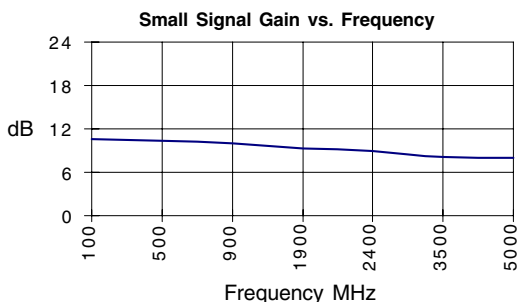


Product Description

Stanford Microdevices' SGA-4186 is a high performance cascadeable 50-ohm amplifier designed for operation at voltages as low as 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-4186 requires only DC blocking and bypass capacitors for external components.



Electrical Specifications at $T_a = 25^\circ\text{C}$

Symbol	Parameters: Test Conditions: $Z_0 = 50\ \Omega$, $I_d = 45\ \text{mA}$, $T = 25^\circ\text{C}$		Units	Min.	Typ.	Max.
$P_{1\text{dB}}$	Output Power at 1dB Compression	$f = 850\ \text{MHz}$ $f = 1950\ \text{MHz}$	dBm dBm		14.6 12.4	
S_{21}	Small Signal Gain	$f = \text{DC} - 1000\ \text{MHz}$ $f = 1000 - 2400\ \text{MHz}$ $f = 2400 - 6000\ \text{MHz}$	dB dB dB	9.0	10.0 9.0 8.0	
S_{12}	Reverse Isolation	$f = \text{DC} - 1000\ \text{MHz}$ $f = 1000 - 2400\ \text{MHz}$ $f = 2400 - 6000\ \text{MHz}$	dB dB dB		16.1 17.0 18.2	
S_{11}	Input VSWR	$f = \text{DC} - 2400\ \text{MHz}$ $f = 2400 - 6000\ \text{MHz}$	-		1.33:1 1.74:1	
S_{22}	Output VSWR	$f = \text{DC} - 2400\ \text{MHz}$ $f = 2400 - 6000\ \text{MHz}$	-		1.40:1 1.63:1	
IP_3	Third Order Intercept Point	$f = 850\ \text{MHz}$ $f = 1950\ \text{MHz}$	dBm dBm		28.3 25.5	
NF	Noise Figure	$f = \text{DC} - 1000\ \text{MHz}$ $f = 1000 - 2000\ \text{MHz}$	dB dB		4.7 5.3	
T_D	Group Delay	$f = 1000\ \text{MHz}$	pS		119.0	
V_D	Device Voltage		V	2.8	3.2	3.6

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SGA-4186

DC-6000 MHz Silicon Germanium Cascadeable Gain Block



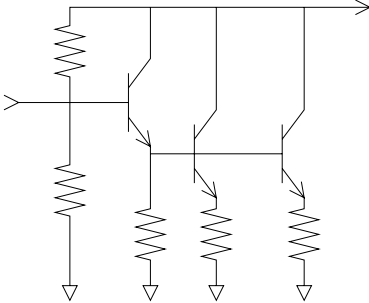
Product Features

- Excellent Broadband Performance - DC-6000 MHz Operation
- Single Voltage Supply
- High Output Intercept: +28.3dBm typ. at 850 MHz
- Low Current Draw: 45mA at 3.2V typ.
- Input/Output Matched to 50 Ohms

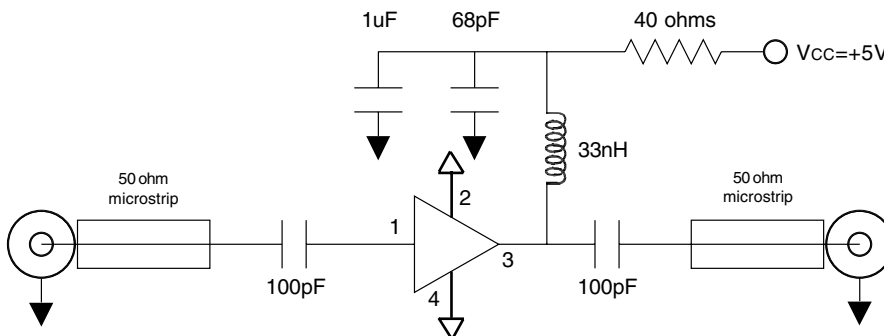
Applications

- Line Drivers for Optical Fiber
- PA for Low Power Applications
- Broadband Test Equipment
- Drivers for CATV Amplifiers

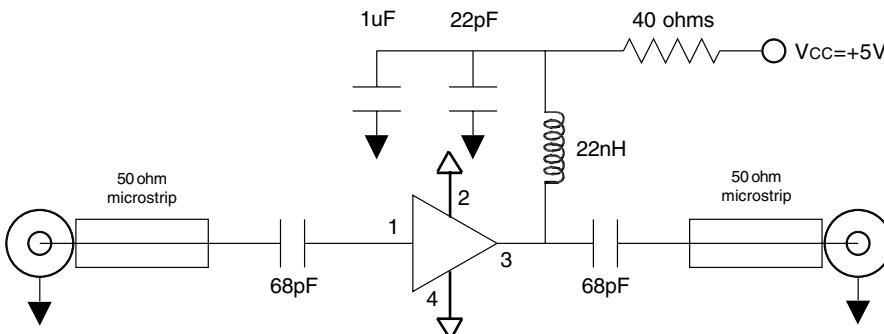
Parameter	Specification			Unit	Test Condition
	Min	Typ.	Max.		
Device Bias					T= 25C
Operating Voltage		3.2		V	
Operating Current		45.0		mA	
500 MHz					T= 25C
Gain		10.4		dB	
Noise Figure		4.6		dB	
Output IP3		29.3		dBm	
Output P1dB		13.6		dBm	
Input Return Loss		25.6		dB	
Isolation		16.0		dB	
850 MHz					T= 25C
Gain		10.0		dB	
Noise Figure		4.7		dB	
Output IP3		28.3		dBm	
Output P1dB		14.6		dBm	
Input Return Loss		16.2		dB	
Isolation		16.6		dB	
1950 MHz					T= 25C
Gain		9.2		dB	
Noise Figure		5.2		dB	
Output IP3		25.5		dBm	
Output P1dB		12.4		dBm	
Input Return Loss		17.9		dB	
Isolation		17.7		dB	
2400 MHz					T= 25C
Gain		8.9		dB	
Noise Figure		5.3		dB	
Output IP3		24.1		dBm	
Output P1dB		11.3		dBm	
Input Return Loss		22.8		dB	
Isolation		18.2		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	

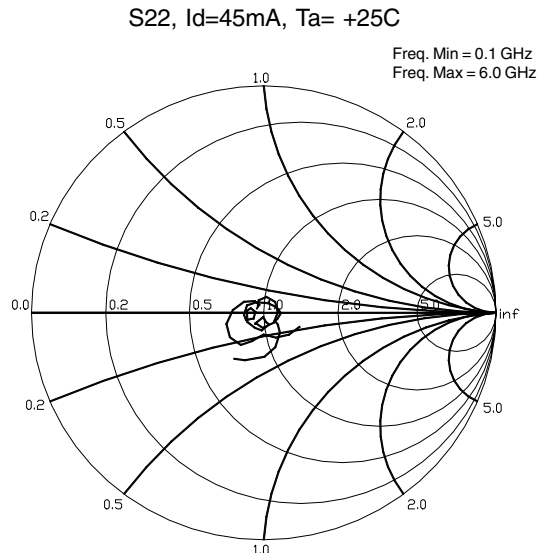
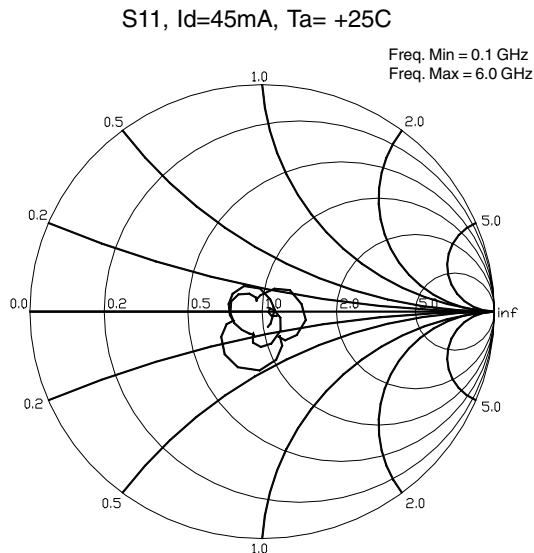
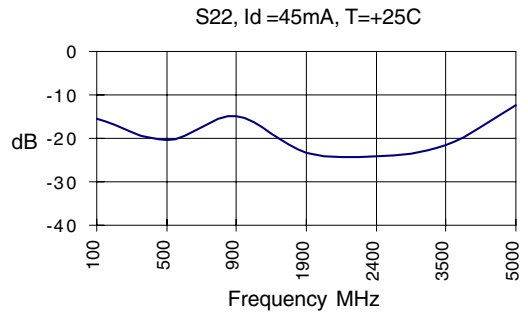
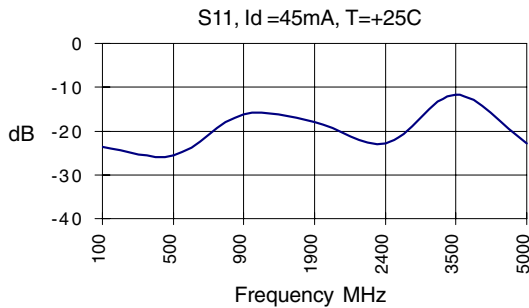
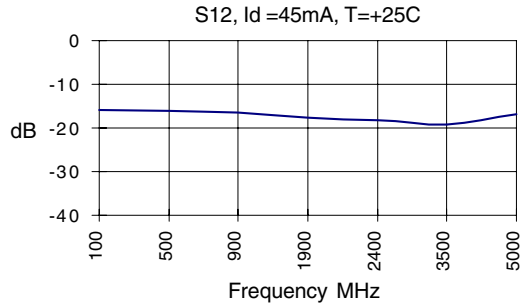
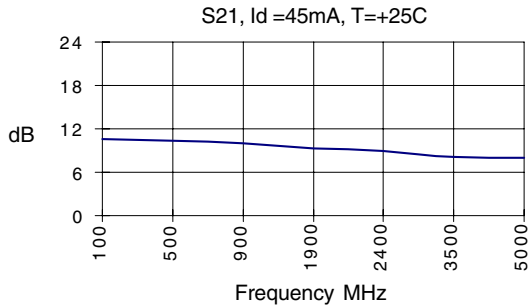
Application Schematic for +5V Operation at 900 MHz



Application Schematic for +5V Operation at 1900 MHz

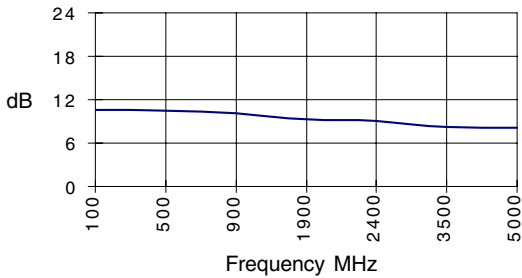


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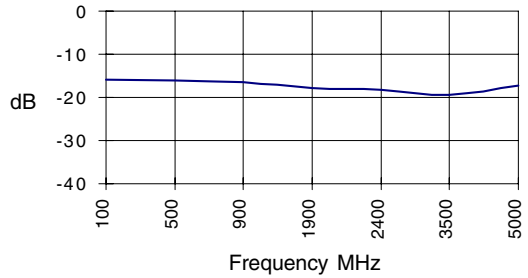


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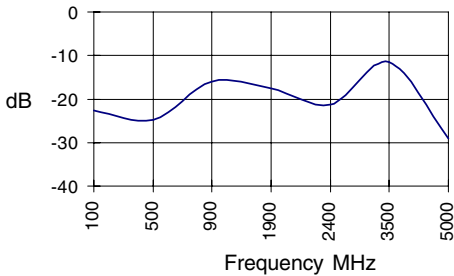
S21, Id =45mA, T=-40C



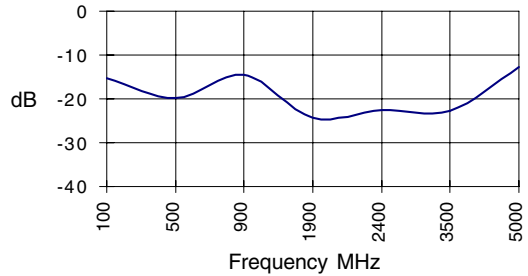
S12, Id =45mA, T=-40C



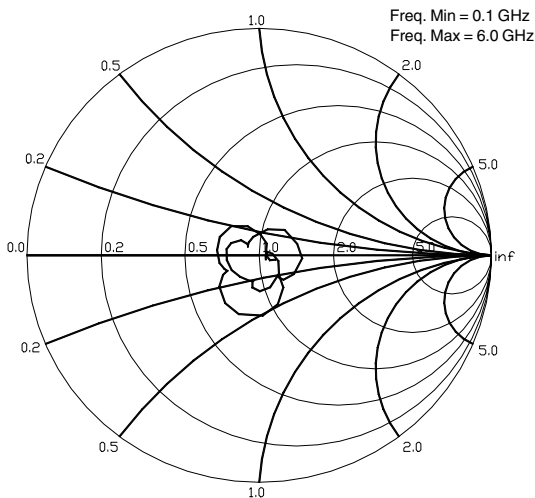
S11, Id =45mA, T=-40C



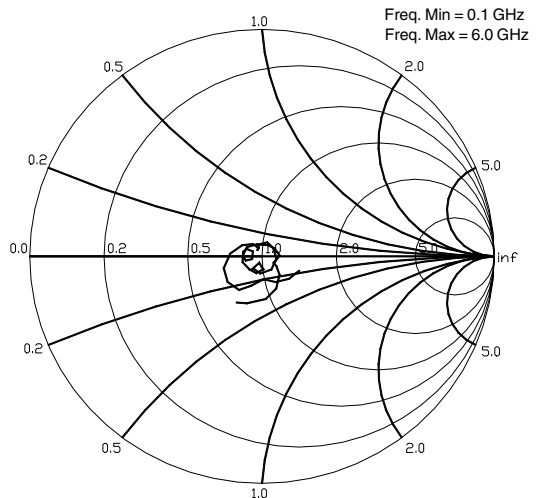
S22, Id =45mA, T=-40C



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

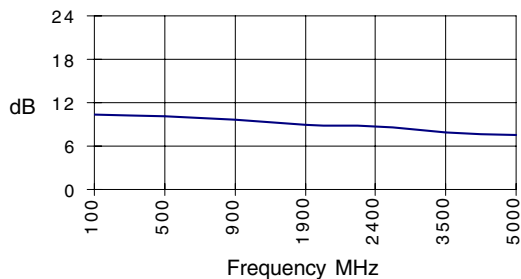


S22, Id=45mA, Ta= -40C

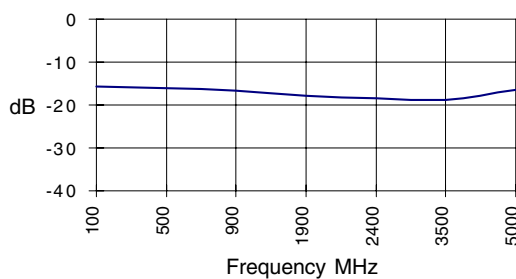


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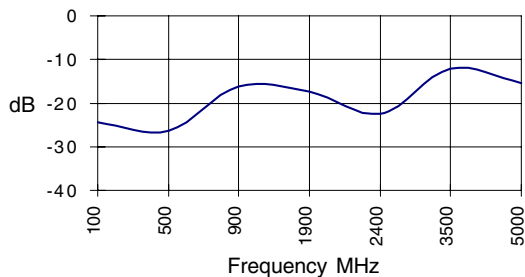
S21, Id =45mA, T=85C



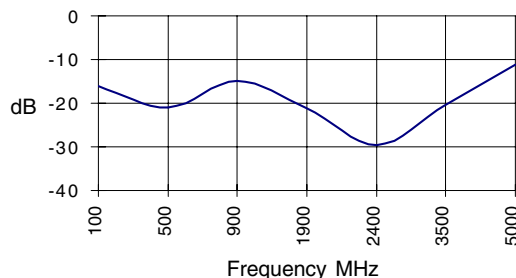
S12, Id =45mA, T=85C



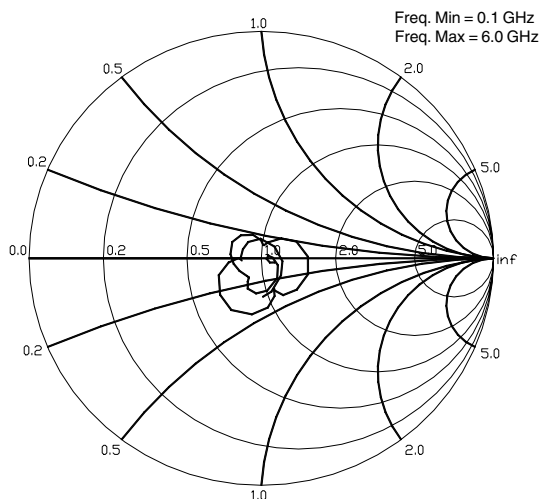
S11, Id =45mA, T=85C



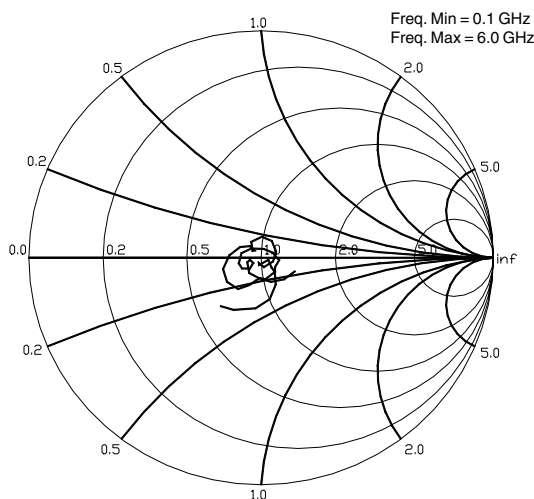
S22, Id =45mA, T=85C



S11, Id=45mA, Ta= 85C



S22, Id=45mA, Ta= 85C



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Absolute Maximum Ratings

Parameter	Value	Unit
Supply Current	90	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

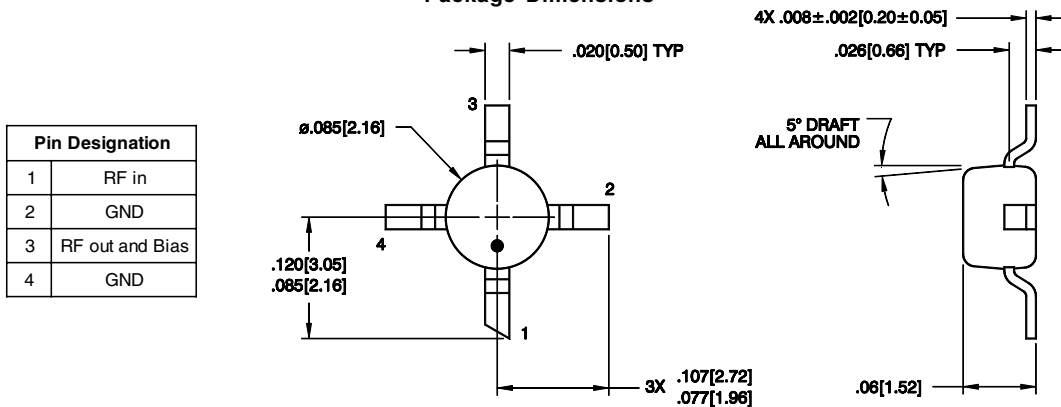
Part Number Ordering Information

Part Number	Reel Size	Devices/Reel
SGA-4186-TR1	7"	1000
SGA-4186-TR2	13"	3000

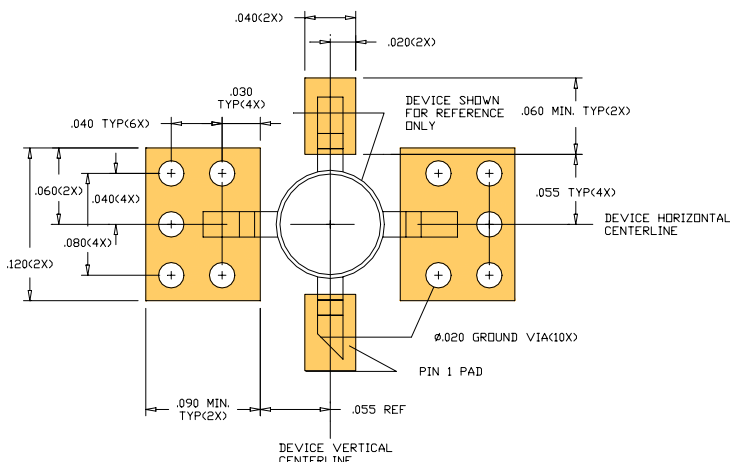
Recommended Bias Resistor Values

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

Package Dimensions



PCB Pad Layout



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