Preliminary Information

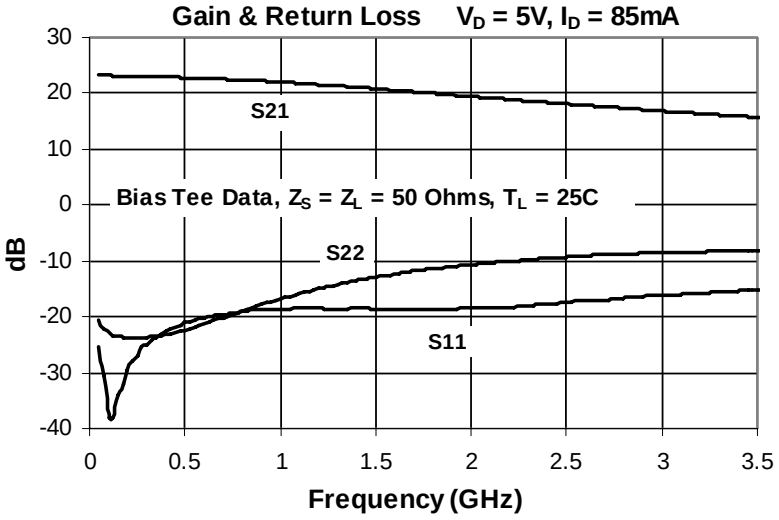
SGC-6489Z

RoHS Compliant & Green Package

50-3500 MHz Silicon Germanium Active Bias Gain Block

Product Description

Sirenza Microdevices' SGC-6489Z is a high performance SiGe HBT MMIC amplifier utilizing a Darlington configuration with an active bias network. The active bias network provides stable current over temperature and process Beta variations. Designed to run directly from a 5V supply, the SGC-6489Z does not require a dropping resistor as compared to traditional Darlington amplifiers. The SGC-6489Z product is designed for high linearity 5V gain block applications that require small size and minimal external components. It is internally matched to 50 ohms.



Product Features

- Single Supply Operation: 5V @ Id = 85mA
- No Dropping Resistor required
- Patented Self Bias Circuitry
- Gain = 19.5 dBm at 1950 MHz
- P1dB = 19.2 dBm at 1950 MHz
- IP3 = 32.8 dBm at 1950 MHz
- Robust 1000V ESD, Class 1C HBM

Applications

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

Symbol	Parameters	Units	Frequency	Min.	Typ.	Max.
G	Small Signal Gain	dB	850 MHz 1950 MHz 2400 MHz		22.2 19.5 18.3	
P_{1dB}	Output Power at 1dB Compression	dBm	850 MHz 1950 MHz 2400 MHz		20.6 19.2 18.4	
OIP_3	Output Third Order Intercept Point	dBm	850 MHz 1950 MHz 2400 MHz		34.1 32.8 31.4	
IRL	Input Return Loss	dB	1950 MHz		18	
ORL	Output Return Loss	dB	1950 MHz		11	
NF	Noise Figure	dB	1930 MHz		2.4	
V_D	Device Operating Voltage	V			5	
I_D	Device Operating Current	mA		76	85	94
Rth, j-l	Thermal Resistance (junction to lead)	°C/W			70	

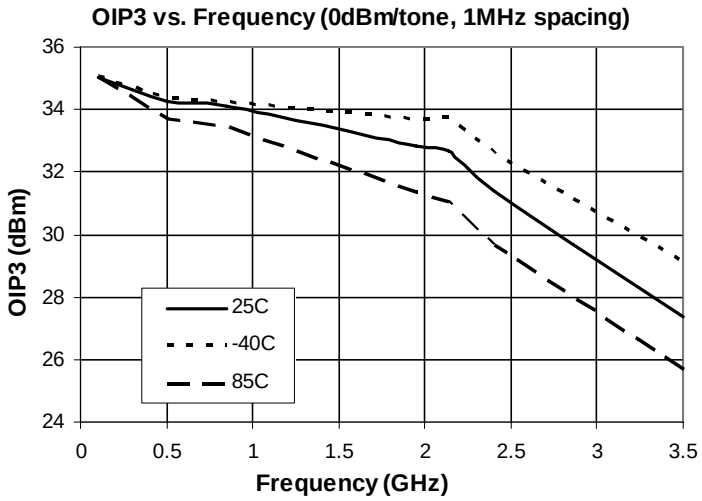
Test Conditions: V_D = 5.0V, I_D = 85mA, T_L = 25°C, OIP_3 Tone Spacing = 1MHz; Bias Tee Data, Z_S = Z_L = 50 Ohms, Pout per tone = 0 dBm

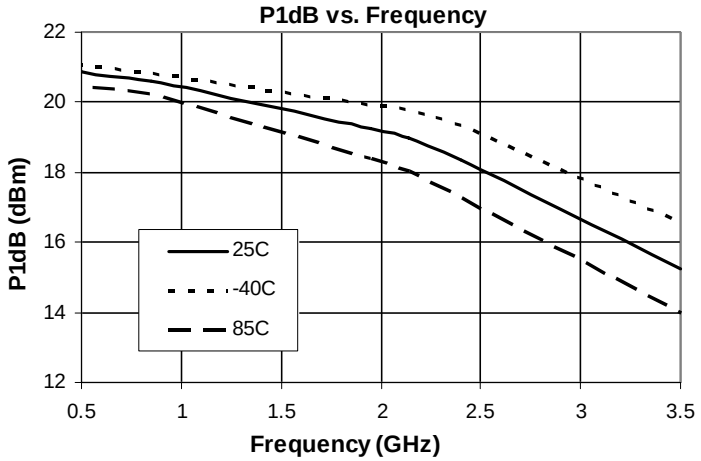
Typical RF Performance at Key Operating Frequencies (Bias Tee Data)

Symbol	Parameter	Unit	Frequency (MHz)						
			100	500	850	1950	2140	2400	3500
G	Small Signal Gain	dB	23.1	22.7	22.2	19.5	19.0	18.3	15.7
OIP_3	Output Third Order Intercept Point	dBm	35.1	34.3	34.1	32.8	32.7	31.4	27.4
P_{1dB}	Output Power at 1dB Compression	dBm	21.8	20.9	20.6	19.2	19.0	18.4	15.2
IRL	Input Return Loss	dB	37	22	19	18	18	17	16
ORL	Output Return Loss	dB	23	22	19	11	11	10	8
S_{12}	Reverse Isolation	dB	25	25	26	25	25	24	22
NF	Noise Figure	dB	1.8	2.0	2.1	2.4	2.4	2.5	2.9

Test Conditions: V_D = 5V I_D = 85mA OIP_3 Tone Spacing = 1MHz, Pout per tone = 0 dBm
T_L = 25°C $Z_S = Z_L$ = 50 Ohms

Typical Performance with Bias Tees, V_D = 5V, I_D = 85mA





Absolute Maximum Ratings

Parameter	Absolute Limit
Max Device Current (I_{CE})	100 mA
Max Device Voltage (V_{CE})	7 V
Max. RF Input Power* (See Note)	+16 dBm
Max. Junction Temp. (T_J)	+150°C
Operating Temp. Range (T_L)	-40°C to +85°C
Max. Storage Temp.	+150°C

***Note:** Load condition, Z_L = 50 Ohms

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:

$I_D V_D < (T_J - T_L) / R_{TH, j-l}$ $T_L = T_{LEAD}$

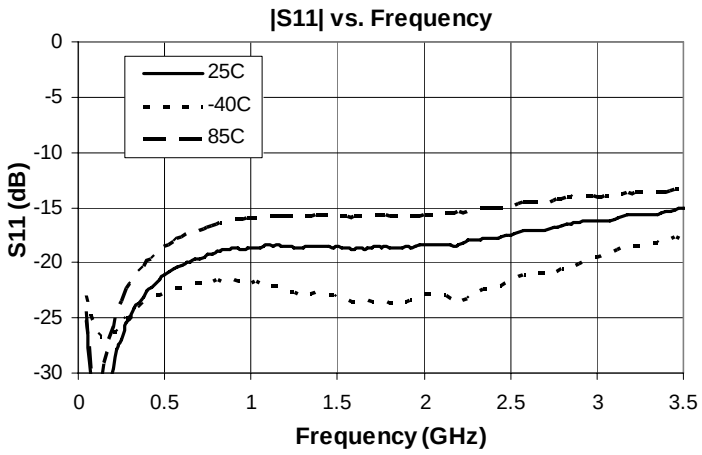
Reliability & Qualification Information

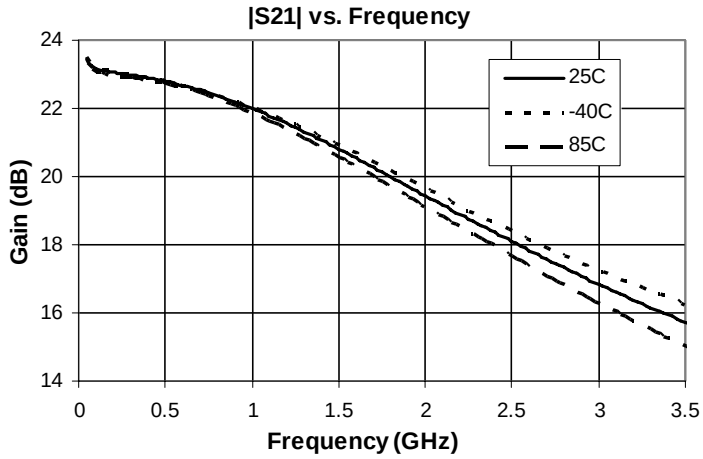
Parameter	Rating
ESD Rating - Human Body Model (HBM)	Class 1C
Moisture Sensitivity Level	MSL 1

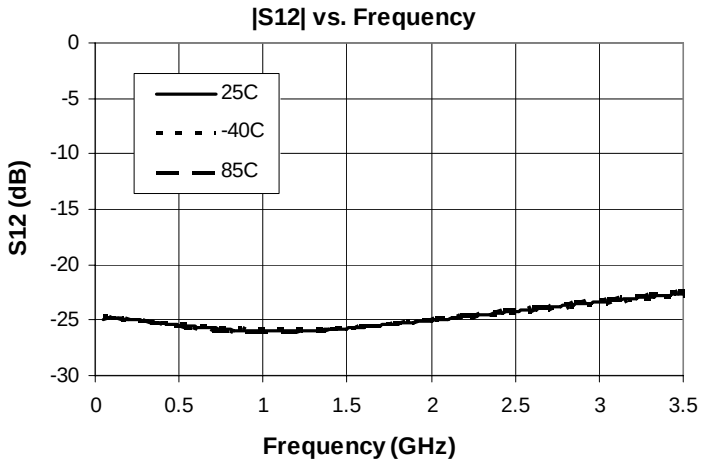
This product qualification report can be downloaded at *www.sirenza.com*

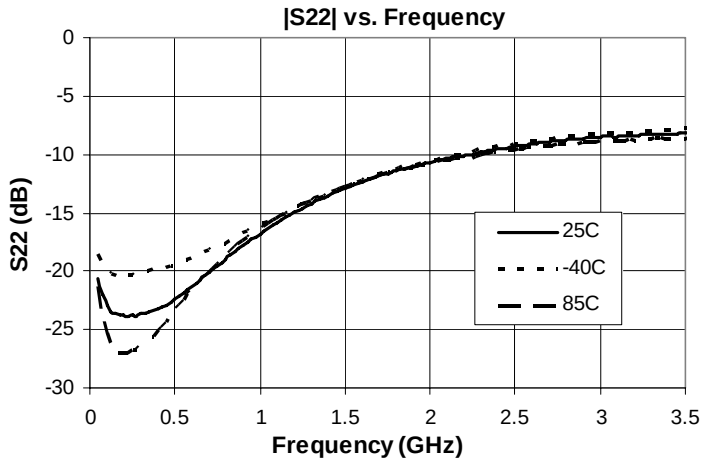
Caution: ESD sensitive
Appropriate precautions in handling, packaging and testing devices must be observed.

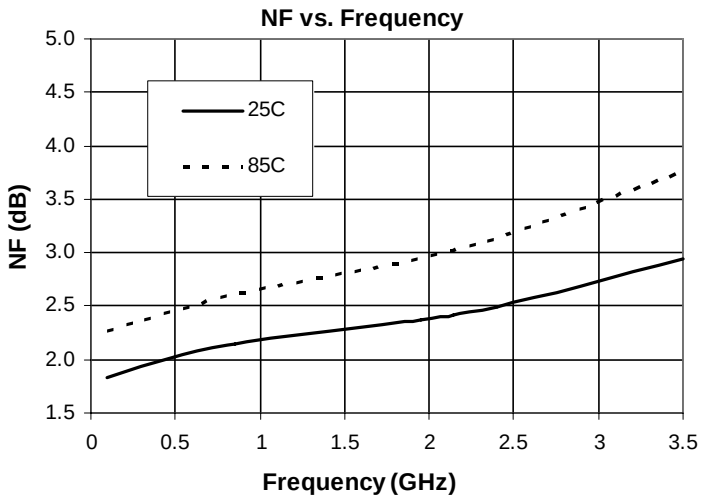
Typical Performance with Bias Tees, V_D = 5V, I_D = 85mA

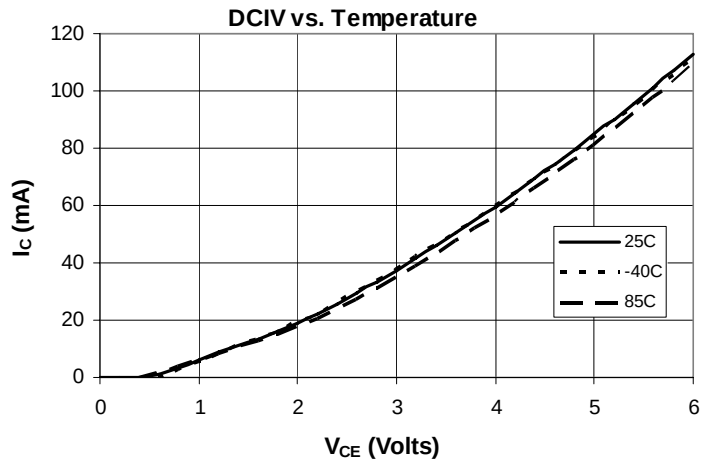




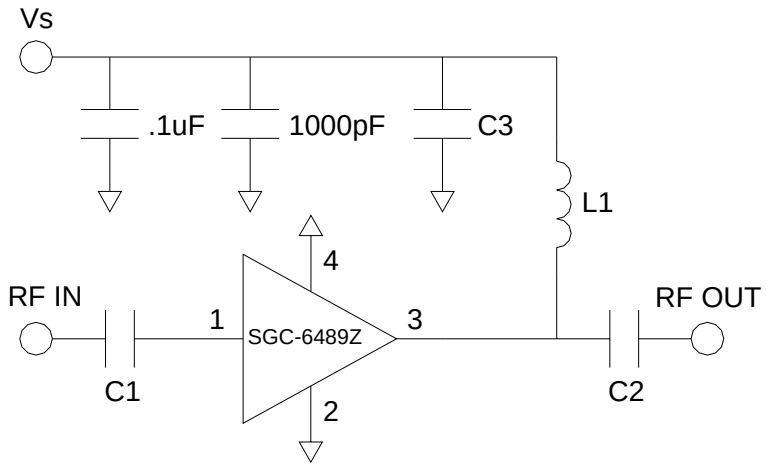






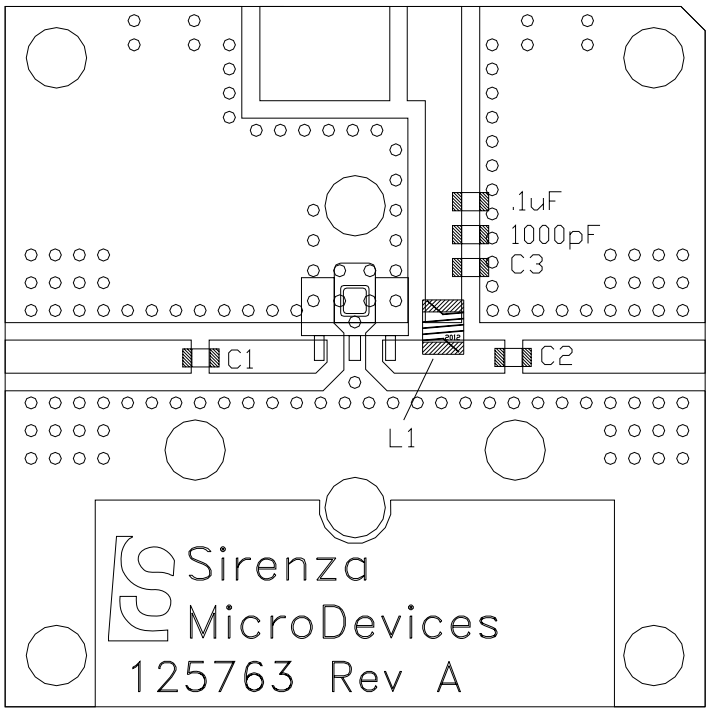


Basic Application Circuit



Application Circuit Element Values

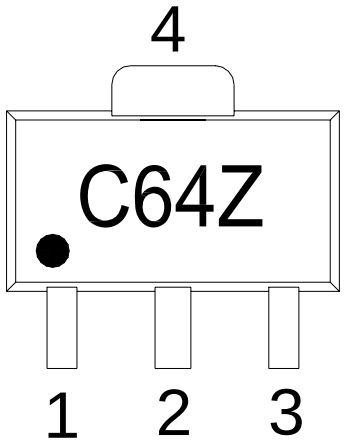
Reference Designator	500 - 2100 MHz
C1	43pF
C2	43pF
C3	100pF
L1	48nH 0805HQ CC



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.

Part Identification Marking & Pinout



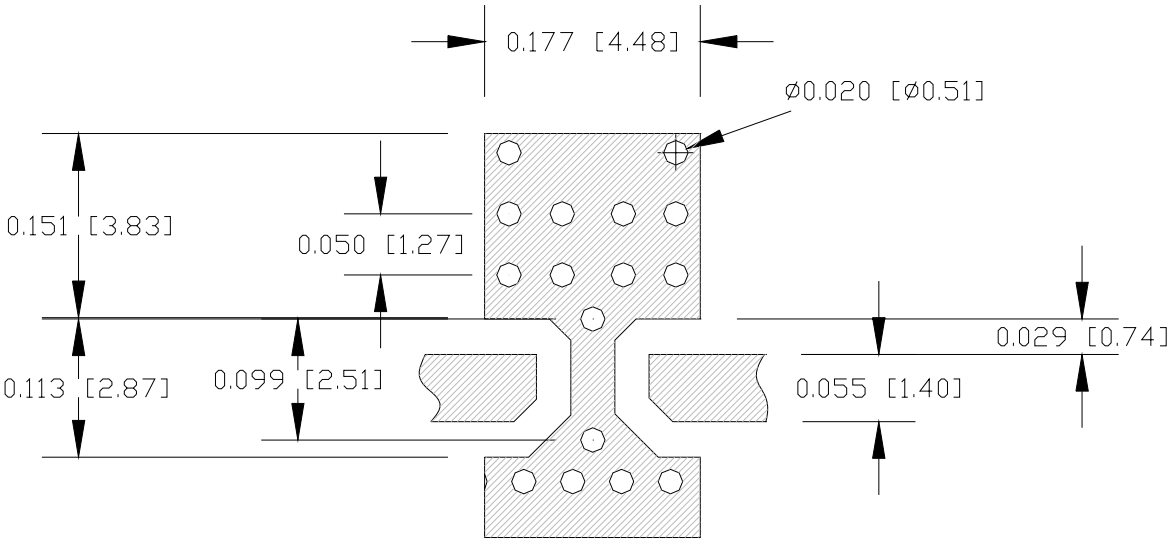
Pin #	Function	Description
1	RF IN	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation
2,4	GND	Connection to ground. Use via holes as close to the device ground leads as possible to reduce ground inductance and achieve optimum RF performance
3	RF OUT / DCBIAS	RF output and bias pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.

Part Ordering Information

Part Number	Package / Lead Composition	Reel Size	Devices / Reel
SGC-6489Z	Lead Free, RoHS Compliant	13"	3000

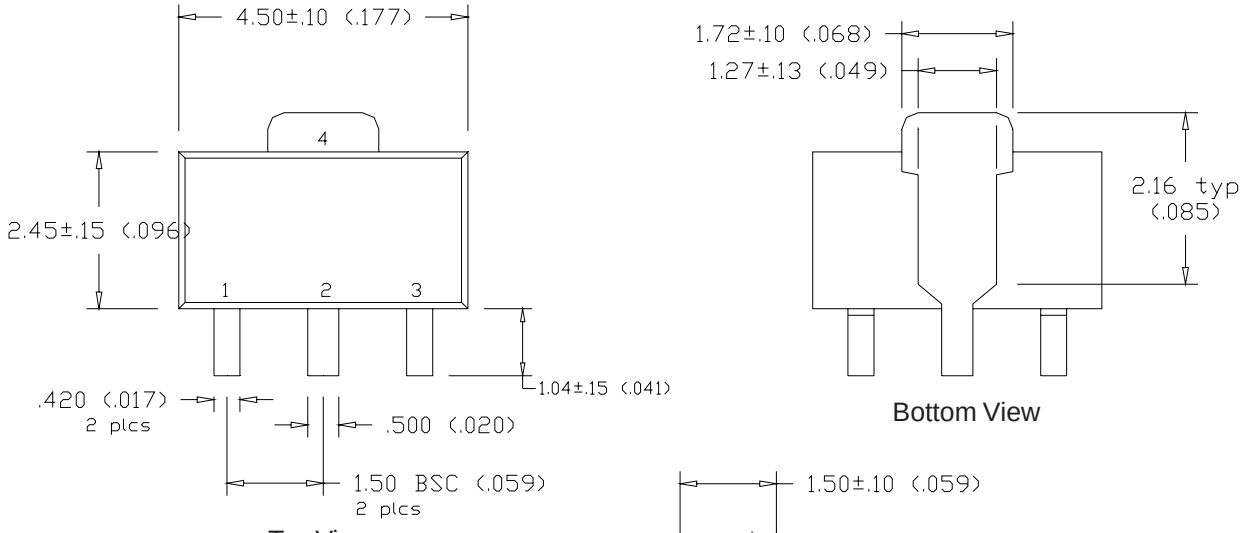
Suggested PCB Pad Layout

Dimensions in inches [millimeters]



Nominal Package Dimensions

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



Package Type: SOT- 89