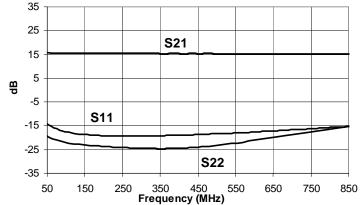


#### **Product Description**

Sirenza Microdevices' SBB-1089Z 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. Designed to run directly from a 5V supply, the SBB-1089Z does not require a dropping resistor as compared to typical Darlington amplifiers. The SBB-1089Z 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 package utilizes a post annealing process to mitigate tin whisker formation and is RoHS compliant per EU Directive 2002/95. This package is also manufactured with green molding compounds that contain no antimony trioxide nor halogenated fire retardants.





## **SBB-1089Z**

50 - 850 MHz, Cascadable Active Bias InGaP HBT MMIC Amplifier



**RoHS Compliant** & Green Package

#### Product Features

- OIP3 = 43.1 dBm @ 240MHz
- P1dB = 19.6 dBm @ 500MHz
- Single Fixed 5V Supply
- Robust 1000V ESD, Class 1C
- **Patented Thermal Design & Bias Circuit**
- Low Thermal Resistance
- MSL 1 moisture rating

#### Applications

- Receiver IF Amplifier
- Cellular, PCS, GSM, UMTS
- Wireless Data, Satellite Terminals

Symbol	Param	eters	Units	Frequency	Min.	Тур.	Max.
_				70 MHz		15.5	
S <sub>21</sub>	Small Signal Gain		dB	240 MHz	14	15.5	17
				400 MHz	14	15.5	17
				70 MHz		19	
P <sub>1dB</sub>	Output Power at 1dB Co	mpression	dBm	240 MHz		19	
				400 MHz	18	19	
	Third Order Intercept Point		dBm	70 MHz		42	
IP <sub>3</sub>				240 MHz		43	
-				400 MHz	38.5	40.5	
Bandwidth	S <sub>11</sub> , S <sub>22</sub> : Minimum 10dB	Return Loss (typ.)	MHz			50 - 850	
IRL	Input Return Loss		dB	70 -500MHz	14	18	
ORL	Output Return Loss		dB	70 -500MHz	12	16	
S <sub>12 </sub>	Reverse Isolation		dB	70 -500MHz		18	
NF	Noise Figure		dB	500 MHz		3.5	4.2
V <sub>D</sub>	Device Operating Voltage		V			5	5.3
Ι <sub>D</sub>	Device Operating Current		mA		82	90	98
R <sub>TH</sub> , j-l	Thermal Resistance (junction - lead)		°C/W			48.8	
est Conditions:	$V_D = 5V$	I <sub>D</sub> = 90mA Typ.	OIP	3 Tone Spacing = 1MI	Hz, Pout per tone	= 0 dBm	
$T_1 = 25^{\circ}C$ $Z_s = Z_1 = 50$ Ohms Tested with Bias Tees							

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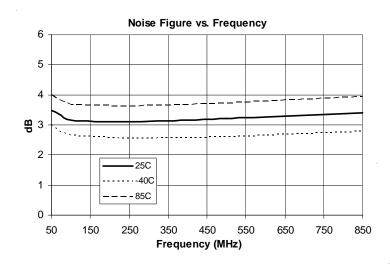
303 S. Technology Ct. Broomfield, CO 80021

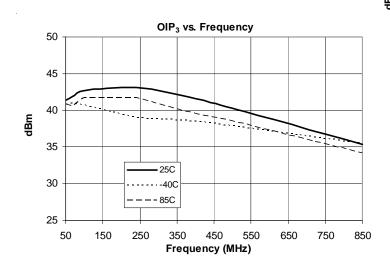
EDS-103998 Rev D



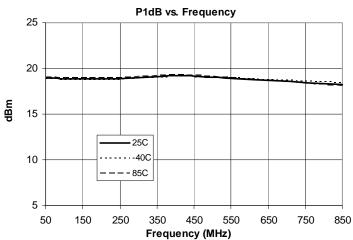
#### Typical RF Performance at Key Operating Frequencies (With 240 MHz Application Circuit)

		Frequency (MHz)							
Symbol	Parameter	Unit	50	70	100	240	400	500	850
S <sub>21</sub>	Small Signal Gain	dB	16	15.5	15.5	15.5	15.5	15.5	15
OIP <sub>3</sub>	Output Third Order Intercept Point	dBm	41.5	42	43	43	41	40	35
$P_{1dB}$	Output Power at 1dB Compression	dBm	19	19	19	19	19	19	18
S <sub>11</sub>	Input Return Loss	dB	13	16	17	19	19	18	15
S <sub>22</sub>	Output Return Loss	dB	18	20	21	23	24	23	17
S <sub>12</sub>	Reverse Isolation	dB	18	18	18	18	18	18	18
NF	Noise Figure	dB	3.5	3.3	3.2	3.1	3.2	3.2	3.4
Test Cond	Test Conditions:VCC = 5V $I_D = 90mA Typ.$ OIP3 Tone Spacing = 1MHz, Pout per tone = 0 dBm								
	$T_L = 25^{\circ}C$ $Z_S = Z_L = 50$ Ohms	S							



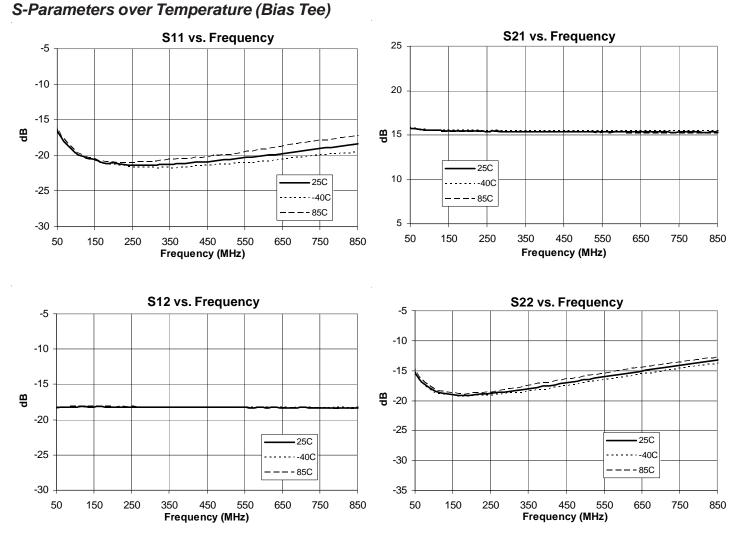


### Data on Charts taken with 240 MHz App. Ckt.

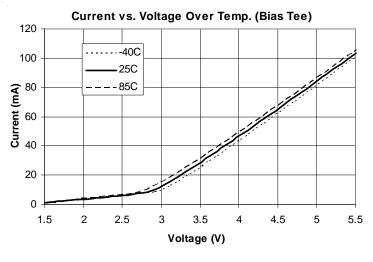


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http://www.sirenza.com EDS-103998 Rev D

# **SIRENZA** microdevices 240 MHz Application Circuit S-Parameters over Temperature

S11 vs. Frequency

-5 20 -10 -15 15 ę æ -20 10 25C 25C -25 5 ----40C -----40C - 85C — — – 85C -30 0 50 150 250 350 450 550 650 750 850 50 250 550 150 350 450 650 750 850 Frequency (GHz) Frequency (GHz) S12 vs. Frequency S22 vs. Frequency -5 -5 -10 -10 25C -15 -15 ----40C - 85C **8** -20 **පු** -20 -25

25



850

-30

-35

50

150

250

350

450

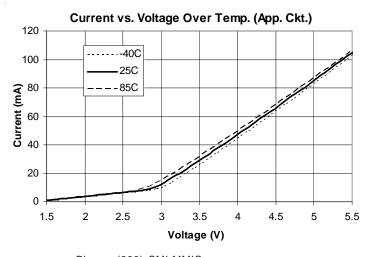
Frequency (GHz)

550

650

750

850



303 S. Technology Ct. Broomfield, CO 80021

-25

-30

-35

50

25C -----40C

250

350

450

Frequency (GHz)

550

650

750

— - 85C

150

http://www.sirenza.com EDS-103998 Rev D

S21 vs. Frequency



#### **Application Schematic**

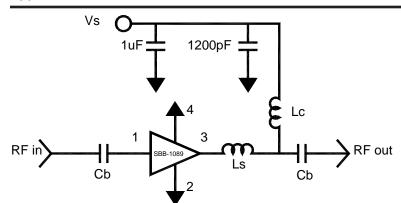
**Evaluation Board Layout** 

0 0 0 0 0 0

**Mounting Instructions** 

0 0 0

000



**Application Circuit Element Values** 

Reference Designator	Frequency (MHz) 50 to 850
C <sub>B</sub>	8200pF
L <sub>C</sub>	1200nH LS Coilcraft
Ls	2.7nH Toko

#### **Absolute Maximum Ratings**

Absolute Limit

#### 0 $\cap$ 0 0 4 0 0 1ul 0 () 1200pF 0 СВ LS СВ

0 0 0

0

125304 SBE×089 BHARD

0 0 0

0 0 0 0

0

ΤN

Ma. Dvice Current (I <sub>D</sub> )	110 mA			
Max Device Voltage (V <sub>D</sub> )	5.5 V			
Max. RF Input Power	+12 dBm			
Max. Operating Dissipated Power	0.61 W			
Max. Junction Temp. (T <sub>J</sub> )	+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 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: $I_DV_D < (T_1 - T_1) / R_{TH1}$ , $I_1 = T_1 = T_1 = T_1$				

#### **ESD Class 1C**

Parameter

0 0

0 0 0 0 0

> 0 0 0

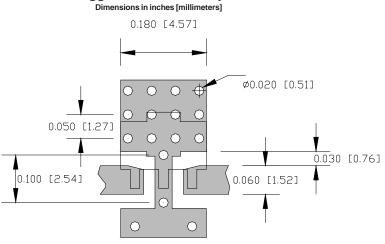
> > Appropriate precautions in handling, packaging and testing devices must be observed.

#### MSL (Moisture Sensitivity Level) Rating: Level 1

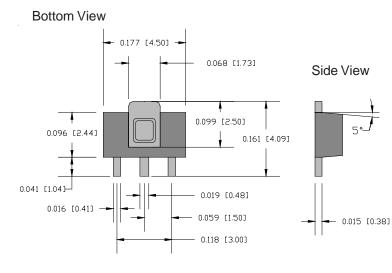
- 1. Solder the copper pad on the backside of the device package to the ground plane.
- 2. Use a large ground pad area with many plated through-holes as shown.
- 3. We recommend 1 or 2 ounce copper. Measurement for this datasheet were made on a 31 mil thick FR-4 board with 1 ounce copper on both sides.



#### Suggested PCB Pad Layout



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



Package Marking					
4					
BB1Z					
1 2 3					
Lead Free					

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.

Part Number Ordering Information					
Part Number	Reel Size	Devices / Reel			
SBB-1089Z	7"	1000			