

DC to 4000 MHz, CASCADABLE SiGe HBT MMIC AMPLIFIER





Product Description

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The SGA4363Z is a high performance SiGe HBT MMIC Amplifier. A Darlington configuration featuring one-micron emitters provides high $F_{\rm T}$ and excellent thermal performance. The heterojunction increases breakdown voltage and minimizes leakage current between junctions. Cancellation of emitter junction non-linearities results in higher suppression of intermodulation products. Only two DC-blocking capacitors, a bias resistor, and an optional RF choke are required for operation.



Features

- High Gain: 14.8dB at 1950MHz
- Cascadable 50Ω
- Operates from Single Supply
- Low Thermal Resistance Package

Applications

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

Baramatar	Specification			11	Condition		
Parameter	Min.	Тур.	Max.	Unit	Condition		
Small Signal Gain	15.5	17.5	19.0	dB	850MHz		
		14.8		dB	1950MHz		
		14.2		dB	2400MHz		
Output Power at 1dB Compression		14.3		dBm	850MHz		
		13.0		dBm	1950MHz		
Output Third Intercept Point		28.7		dBm	850MHz		
		25.7		dBm	1950MHz		
Bandwidth Determined by Return Loss		4000		MHz	>9dB		
Input Return Loss		14.4		dB	1950MHz		
Output Return Loss		10.7		dB	1950MHz		
Noise Figure		3.1		dB	1950MHz		
Device Operating Voltage	2.9	3.2	3.5	V			
Device Operating Current	41	45	49	mA			
Thermal Resistance (Junction - Lead)		255		°C/W			

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Absolute Maximum Ratings

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Parameter	Rating	Unit			
Max Device Current (I _D)	90	mA			
Max Device Voltage (V _D)	5	V			
Max RF Input Power	+18	dBm			
Max Junction Temp (T _J)	+150	°C			
Operating Temp Range (T_L)	-40 to +85	°C			
Max Storage Temp	+150	°C			
	- · · · ·				

Operation of this device beyond any one of these limits may cause permanent dam-age. 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



Caution! ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions no reaction of the device may reduce device reliability. Specified typical perfor-mance or functional operation of the device under Absolute Maximum Rating condi-tions is not implied.

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RFMD Green: RoHS compliant per EU Directive 2002/95/EC, halogen free per IEC 61249-2-21, < 1000 ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

Typical Performance at Key Operating Frequencies

Parameter	Unit	100	500	850	1950	2400	3500
		MHz	MHz	MHz	MHz	MHz	MHz
Small Signal Gain	dB	17.7	17.6	17.5	14.8	14.2	12.5
Output Third Order Intercept Point	dBm		29.4	28.7	25.7	23.8	
Output Power at 1dB Compression	dBm		14.3	14.3	13.0	11.8	
Input Return Loss	dB	11.9	12.2	12.9	14.4	13.6	11.0
Output Return Loss	dB	10.2	11.5	13.3	10.7	9.2	9.7
Reverse Isolation	dB	20.9	21.4	21.4	20.7	20.1	18.4
Noise Figure	dB		2.8	2.7	3.1	3.6	

Test Conditions: $V_S = 8V$, $I_D = 45$ mA Typ., OIP₃ Tone Spacing = 1MHz, P_{OUT} per tone = 5dBm, $R_{BIAS} = 110\Omega$, $T_L = 25$ °C, $Z_S = Z_L = 50\Omega$





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Typical RF Performance Over Temperature (Bias: V_p = 3.2 V, I_p = 45 mA (Typ.))

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Pin	Function	Description
3	RF IN	RF input pin. This pin requires the use of an external DC-blocking capacitor chosen for the frequency of operation.
1, 2, 4, 5	GND	Connection to ground. For optimum RF performance, use via holes as close to ground leads as possible to reduce lead inductance.
6	RF OUT/BIAS	RF output and bias pin. DC voltage is present on this pin, therefor a DC-blocking capacitor is necessary for proper opera- tion.



Suggested Pad Layout

Package Drawing







Application Schematic



Reference	Frequency (Mhz)						
Designator	500	850	1950	2400	3500		
C _B	220 pF	100 pF	68 pF	56 pF	39 pF		
C _D	100 pF	68 pF	22 pF	22 pF	15 pF		
L _c	68 nH	33 nH	22 nH	18 nH	15 nH		

Recommended Bias Resistor Values for I_{D} =45mA R_{BIAS} =(V_{S} - V_{D}) / I_{D}				
Supply Voltage(V $_{\rm S}$)	6 V	8 V	10 V	12 V
R _{BIAS} 62 Ω 110 Ω 150 Ω 200 Ω				
Note: R _{BIAS} provides DC bias stability over temperature.				



Mounting Instructions:

1. Use a large ground pad area near device pins 1, 2, 4, and 5 with many plated through-holes, as shown.

2. We recommend 1 or 2 ounces copper. Measurements for this data sheet were made on a 31mil thick FR-4 board with 1 ounce cooper on both sides.



Part Identification Marking



Ordering Information

Ordering Code	Description
SGA4363Z	7" Reel with 3000 pieces
SGA4363ZSQ	Sample bag with 25 pieces
SGA4363ZSR	7" Reel with 100 pieces
SGA4363ZPCK1	850MHz, 8V Operation PCBA with 5-piece sample bag