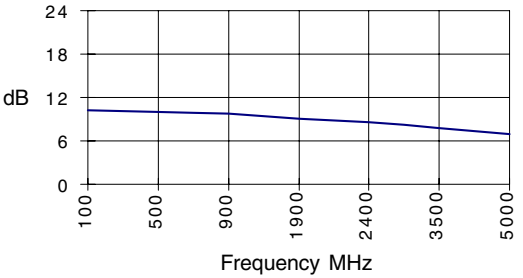
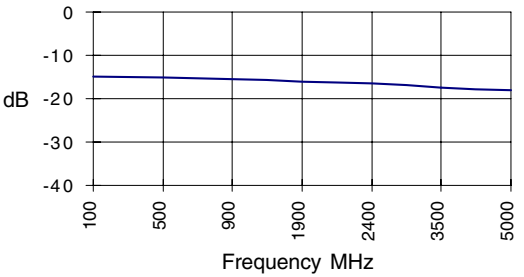
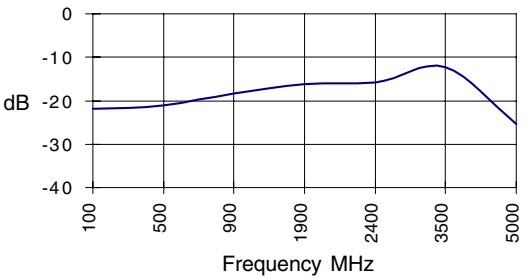
S21, Id =20mA, T=85C



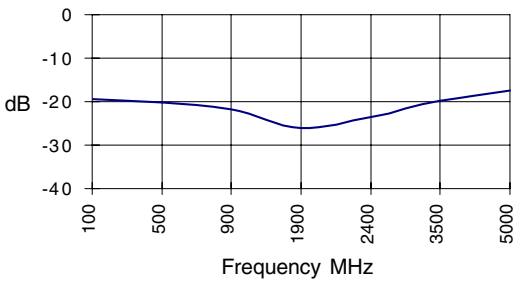
S12, Id =20mA, T=85C



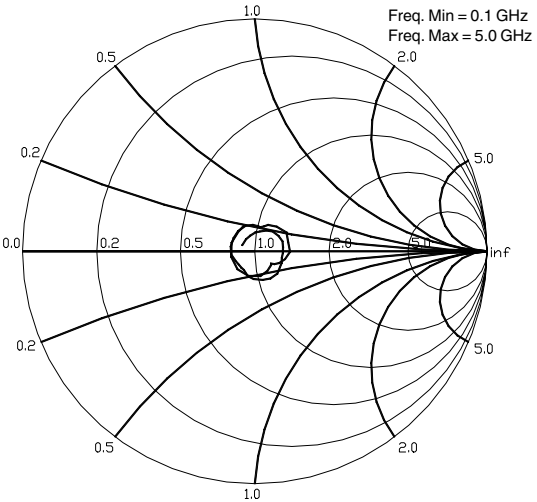
S11, Id =20mA, T=85C



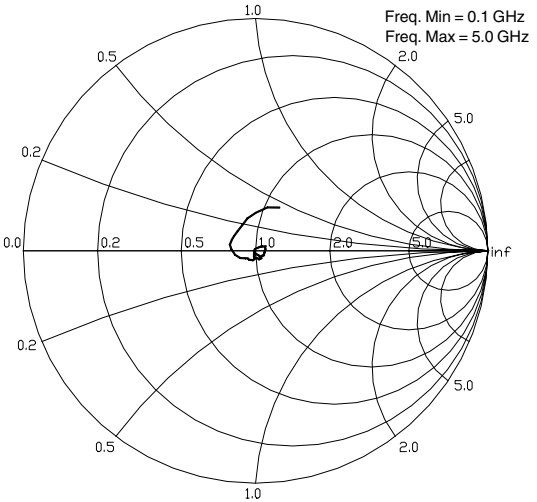
S22, Id =20mA, T=85C



S11, Id=20mA, Ta= 85C



S22, Id=20mA, Ta= 85C



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Preliminary

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Absolute Maximum Ratings

Parameter	Value	Unit
Supply Current	40	mA
Operating Temperature	-40 to +85	C
Maximum Input Power	+13	dBm
Storage Temperature Range	-40 to +85	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): 97° C/W

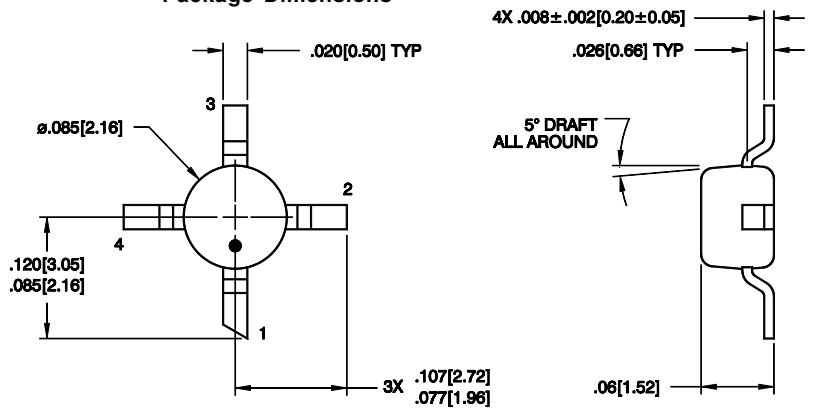
Part Number Ordering Information

Part Number	Reel Size	Devices/Reel
SGA-2186-TR1	7"	1000
SGA-2186-TR2	13"	3000

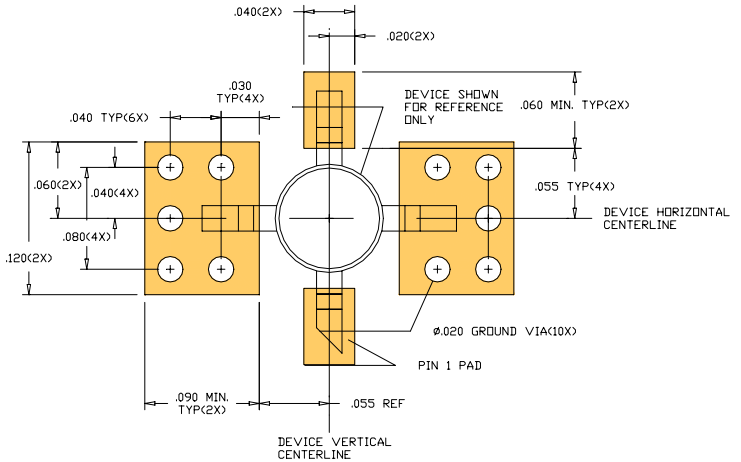
Recommended Bias Resistor Values					
Supply Voltage(Vs)	3V	5V	7.5V	9V	12V
Rbias (Ohms)	40	140	265	340	490

Package Dimensions

Pin Designation	
1	RF in
2	GND
3	RF out and Bias
4	GND



PCB Pad Layout



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