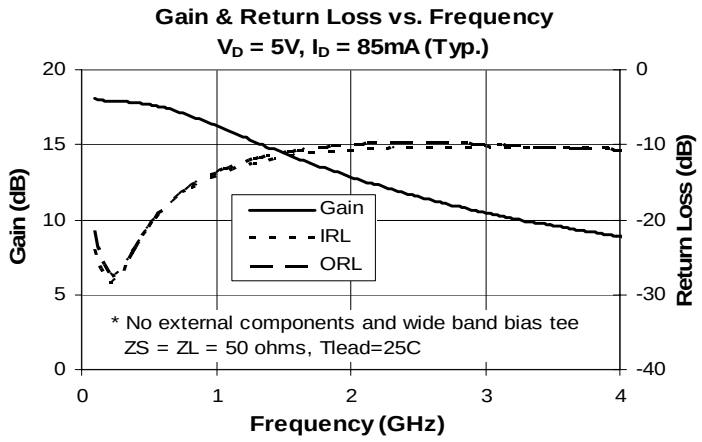
Product Description

Sirenza Microdevices' SGC-6389Z 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-6389Z does not require a drop resistor as compared to typical Darlington amplifiers. The SGC-6389Z 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.

The matte tin finish on Sirenza's lead-free "Z" package is applied using a post annealing process to mitigate tin whisker formation and is RoHS compliant per EU Directive 2002/95. The package body is manufactured with green molding compounds that contain no antimony trioxide or halogenated fire retardants.



Preliminary Information

SGC-6389Z

RoHS Compliant & Green Package

50-4000 MHz Silicon Germanium Cascadable Gain Block

Product Features

- Single Fixed 5V Supply
- Supply Drop Resistor not required
- Patented Self Bias Circuitry
- P1dB = 18.6 dBm at 1950 MHz
- IP3 = 34.6 dBm at 1950 MHz
- Robust 1000V ESD, Class 1C HBM

Applications

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

Typical performance with appropriate application circuit

Symbol	Parameters	Units	Frequency	Min.	Typ.	Max.
G	Small Signal Gain	dB	850 MHz 1950 MHz		16.7 13.1	
P_{1dB}	Output Power at 1dB Compression	dBm	850 MHz 1950 MHz		19.5 18.6	
OIP_3	Output Third Order Intercept Point	dBm	850 MHz 1950 MHz		35.8 34.6	
IRL	Input Return Loss	dB	1950 MHz		12.6	
ORL	Output Return Loss	dB	1950 MHz		11.7	
NF	Noise Figure	dB	1930 MHz		4.0	
V_D	Device Operating Voltage	V			5.0	
I_D	Device Operating Current	mA			85	
Rth, j-l	Thermal Resistance (junction to lead)	°C/W			60	

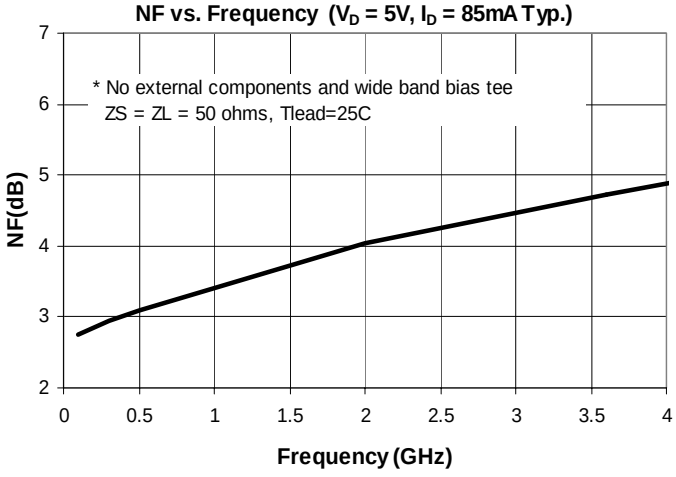
Test Conditions: V_S = 5.0V I_D = 85mA Typ. OIP_3 Tone Spacing = 1MHz T_L = 25°C
$Z_S = Z_L$ = 50 Ohms Pout per tone = 0 dBm

Typical RF Performance at Key Operating Frequencies (Application Circuit)

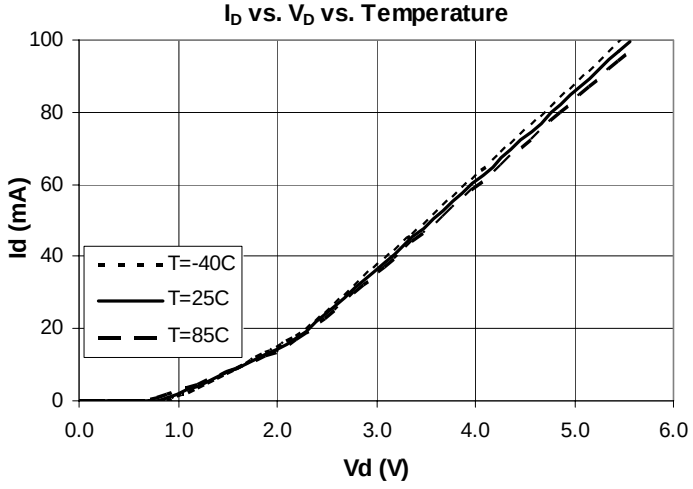
Symbol	Parameter	Unit	Frequency (MHz)					
			100 - 1000MHz App. Circuit			1000 - 2200MHz App. Circuit		
			100	500	850	1000	1950	2200
G	Small Signal Gain	dB	17.5	17.6	16.7	15.7	13.1	12.5
OIP_3	Output Third Order Intercept Point	dBm	35.7	36.2	35.8	35.3	34.6	34.1
P_{1dB}	Output Power at 1dB Compression	dBm	19.7	20.0	19.5	19.4	18.6	18.4
IRL	Input Return Loss	dB	10.0	18.5	14.6	10.1	12.6	11.9
ORL	Output Return Loss	dB	12.9	30.0	16.2	11.0	11.7	11.5
S_{12}	Reverse Isolation	dB	20.6	20.9	21.2	21.7	19.2	19.6
NF	Noise Figure	dB	2.9	3.1	3.2	3.4	4.0	4.2

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

NF vs. Frequency (V_D = 5V, I_D = 85mA Typ.)



I_D vs. V_D vs. Temperature



Absolute Maximum Ratings

Parameter	Absolute Limit
Max Device Current (I_{CE})	130 mA
Max Device Voltage (V_{CE})	6.5 V
Max. RF Input Power* (See Note)	+18 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:

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

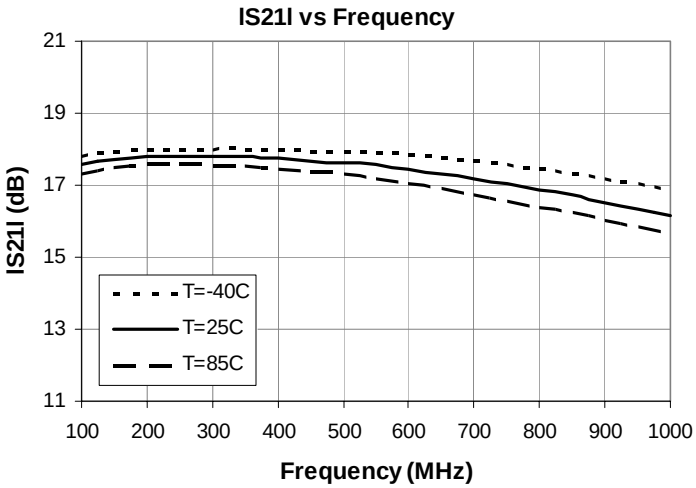
Reliability & Qualification Information	
Parameter	**Rating**
ESD Rating - Human Body Model (HBM)	Class 1C
Moisture Sensitivity Level	MSL 1

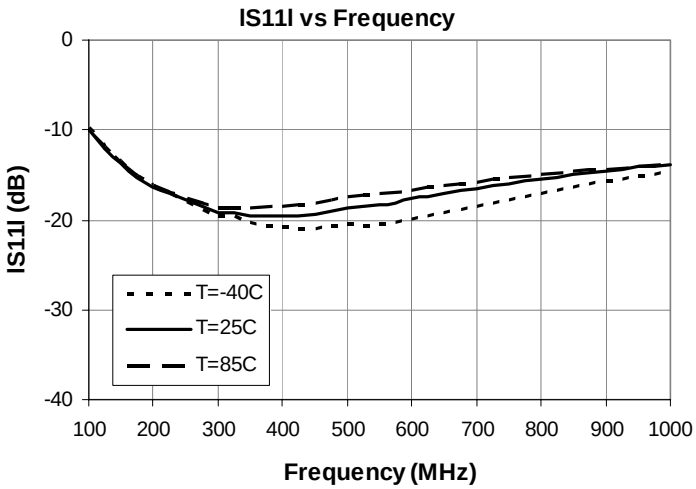
This product qualification report can be downloaded at *www.sirenza.com*

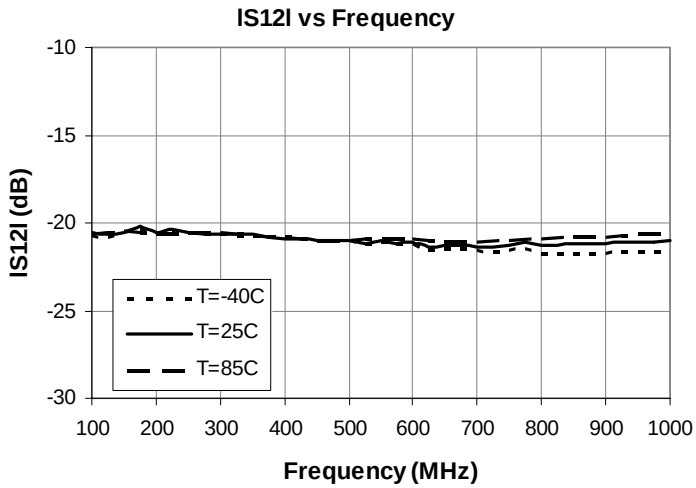
Caution: ESD sensitive
Appropriate precautions in handling, packaging and testing devices must be observed.

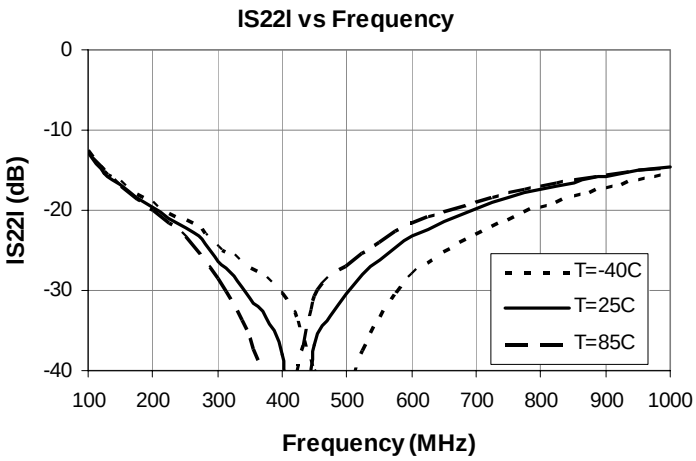
Typical RF Performance, 100-1000 MHz Application Circuit

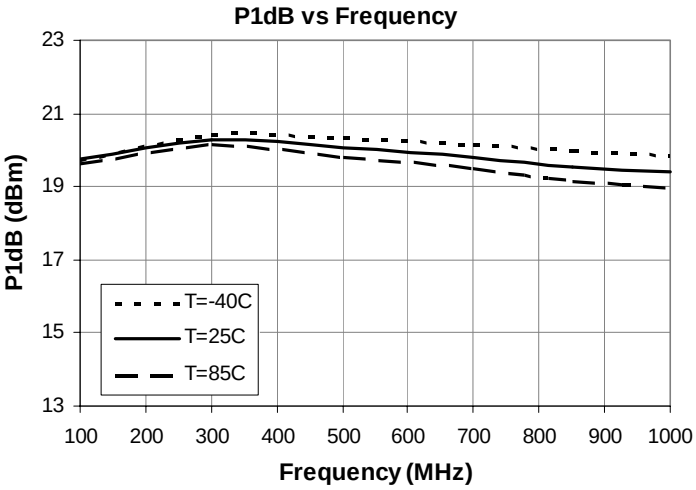
(Bias: V_D= 5.0 V, I_D= 85 mA (Typ.))

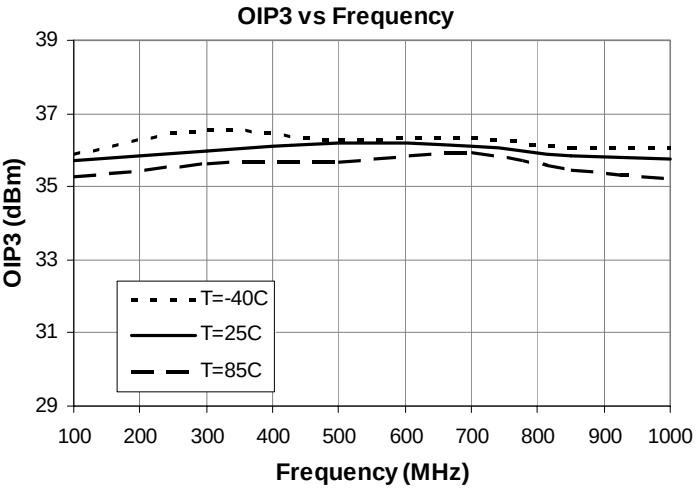








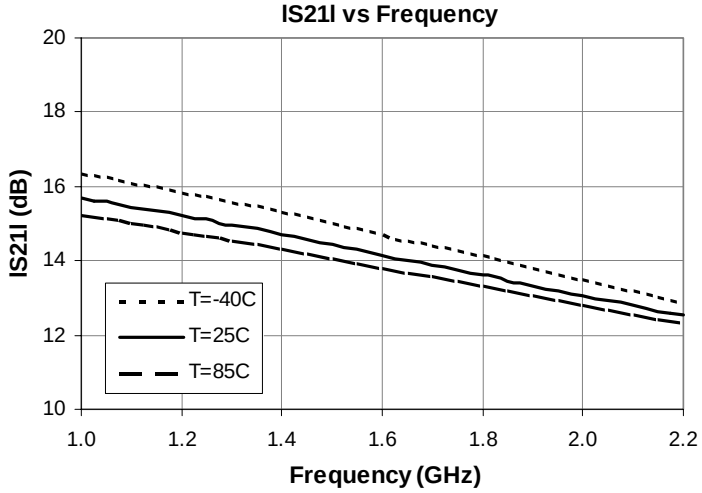




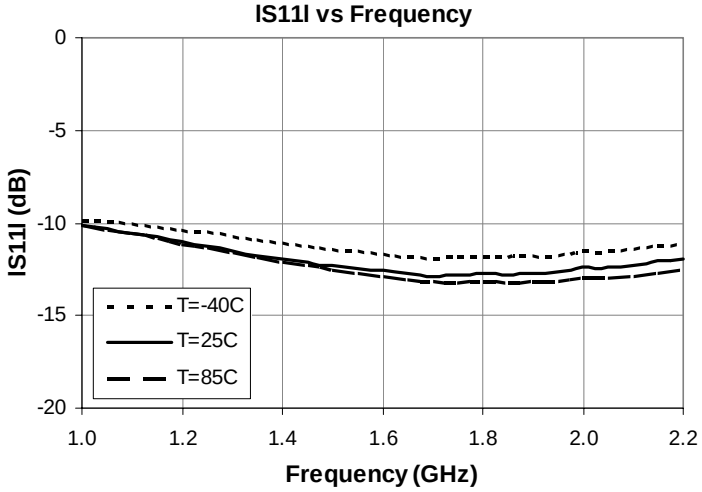
Typical RF Performance, 1000-2200 MHz Application Circuit

(Bias: V_D= 5.0 V, I_D= 85 mA (Typ.))

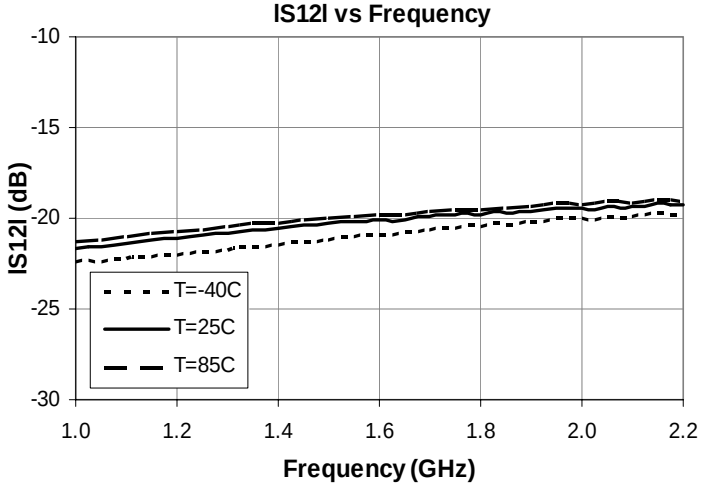
IS21I vs Frequency



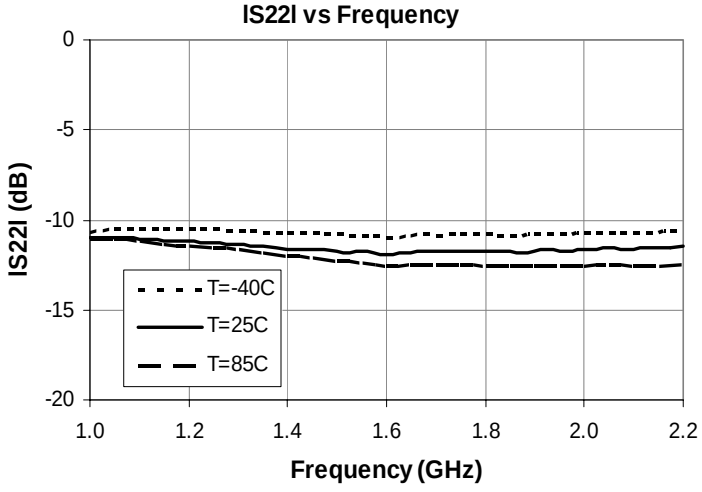
IS11I vs Frequency



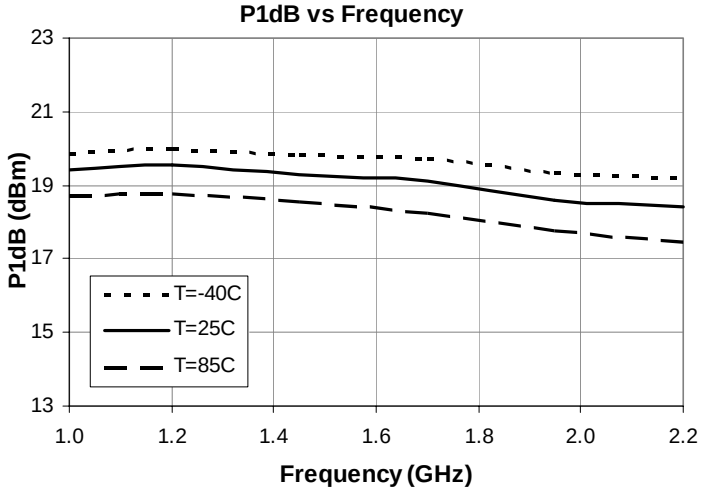
IS12I vs Frequency



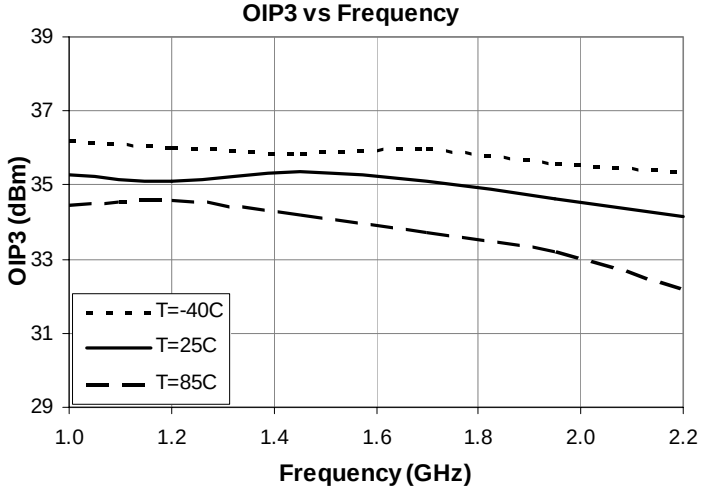
IS22I vs Frequency



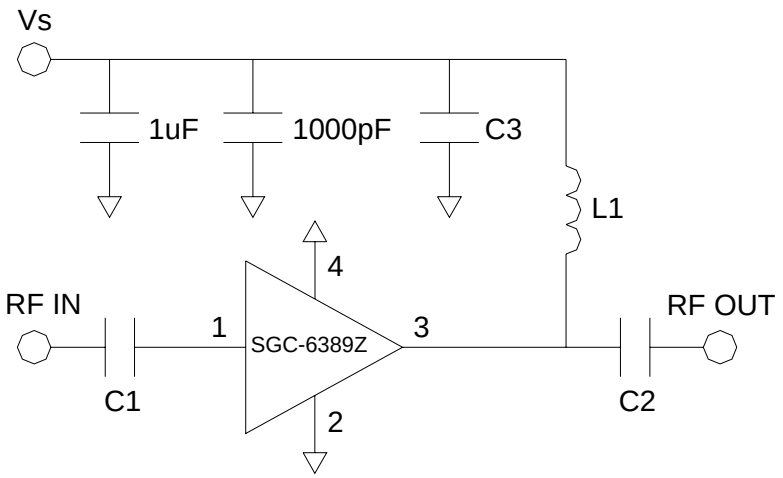
P1dB vs Frequency



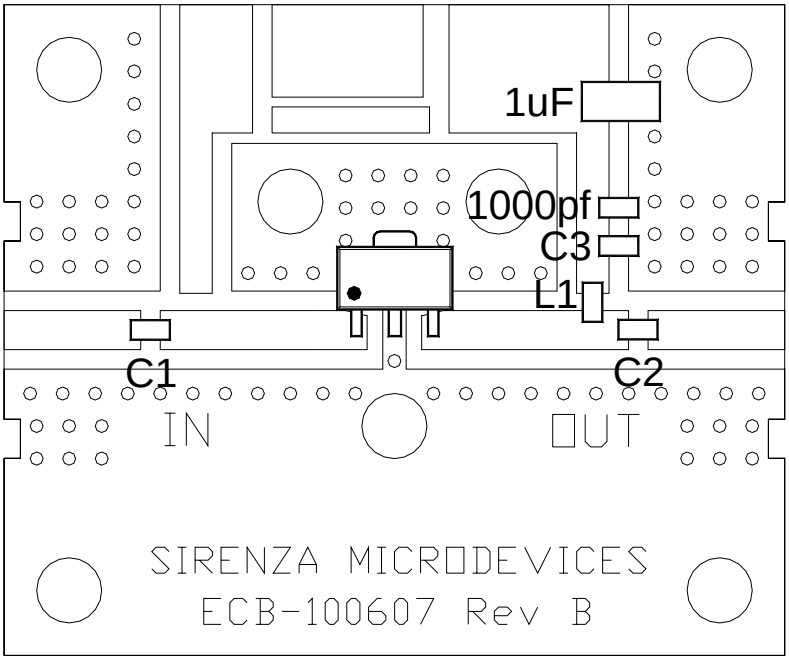
OIP3 vs Frequency



Basic Application Circuit



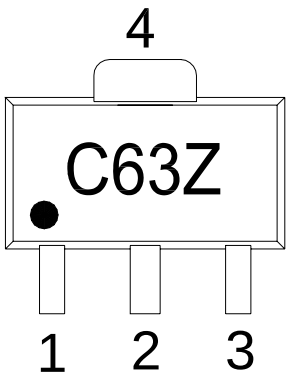
Application Circuit Element Values		
Reference Designator	100-1000MHz	1000-2200MHz
C1	1000pF	6.8pF
C2	100pF	6.8pF
C3	100pF	6.8pF
L1	100nH	39nH



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

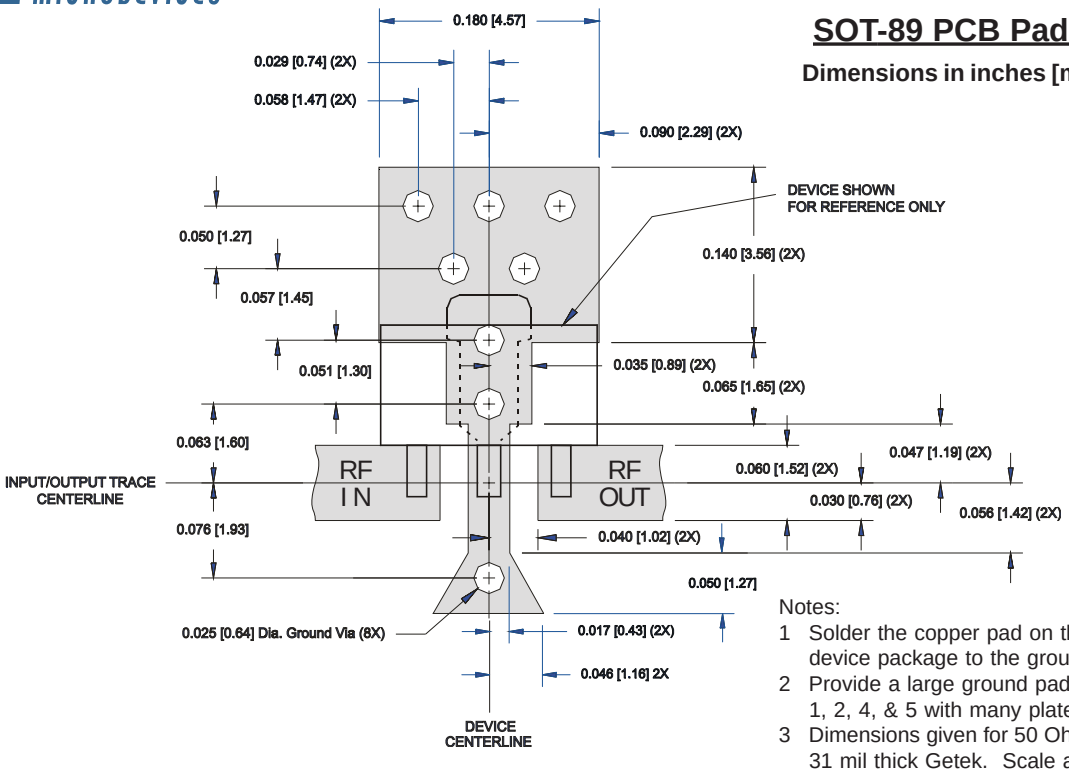


Pin #	Function	Description
1	RF IN	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation
2,4	GND	Connection to ground. Use via holes as close to the device ground leads as possible to reduce ground inductance and achieve optimum RF performance
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 Number	Package / Lead Composition	Reel Size	Devices / Reel
SGC-6389Z	Lead Free, RoHS Compliant	13"	3000

SOT-89 PCB Pad Layout

Dimensions in inches [millimeters]



Notes:

1 Solder the copper pad on the backside of the device package to the ground plane.
2 Provide a large ground pad area under device pins 1, 2, 4, & 5 with many plated via holes as shown.
3 Dimensions given for 50 Ohm RF I/O lines are for 31 mil thick Getek. Scale accordingly for different board thicknesses and dielectric contants.
4. We recommend 1 or 2 ounce copper. Measurements for this data sheet were made on a 31 mil thick Getek with 1 ounce copper on both sides.

SOT-89 Nominal Package Dimensions

Dimensions in inches [millimeters]

A link to the SOT-89 package outline drawing with full dimensions and tolerances may be found on the product web page at www.sirenza.com.