SGA-6389

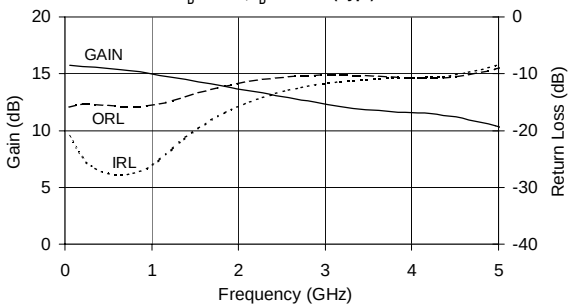
DC-4500 MHz, Cascadable SiGe HBT MMIC Amplifier

Product Description

Sirenza Microdevices' SGA-6389 is a high performance SiGe HBT MMIC Amplifier. A Darlington configuration featuring 1 micron emitters provides high F_T and excellent thermal perfomance. The heterojunction increases breakdown voltage and minimizes leakage current between junctions. Cancellation of emitter junction non-linearities results in higher suppression of intermodulation products. At 850 Mhz and 80mA , the SGA-6389 typically provides +35.2 dBm output IP3, 15.5 dB of gain, and +20.2 dBm of 1dB compressed power using a single positive voltage supply. Only 2 DC-blocking capacitors, a bias resistor and an optional RF choke are required for operation.

Gain & Return Loss vs. Frequency

V_D= 4.9 V, I_D= 80 mA (Typ.)



Product Features

- **Broadband Operation: DC-4500 MHz**
- **Cascadable 50ohm**
- **Patented SiGe Technology**
- **Operates From Single Supply**
- **Low Thermal Resistance Package**

Applications

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

Symbol	Parameter	Units	Freq. (MHz)	Min.	Typ.	Max.
G	Small Signal Gain	dB	850 1950 2400	14.3 12.8	15.5 14.0 13.3	17.0 15.2
P_{1dB}	Output Power at 1dB Compression	dBm	850 1950	17.5	20.2 19.0	
OIP_3	Output Third Order Intercept Point	dBm	850 1950	30.6	35.2 32.6	
Bandwidth	Determined by Return Loss (>10dB)	MHz			4500	
IRL	Input Return Loss	dB	1950	13.1	18.9	
ORL	Output Return Loss	dB	1950	10.0	12.5	
NF	Noise Figure	dB	1950		4.2	5.2
V_D	Device Operating Voltage	V		4.6	4.9	5.2
I_D	Device Operating Current	mA		72	80	88
R_{TH}, j-l	Thermal Resistance (junction to lead)	°C/W			92	

Test Conditions: V_S = 8v, I_D = 80mA Typ., OIP3 Tone Spacing = 1 MHz, Pout per tone = 0 dBm; R_{BIAS} = 39 ohms, T_L = 25ºC, Z_S = Z_L = 50 Ohms

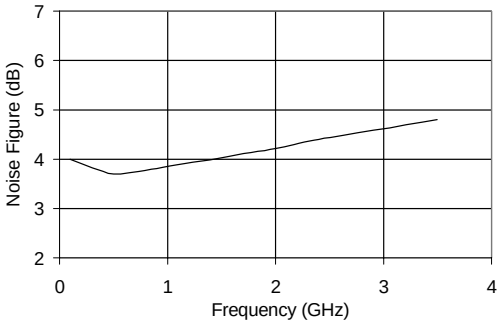
522 Almanor Ave., Sunnyvale, CA 94085 Phone: (800) SMI-MMIC http://www.sirenza.com

Typical RF Performance at Key Operating Frequencies

Symbol	Parameter	Unit	Frequency (MHz) 100	500	850	1950	2400	3500
G	Small Signal Gain	dB	15.7	15.6	15.5	14.0	13.3	12.0.
OIP_3	Output Third Order Intercept Point	dBm	36.6	36.0	35.2	32.6	31.2	26.8
P_{1dB}	Output Power at 1dB Compression	dBm	20.1	20.4	20.2	19.0	18.1	15.5
IRL	Input Return Loss	dB	22.3	27.5	27.4	18.9	13.7	11.0
ORL	Output Return Loss	dB	14.7	14.5	14.8	12.5	10.8	10.4
S_{12}	Reverse Isolation	dB	20.4	20.2	20.3	20.1	19.7	18.2
NF	Noise Figure	dB	4.0	3.7	3.8	4.2	4.4	4.8

Test Conditions: V_S = 8v, R_{BIAS} = 39 ohms, I_D = 80mA Typ., T_L = 25ºC, OIP3 Tone Spacing = 1 MHz, Pout per tone = 0 dBm, $Z_S = Z_L$ = 50 Ohms

Noise Figure vs. Frequency
V_D= 4.9 V, I_D= 80 mA



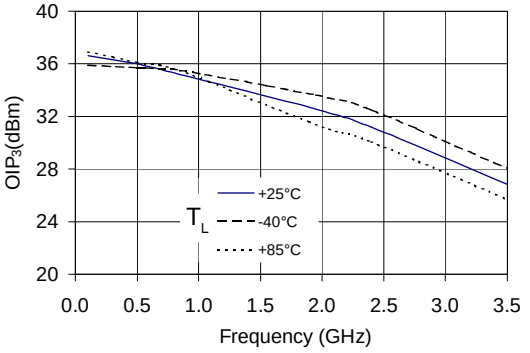
Absolute Maximum Ratings

Parameter	Absolute Limit
Max. Device Current (I_D)	160 mA
Max. Device Voltage (V_D)	7 V
Max. RF Input Power	+18 dBm
Max. Junction Temp. (T_J)	+150°C
Operating Temp. Range (T_L)	-40°C to +85°C
Max. Storage Temp.	+150°C

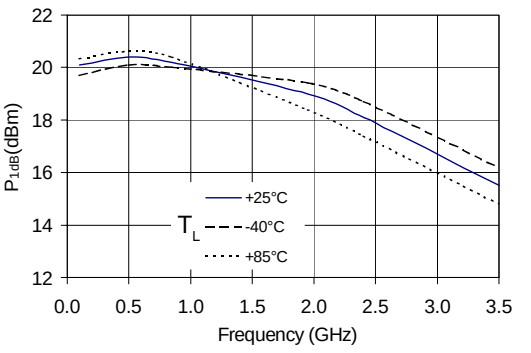
Operation of this device beyond any one of these limits may cause permanent damage. For reliable continous operation, the device voltage and current must not exceed the maximum operating values specified in the table on page one.

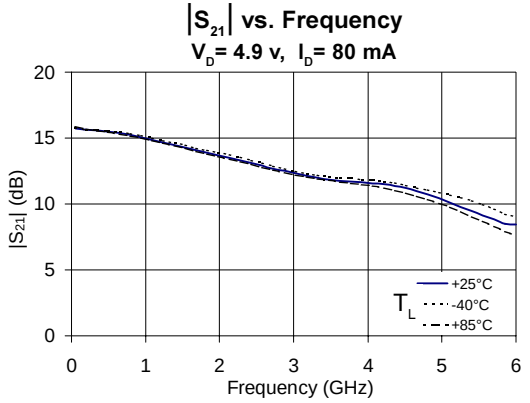
Bias Conditions should also satisfy the following expression:
$I_D V_D < (T_J - T_L) / R_{TH}$, j-l

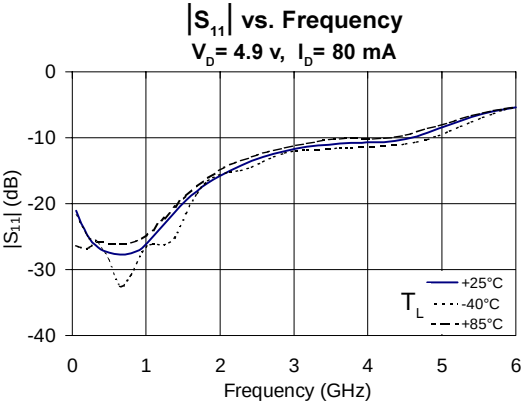
OIP_3 vs. Frequency
V_D= 4.9 V, I_D= 80 mA

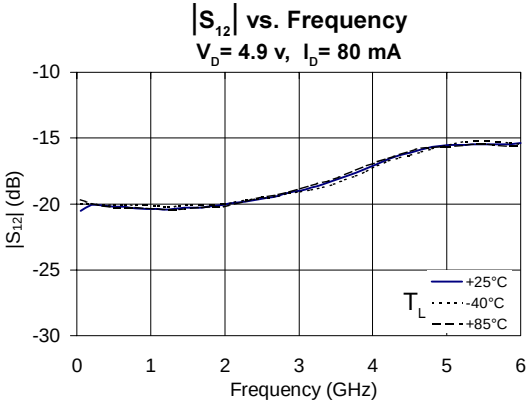


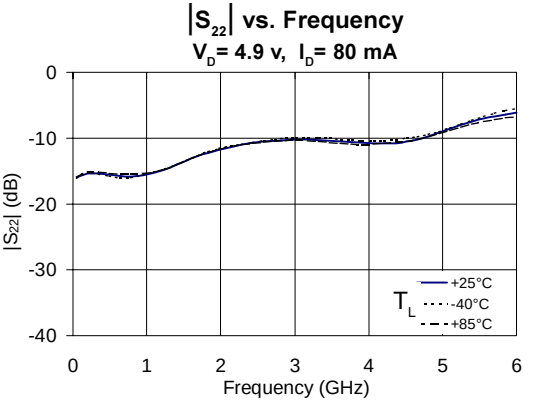
P_{1dB} vs. Frequency
V_D= 4.9 v, I_D= 80 mA

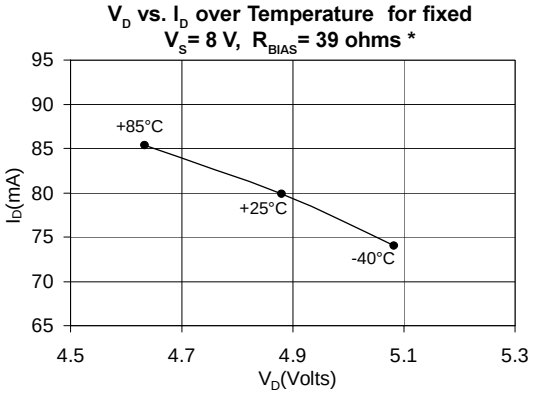


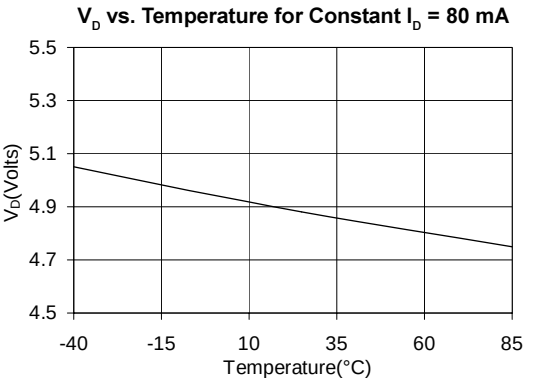






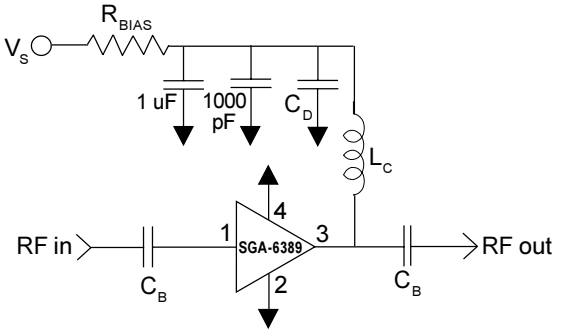


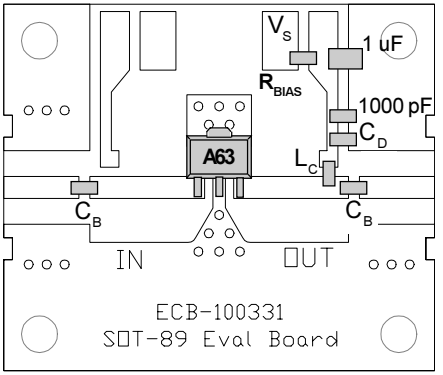




* Note: In the applications circuit on page 4, R_{BIAS} compensates for voltage and current variation over temperature.

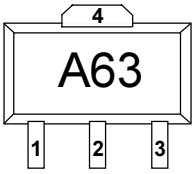
Basic Application Circuit





Part Identification Marking

The part will be marked with an "A63" designator on the top surface of the package.



Application Circuit Element Values

Reference Designator	Frequency (Mhz)				
	500	850	1950	2400	3500
C_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=80mA $R_{BIAS}=(V_S-V_D)/I_D$				
Supply Voltage(V_S)	7 V	8 V	10 V	12 V
R_{BIAS}	27 Ω	39 Ω	62 Ω	91 Ω
Note: R_{BIAS} provides DC bias stability over temperature.				

Mounting Instructions

1. Solder the copper pad on the backside of the device package to the ground plane.
2. Use a large ground pad area with many plated through-holes as shown.
3. 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.

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. For optimum RF performance, use via holes as close to ground leads as possible to reduce lead inductance.
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.

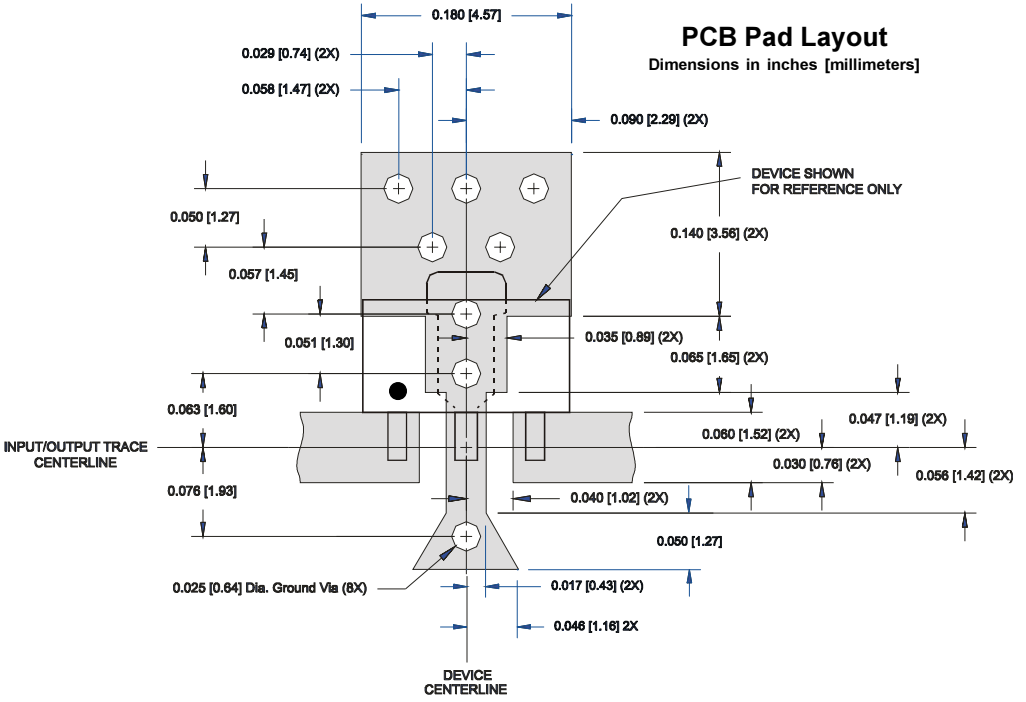
Caution: ESD sensitive
Appropriate precautions in handling, packaging and testing devices must be observed.

Part Number Ordering Information

Part Number	Reel Size	Devices/Reel
SGA-6389	13"	3000

PCB Pad Layout

Dimensions in inches [millimeters]



Nominal Package Dimensions

Dimensions in inches [millimeters]

Refer to package drawing posted at *www.sirenza.com* for tolerances.