

SGA-2286(Z)

DC to 5000 MHz, CASCADABLE SiGe HBT MMIC AMPLIFIER

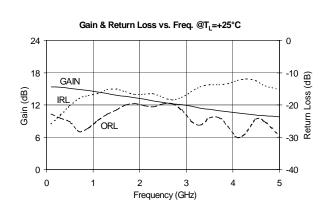
RFMD Green, RoHS Compliant, Pb-Free (Z Part Number)
Package: SOT-86



Product Description

The SGA-2286 is a high performance SiGe HBT MMIC Amplifier. A Darlington configuration featuring one-micron emitters provides high F_T and excellent thermal performance. The heterojunction increases breakdown voltage and minimizes leakage current between junctions. Cancellation of emitter junction non-linearities results in higher suppression of intermodulation products. Only two DC-blocking capacitors, a bias resistor, and an optional RF choke are required for operation.





Features

- High Gain: 14dB at 1950MHz
- Cascadable 50Ω
- Operates from Single Supply
- Low Thermal Resistance Package

Applications

- PA Driver Amplifier
- Cellular, PCS, GSM, UMTS
- IF Amplifier
- Wireless Data, Satellite

Davamatav	Specification			Hoit	Oan dition	
Parameter	Min.	in. Typ. Max.		Unit	Condition	
Small Signal Gain	13.5	15.0	16.5	dB	850MHz	
		14.0		dB	1950MHz	
		12.6		dB	2400MHz	
Output Power at 1dB Compression		8.3		dBm	850 MHz	
		7.0		dBm	1950MHz	
Output Third Intercept Point		20.0		dBm	850MHz	
		19.4		dBm	1950MHz	
Bandwidth Determined by Return Loss (>10dB)		5000		MHz		
Input Return Loss		16.8		dB	1950MHz	
Output Return Loss		19.5		dB	1950MHz	
Noise Figure		3.5		dB	1950MHz	
Device Operating Voltage	1.9	2.2	2.5	V		
Device Operating Current	17	20	23	mA		
Thermal Resistance (Junction - Lead)		97		°C/W		

Test Conditions: $V_S = 5V$, $I_D = 20$ mA Typ., OIP_3 Tone Spacing = 1MHz, P_{OIIT} per tone = -10dBm, $R_{BIAS} = 140\Omega$, $T_L = 25$ °C, $Z_S = Z_L = 50\Omega$

SGA-2286(Z)



Absolute Maximum Ratings

Parameter	Rating	Unit
Max Device Current (I _D)	40	mA
Max Device Voltage (V _D)	4	V
Max RF Input Power	+18	dBm
Max Junction Temp (T _J)	+150	°C
Operating Temp Range (T _L)	-40 to +85	°C
Max Storage Temp	+150	°C

Operation of this device beyond any one of these limits may cause permanent damage. For reliable continuous operation, the device voltage and current must not exceed the maximum operating values specified in the table on page one. Bias Conditions should also satisfy the following expression: $I_DV_D < (T_J - T_L) / R_{TH}, j - I_J > I_J >$



Caution! ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

RoHS status based on EU Directive 2002/95/EC (at time of this document revision).

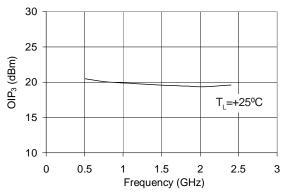
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Typical Performance at Key Operating Frequencies

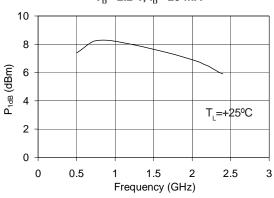
Parameter	Unit	100 MHz	500MHz	850MHz	1950MHz	2400 MHz	3500 MHz
Small Signal Gain	dB		15.1	15.0	14.0	12.6	
Output Third Order Intercept Point	dBm		20.5	20.0	19.4	19.6	
Output Power at 1dB Compression	dBm		7.4	8.3	7.0	5.9	
Input Return Loss	dB	25.6	20.3	17.1	16.8	16.9	13.7
Output Return Loss	dB	22.8	25.2	27.1	19.5	20.1	24.0
Reverse Isolation	dB	18.3	18.5	18.7	19.0	19.1	19.5
Noise Figure	dB		3.2	3.2	3.5	3.8	

 $Test \ Conditions: V_S = 5V, \ I_D = 20 \ mA \ Typ., \ OIP_3 \ Tone \ Spacing = 1 \ MHz, \ P_{OUT} \ per \ tone = -10 \ dBm, \ R_{BIAS} = 140 \ \Omega, \ T_L = 25 \ ^\circ C, \ Z_S = Z_L = 50 \ \Omega$

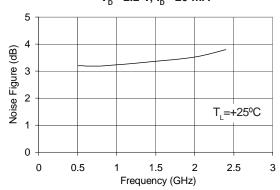




P_{1dB} vs. Frequency $V_D = 2.2 \text{ V}, I_D = 20 \text{ mA}$

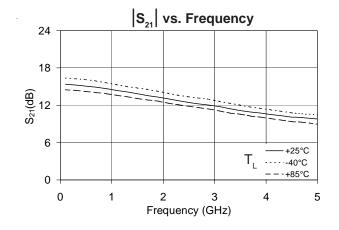


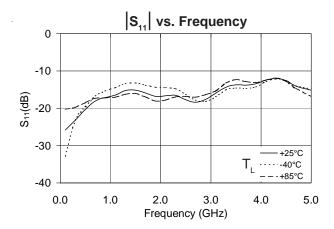
Noise Figure vs. Frequency $V_p = 2.2 \text{ V}, I_p = 20 \text{ mA}$

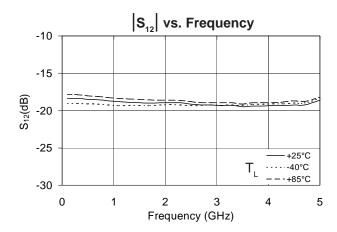


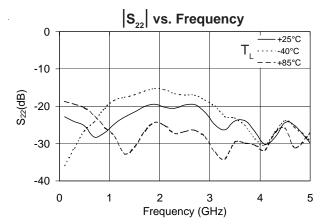


Typical RF Performance Over Temperature (Bias: $V_D = 2.2V$, $I_D = 20 \text{ mA}$ (Typ.))





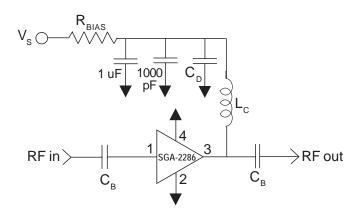


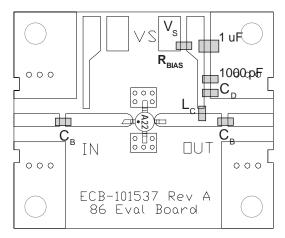




Pin	Function	Description
1	RF IN	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.
2, 4	GND	Connection to ground. Use via holes for best performance to reduce lead inductance as close to ground leads as possible.
3	RF OUT/BIAS	RF output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

Basic Application Circuit





Deference	Frequency (Mhz)					
Reference Designator	500	850	1950	2400	3500	
$C_{_{\rm B}}$	220 pF	100 pF	68 pF	56 pF	39 pF	
C_D	100 pF	68 pF	22 pF	22 pF	15 pF	
L _c	68 nH	33 nH	22 nH	18 nH	15 nH	

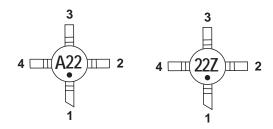
Recommended Bias Resistor Values for $I_D=20$ mA $R_{BIAS}=(V_S-V_D)/I_D$					
Supply Voltage(V _s)	5 V	6 V	8 V	10 V	
R_{BIAS} 140^{Ω} 200^{Ω} 300^{Ω} 390^{Ω}					
Note: R _{plas} provides DC bias stability over temperature.					

Mounting Instructions

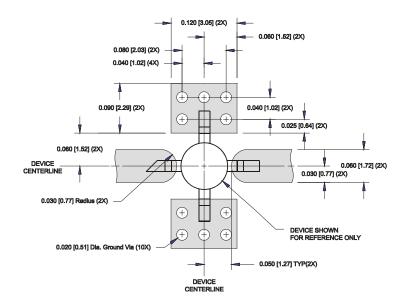
- 1. Use a large ground pad area under device pins 2 and 4 with many plated through-holes as shown.
- We recommend 1 or 2 ounce copper. Measurements for this data sheet were made on a 31 mil thick FR-4 board with 1 ounce copper on both sides.



Part Identification



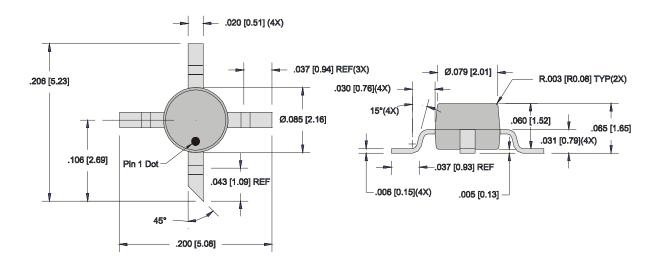
Suggested Pad Layout





Package Drawing

Dimensions in inches (millimeters)
Refer to drawing posted at www.rfmd.com for tolerances.



Ordering Information

Part Number	Reel Size	Devices/Reel		
SGA-2286	13"	3000		
SGA-2286Z	13"	3000		