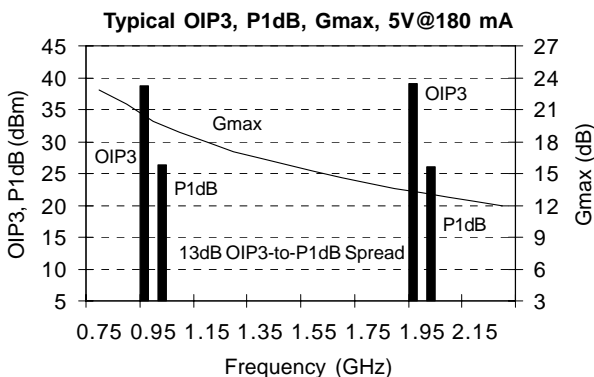


Product Description

Stanford Microdevices' SGA-9189 is a high performance amplifier designed for operation from DC to 3500 MHz. With optimal matching at 2 GHz, TOI=39 dBm and P1dB=26 dBm. This RF device uses the latest Silicon Germanium Heterostructure Bipolar Transistor (SiGe HBT) process. The process has a $V_{BCEO}=8V$ and an $f_T=25$ GHz. The SGA-9189 is cost-effective for applications requiring high linearity, even at moderate biasing levels.



Preliminary

SGA-9189

Silicon Germanium HBT Amplifier



Product Features

- DC-3500 MHz Operation
- High Output IP3, +39 dBm Typical at 1.96 GHz
- 11.9 dB Gain Typical at 1.96 GHz
- 26 dBm P1dB Typical at 1.96 GHz
- Cost Effective

Applications

- Wireless Infrastructure Driver Amplifiers
- CATV Amplifiers
- Wireless Data, WLL Amplifiers
- AN-021 contains detailed application circuits

Symbol	Device Characteristics, T = 25°C V _{CE} = 5V, I _{CQ} = 185 mA (unless otherwise noted)		Units	Min.	Typ.	Max.
G _{MAX}	Maximum Available Gain	f = 900 MHz, Z _S =Z _S [*] , Z _L =Z _L [*] f = 1960 MHz, Z _S =Z _S [*] , Z _L =Z _L [*]	dB		20.5 13.2	
S ₂₁ ²	Gain	f = 900 MHz, Z _S =Z _S ^{SOPT} , Z _L =Z _L ^{LOPT} f = 1960 MHz, Z _S =Z _S ^{SOPT} , Z _L =Z _L ^{LOPT}	dB		18.6 11.9	
P1dB	Output 1 dB compression point	f = 900 MHz, Z _S =Z _S ^{SOPT} , Z _L =Z _L ^{LOPT} f = 1960 MHz, Z _S =Z _S ^{SOPT} , Z _L =Z _L ^{LOPT}	dBm		26.3 26.1	
OIP ₃	Output Third Order Intercept Point	f = 900 MHz, Z _S =Z _S ^{SOPT} , Z _L =Z _L ^{LOPT} f = 1960 MHz, Z _S =Z _S ^{SOPT} , Z _L =Z _L ^{LOPT}	dBm		38.8 38.9	
V _{BCEO}	Collector - emitter breakdown voltage		V	7.5	8.5	
I _{CES}	Collector Cutoff current	V _{CE} =5V, V _{BE} =0V	μA		**	
h _{FE}	DC current gain			100	180	300
Rth	Thermal Resistance (junction to lead)		°C/W		47	

** Characterization in Progress

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SGA-9189 DC-3.5 GHz 5.0V SiGe HBT Amplifier

Absolute Maximum Ratings

Operation of this device above any one of these parameters may cause permanent damage.

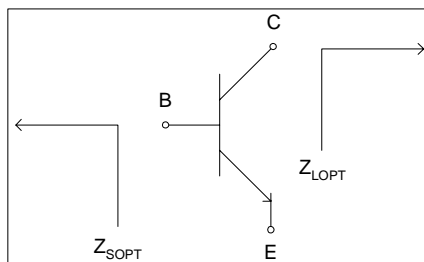
Bias Conditions should also satisfy the following expression: $I_{CE} V_{CE} (\text{max}) < (T_J - T_L) / R_{TH}$

Parameter	Symbol	Value	Unit
Base Current	I_B	10	mA
Collector Current	I_C	200	mA
Collector - Emitter Voltage	V_{CEO}	7.0	V
Collector - Base Voltage	V_{CBO}	18	V
Emitter - Base Voltage	V_{EB0}	4.8	V
Operating Temperature	T_{OP}	-40 to +85	C
Storage Temperature Range	T_{stor}	-40 to +150	C
Operating Junction Temperature	T_J	+150	C

Typical Performance - Engineering Application Circuits (See AN-021)

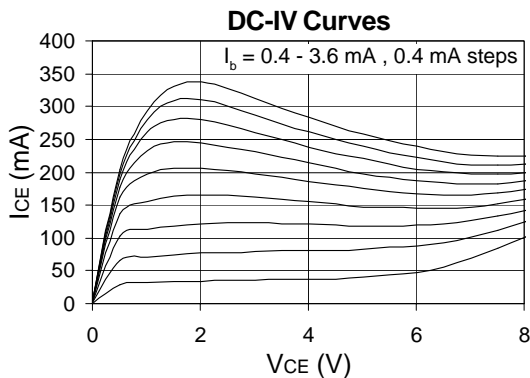
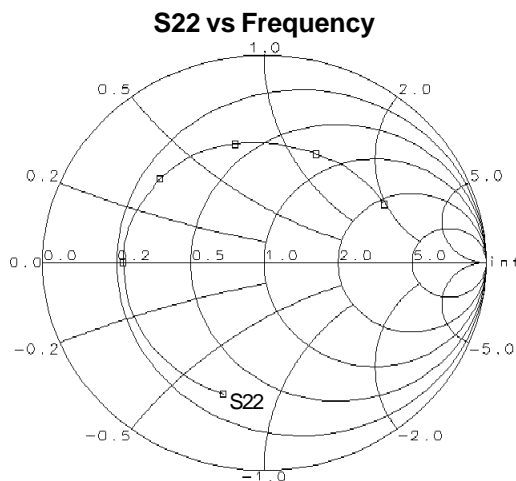
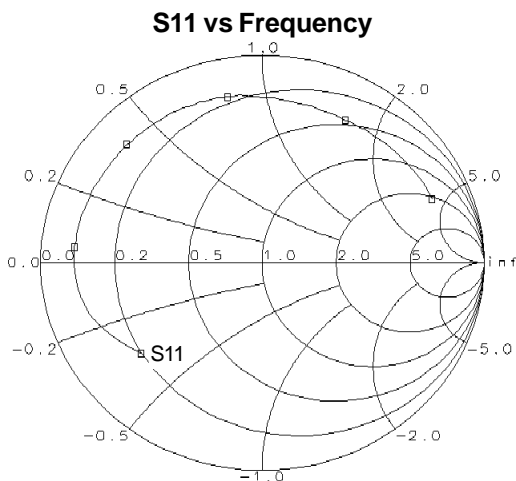
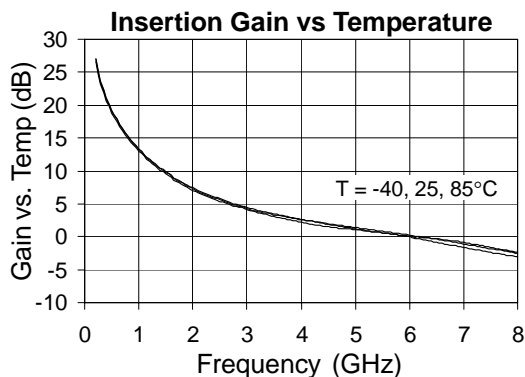
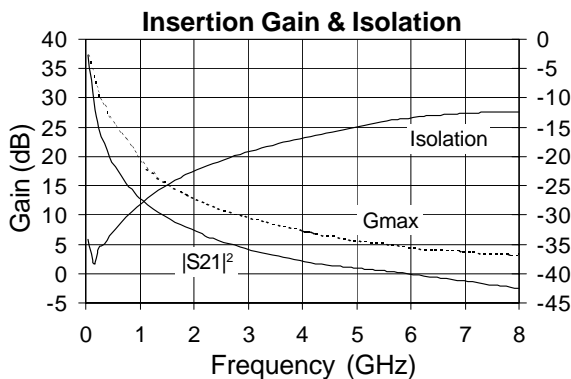
Freq (MHz)	V_{CE} (V)	I_{CQ} (mA)	P1dB (dBm)	OIP3 (dBm)	Gain (dB)	S11 (dB)	S22 (dB)	Z_{SOPT} Mag \angle Ang	Z_{LOPT} Mag \angle Ang
500	5	**	**	**	**	**	**	**	**
	3	**	**	**	**	**	**	**	**
945	5	184	26.2	38.1	18.3	-18	-16	**	**
	3	165	22.1	34.3	17.7	-18	-11	**	**
1960	5	179	26.0	39.1	11.7	-15	-18	**	**
	3	162	22.4	35.0	11.8	-18	-16	**	**
2140	5	**	**	**	**	**	**	**	**
	3	**	**	**	**	**	**	**	**
2450	5	**	**	**	**	**	**	**	**
	3	**	**	**	**	**	**	**	**

Data above represents typical performance of the application circuits noted in Application Note AN-021. Refer to the application note for additional RF data, PCB layouts, and BOMs for each application circuit. The application note also includes biasing instructions and other key issues to be considered. For the latest application notes please visit our site at www.stanfordmicro.com or call your local sales representative.



** Characterization in Progress

De-embedded S-Parameters ($Z_s=Z_L=50\ \Omega$, $V_{CE}=5V$, $I_{CQ}=185mA$, $25^\circ C$)



Note: S-parameters are de-embedded to the device leads. The data represents typical performance of the device. Measured s-parameter data files can be downloaded using a link found on the SGA-9189 device page from our web site at www.stanfordmicro.com.

SGA-9189 DC-3.5 GHz 5.0V SiGe HBT Amplifier



Caution: ESD sensitive

Appropriate precautions in handling, packaging and testing devices must be observed.

Pin Description

Pin #	Function	Description
1	Base	Base pin.
2	GND & Emitter	Connection to ground. Use via holes to reduce lead inductance. Place vias as close to ground leads as possible.
3	Collector	Collector pin.
4	GND & Emitter	Same as Pin 2

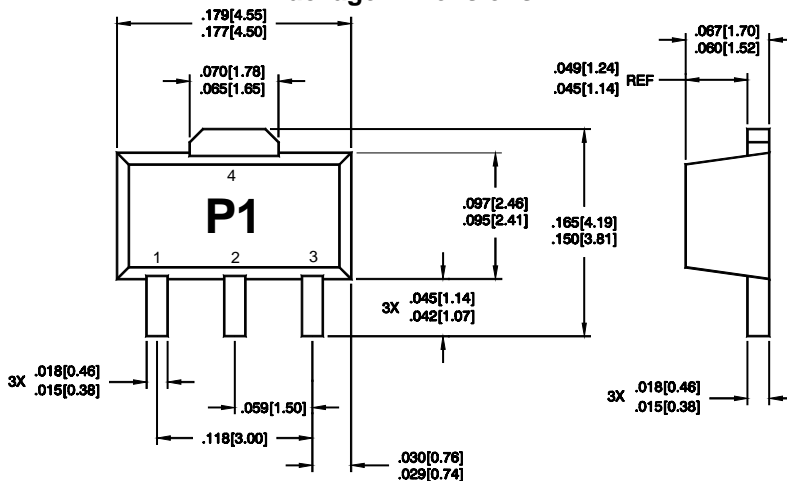
Part Number Ordering Information

Part Number	Reel Size	Devices/Reel
SGA-9189	13"	3000

Part Symbolization

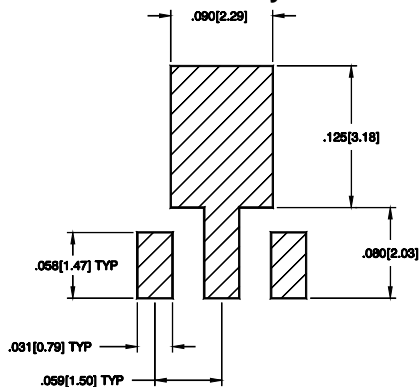
The part will be symbolized with "P1" designator on the top surface of the package.

Package Dimensions

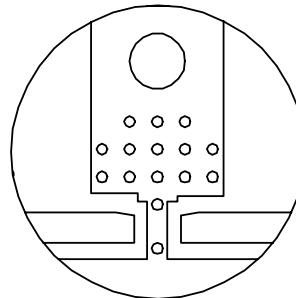


Pin assignments shown for reference only, not marked on part

PCB Pad Layout



Recommended via and mounting hole pattern (RF Ground and Thermal considerations)



DIMENSIONS ARE IN INCHES [MM]

Use multiple plated-through vias holes located close to the package pins to ensure a good RF ground connection to a continuous groundplane on the backside of the board.