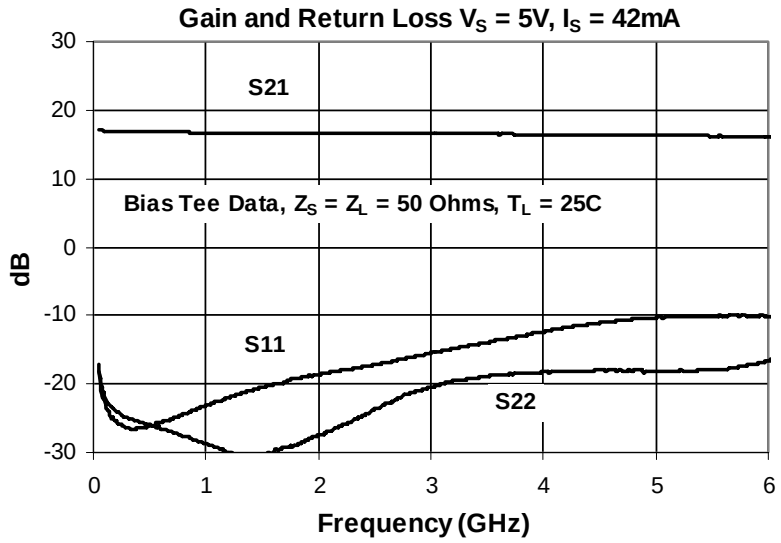
Product Description

Sirenza Microdevices' SBB-3089Z is a high performance InGaP 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. The SBB-3089Z product is designed for high linearity 5V gain block applications that require excellent gain flatness, small size, and minimal external components. It is internally matched to 50 ohms.



Preliminary Information

SBB-3089Z

RoHS Compliant & Green Package

50-6000 MHz InGaP HBT Active Bias Gain Block

Product Features

- Single Fixed 5V Supply
- Patented Self Bias Circuit and Thermal Design
- Gain = 16.7 dBm at 1950 MHz
- P1dB = 15.2 dBm at 1950 MHz
- OIP3 = 29.8 dBm at 1950 MHz
- Robust 1000V ESD, Class 1C HBM
- MSL 1 Moisture Rating

Applications

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

Symbol	Parameters	Units	Frequency	Min.	Typ.	Max.
G	Small Signal Gain	dB	850 MHz 1950 MHz 2400 MHz		16.8 16.7 16.7	
P_{1dB}	Output Power at 1dB Compression	dBm	850 MHz 1950 MHz 2400 MHz		15.4 15.2 15.3	
OIP_3	Output Third Order Intercept Point	dBm	850 MHz 1950 MHz 2400 MHz		29.7 29.8 29.4	
IRL	Input Return Loss	dB	1950 MHz		22	
ORL	Output Return Loss	dB	1950 MHz		30	
NF	Noise Figure	dB	1950 MHz		3.9	
V_D	Device Operating Voltage	V			4.2	4.3
I_D	Device Operating Current	mA			42	
$I_{D\ RANGE}$	Operational Current Range	mA		30		46
Rth, j-l	Thermal Resistance (junction to lead)	°C/W			80	

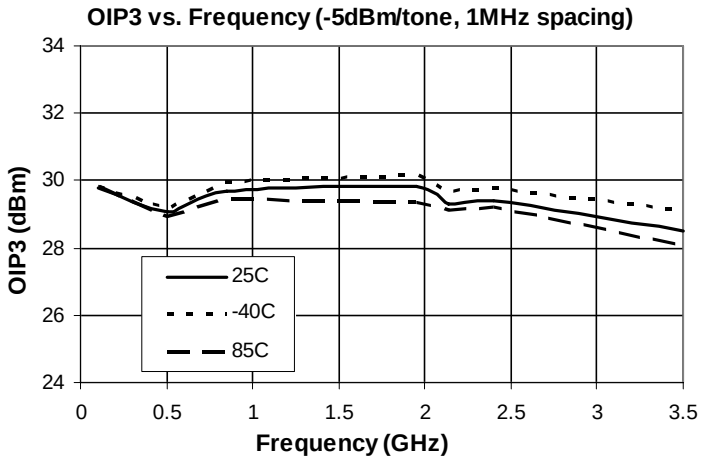
Test Conditions: V_D = 4.2V I_D = 42mA T_L = 25°C OIP_3 Tone Spacing = 1MHz
R_{DC} = 20 ohms Bias Tee Data Z_S = Z_L = 50 Ohms Pout per tone = -5 dBm

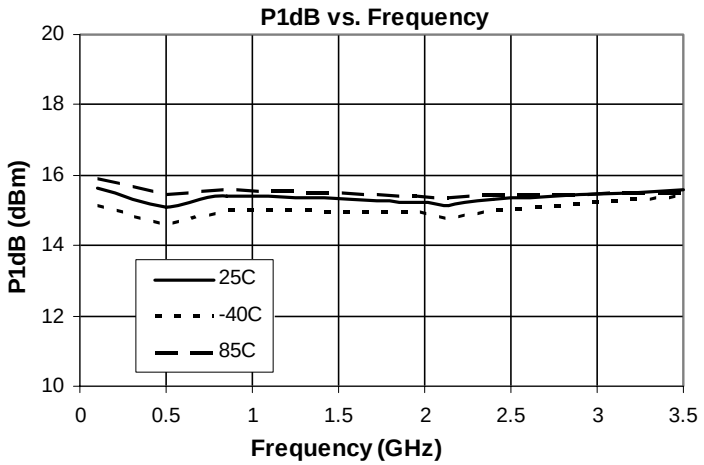
Typical RF Performance at Key Operating Frequencies (Bias Tee Data)

Symbol	Parameter	Unit	Frequency (MHz)						
			100	500	850	1950	2140	2400	3500
G	Small Signal Gain	dB	17.0	16.8	16.8	16.7	16.7	16.7	16.6
OIP_3	Output Third Order Intercept Point	dBm	29.8	29.1	29.7	29.8	29.3	29.4	28.5
P_{1dB}	Output Power at 1dB Compression	dBm	15.6	15.1	15.4	15.2	15.1	15.3	15.6
IRL	Input Return Loss	dB	21.5	26.0	26.0	22.5	21.5	21.0	18.5
ORL	Output Return Loss	dB	20.5	24.5	26.0	30.0	31.0	31.0	26.5
S_{12}	Reverse Isolation	dB	19.5	19.0	19.0	19.5	19.5	19.5	19.5
NF	Noise Figure	dB	3.7	3.9	3.9	3.9	3.9	3.9	3.8

Test Conditions: V_D = 4.2V I_D = 42mA OIP_3 Tone Spacing = 1MHz, Pout per tone = -5 dBm
R_{DC} = 20 ohms T_L = 25°C $Z_S = Z_L$ = 50 Ohms

Typical Performance with Bias Tees, V_D = 5V with R_{DC}=20 ohms, I_D = 42mA





Absolute Maximum Ratings

Parameter	Absolute Limit
Max Device Current (I_D)	100mA
Max Device Voltage (V_D)	6 V
Max. RF Input Power* (See Note)	+20 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 $T_L = T_{LEAD}$

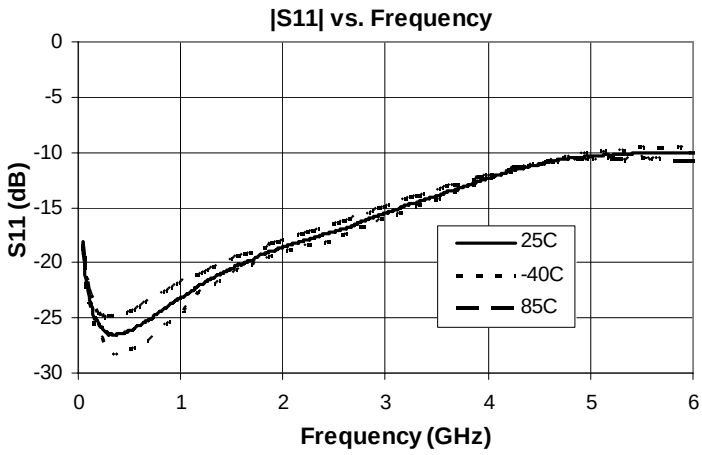
Reliability & Qualification Information

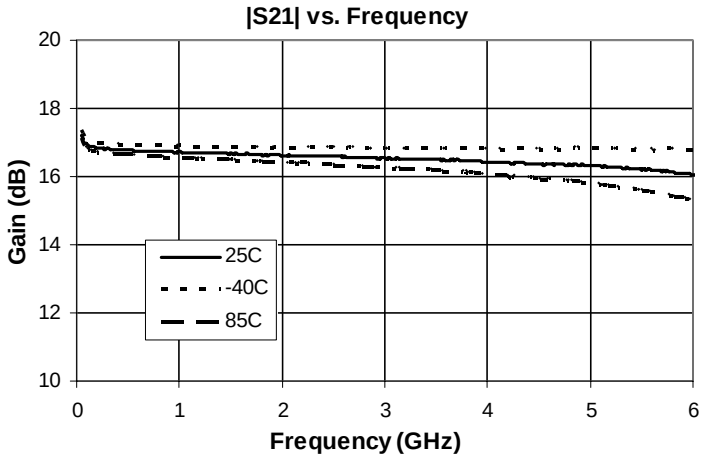
Parameter	Rating
ESD Rating - Human Body Model (HBM)	Class 1C
Moisture Sensitivity Level	MSL 1

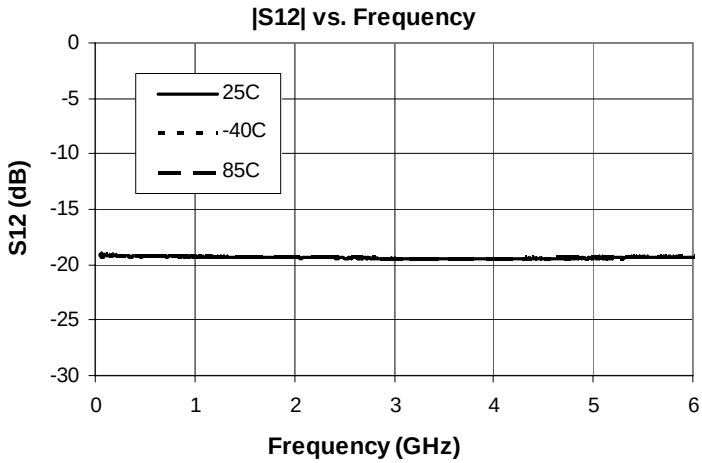
This product qualification report can be downloaded at *www.sirenza.com*

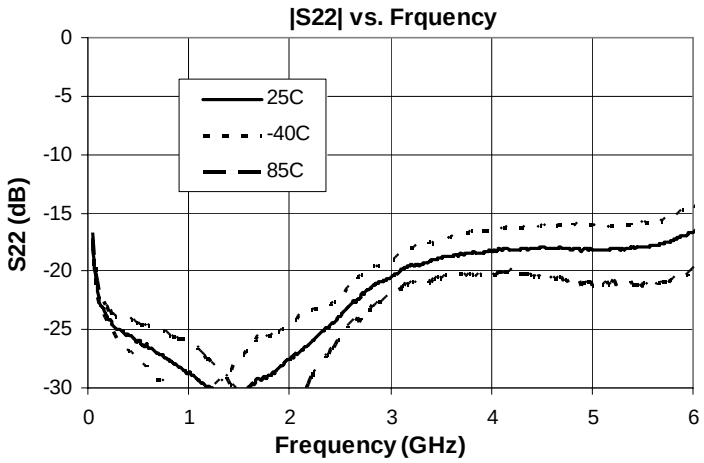
Caution: ESD sensitive
Appropriate precautions in handling, packaging and testing devices must be observed.

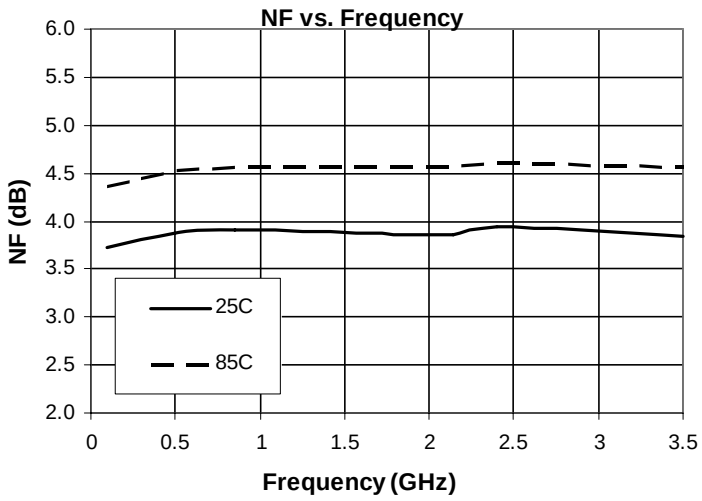
Typical Performance with Bias Tees, V_S = 5V R_{DC}= 20 ohms, I_D = 42mA

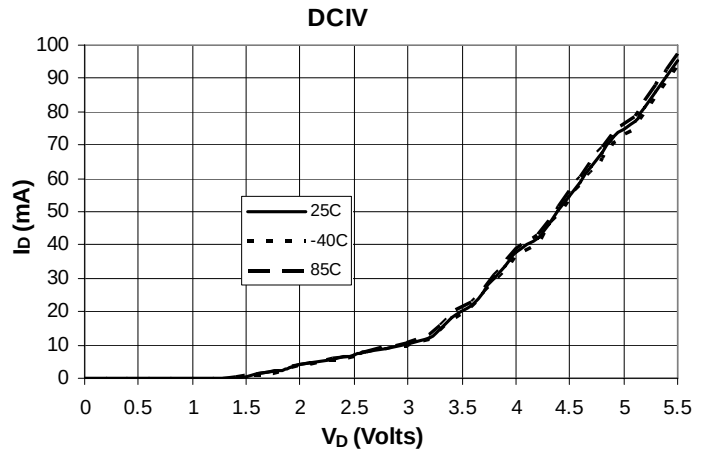




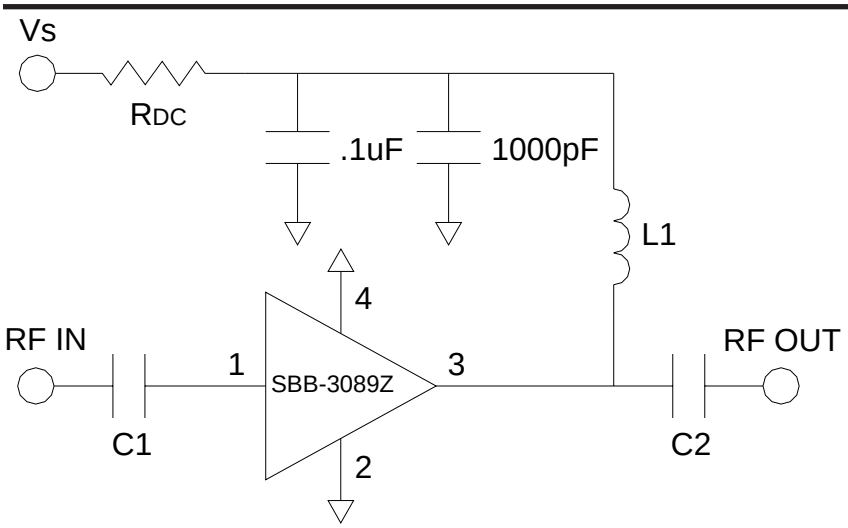








Basic Application Circuit

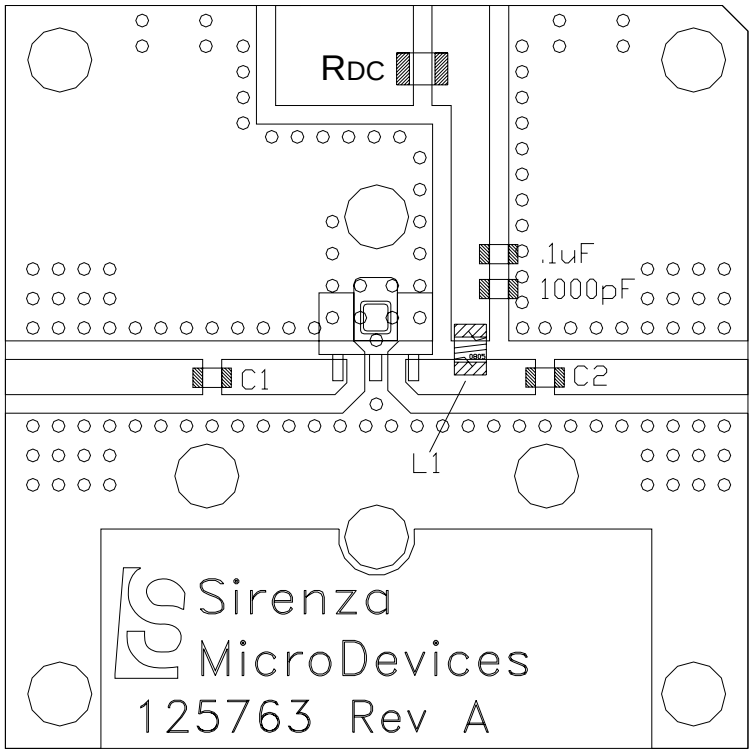


Application Circuit Element Values

Reference Designator	500 - 3500 MHz
C1	1000pF
C2	68pF
L1	48nH 0805HQ Coilcraft

Recommended Bias resistor Values for I_D=42mA
$R_{DC} = (V_S - V_D) / I_D$

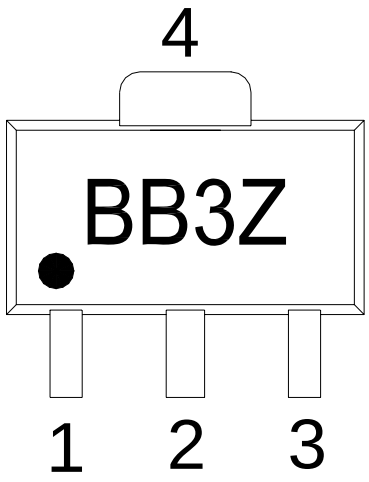
Supply Voltage(V_S)	5V	6V	8V	10V	12V
R_{DC}	20Ω	43Ω	91Ω	139Ω	187Ω



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



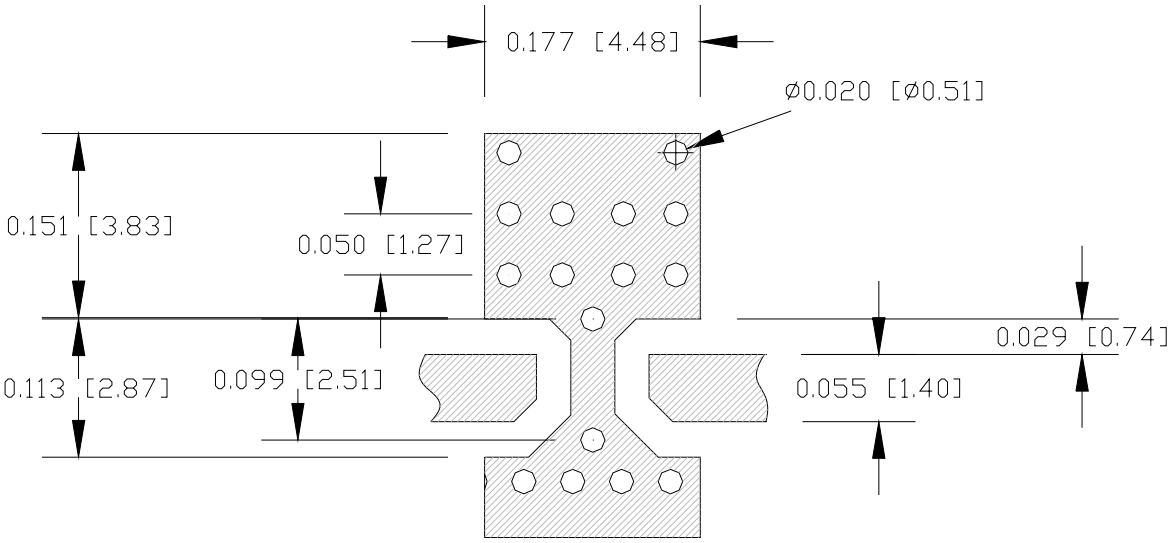
Pin #	Function	Description
1	RF IN	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation
2,4	GND	Connection to ground. Use via holes as close to the device ground leads as possible to reduce ground inductance and achieve optimum RF performance
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
SBB-3089Z	Lead Free, RoHS Compliant	7"	1000

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