

Product Description

Sirenza Microdevices' SBB-5089 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-5089 does not require a dropping resistor as compared to typical Darlington amplifiers. The SBB-5089 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.

Gain & Return Loss vs. Frequency (w/ BiasTees)



SBB-5089 SBB-5089Z



0.05-6 GHz, Cascadable Active Bias InGaP/GaAs HBT MMIC Amplifier



Product Features

- Available in Lead free, RoHS compliant, & Green packaging
- Wideband Flat Gain to 4GHz: +/-1.1dB
- P1dB = 20.4 dBm @ 1950MHz
- Single Fixed 5V Supply
- Robust 1000V ESD, Class 1C
- Patented Thermal Design & Patent Pending Bias Circuit
- Low Thermal Resistance
- MSL 1 moisture rating

Applications

- PA Driver Amplifier
- Cellular, PCS, GSM, UMTS
- Wideband Intrumentation
- Wireless Data, Satellite Terminals

Symbol	Parame	eters	Units	Frequency	Min.	Тур.	Max.
S ₂₁	Small Signal Gain		dB	850 MHz 1950 MHz 6000 MHz	18.7	20.7 20.2 16	21.7
P _{1dB}	Output Power at 1 dB Co	ompression	dBm	850 MHz 1950 MHz	18.9	20.5 20.4	
IP ₃	Third Order Intercept Poi	nt	dBm	850 MHz 1950 MHz	32.8	38.6 34.8	
Bandwidth	S ₁₁ , S ₂₂ : Minimum 10dB	Return Loss (typ.)	MHz			3000	
S ₁₁	Input Return Loss		dB	1950 MHz		12.8	
S ₂₂	Output Return Loss		dB	1950 MHz		12.3	
S ₁₂	Reverse Isolation		dB	1950 MHz		23.3	
NF	Noise Figure		dB	1950 MHz		4.2	5.2
V _D	Device Operating Voltage		V			5	5.25
I _D	Device Operating Current		mA		72	80	88
R _{TH} , j-l	Thermal Resistance (junction - lead)		°C/W			97	
Test Conditions:	: $V_D = 5V$ $I_D = 80mA Typ.$ $T_L = 25^{\circ}C$ $Z_S = Z_L = 50 Ohms$		OIP: Test	₃Tone Spacing = 1M ed with Bias Tees	Hz, Pout per tone	= 0 dBm	

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EDS-103839 Rev A

Preliminary



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SBB-5089 0.05-6 GHz Cascadable MMIC Amplifier

Typical RF Performance at Key Operating Frequencies (With .5-3.5 GHz Application Circuit)

			Frequency (MHz)					
Symbol	Parameter	Unit	500	850	1950	2500	3500	4000
S ₂₁	Small Signal Gain		20.8	20.8	20.1	19.8	18.7	17.8
OIP ₃	Output Third Order Intercept Point		38.6	39.2	34.9	32.8	29.4	26.8
P_{1dB}	P _{1dB} Output Power at 1dB Compression		20.5	20.4	20.4	19.4	16.9	14.7
S ₁₁	Input Return Loss		27.2	22.7	14.6	12.9	10.6	11.6
S ₂₂	Output Return Loss	dB	31.8	21.5	13.5	12.0	13.5	27.5
S ₁₂	S ₁₂ Reverse Isolation		22.7	22.8	23.4	23.7	24.7	25.7
NF	Noise Figure	dB	3.8	3.8	4.1	4.1	4.3	4.6
Test Conditions:VCC = 5V $I_D = 80mA$ Typ.OIP3 Tone Spacing = 1MHz, Pout per tone = 0 dBm $T_L = 25^{\circ}C$ $Z_S = Z_L = 50$ Ohms								







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Preliminary SBB-5089 0.05-6 GHz Cascadable MMIC Amplifier

S-Parameters taken with Bias Tees over Temperature







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Application Schematic



Evaluation Board Layout



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. Measurement for this datasheet were made on a 31 mil thick FR-4 board with 1 ounce copper on both sides.

Application Circuit Element Values

Reference Designator	Frequency (MHz) 500 to 3500
C _B	68pF
L _c	82nH HQ

Absolute	Maximum	Ratings
ameter		Absolut

Parameter	Absolute Limit		
Ma. Dvice Current (I _D)	100 mA		
Max Device Voltage (V_D)	5.5 V		
Max. RF Input Power	+12 dBm		
Max. Operating Dissipated Power	0.55 W		
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			

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



ESD Class 1C

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

MSL (Moisture Sensitivity Level) Rating: Level 1



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Suggested PCB Pad Layout



Nominal Package Dimensions

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







Part Number	Ordering	Information
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Part Number	Reel Size	Devices / Reel
SBB-5089	7"	1000
SBB-5089Z	7"	1000

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.

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