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SGA0363Z

DC to 5000 MHz, SILICON GERMANIUM CASCADABLE GAIN BLOCK

Package: SOT-363

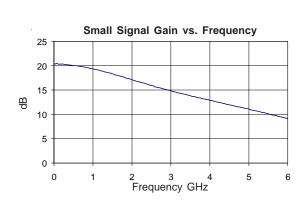




Product Description

The SGA0363Z is a high performance SiGe HBT MMIC Amplifier. A Darlington configuration featuring one-micron emitters provides high F_T and excellent thermal perfomance. 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

- DC to 5000MHz Operation
- Single Voltage Supply
- Low Current Draw: 11mA at 2.5 V Typ.
- High Output Intercept: 14dBm Typ. at 1950MHz

Applications

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

Parameter	Specification			Unit	Open disting	
Parameter	Min.	Тур.	Max.	Unit	Condition	
Output Power at 1dB Compression		2.3		dBm	850MHz	
		2.3		dBm	1950MHz	
		1.6		dBm	2400MHz	
Third Order Intercept Point		14.2		dBm	850MHz	
		14.0		dBm	1950MHz	
		13.1		dBm	2400MHz	
Small Signal Gain		19.6		dB	850MHz	
		17.2		dB	1950MHz	
		16.2		dB	2400MHz	
3dB Bandwidth		5000		MHz		
Input VSWR		1.8:1			DC to 4500 MHz	
Output VSWR		1.7:1			DC to 4500MHz	
Reverse Isolation		24.0		dB	850MHz	
		22.8		dB	1950MHz	
		22.1		dB	2400MHz	
Noise Figure ^[1]		3.0		dB	1950MHz	
Device Operating Voltage		2.5		V		
Device Operating Current	9	11	13	mA		
Thermal Resistance		255		°C/W	junction - lead	

 $\textbf{Test Conditions: V}_S = \textbf{5V}, \textbf{I}_D = \textbf{11} \textbf{mA Typ., T}_L = 25 \text{ °C. OIP3 Tone Spacing} = \textbf{1MHz}, \textbf{P}_{OUT} \text{ per tone} = -\textbf{12} \text{ dBm}, \textbf{R}_{BIAS} = 220 \Omega, \textbf{Z}_S = \textbf{Z}_L = 50 \Omega$

SGA0363Z



Absolute Maximum Ratings

Parameter	Rating	Unit
Device Current (I _D)	22	mA
Device Voltage (V _D)	6	V
RF Input Power	-5	dBm
Junction Temp (T _J)	+150	°C
Operating Temp Range (T _L)	-40 to +85	°C
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: $I_DV_D \! < \! (T_J \! - \! T_L) / R_{TH}, j \! - \! I$



Caution! ESD sensitive device.

CAUDINI COD 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 to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions 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

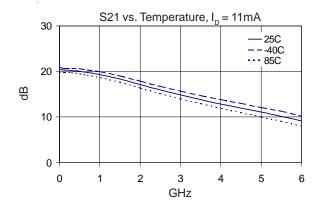
Parameter	Specification		Heit	Oan dikian	
	Min.	Тур.	Max.	Unit	Condition
Gain		20.4		dB	100 MHz
		20.0		dB	500MHz
		19.6		dB	850MHz
		17.2		dB	1950MHz
		16.2		dB	2400MHz
		13.8		dB	3500MHz
Output IP ₃		14.8		dBm	100 MHz, Tone spacing=1MHz, P _{OUT} per tone= -12dBm
		14.5		dBm	500 MHz, Tone spacing=1MHz, P _{OUT} per tone= -12dBm
		14.2		dBm	850MHz, Tone spacing=1MHz, P _{OUT} per tone= -12dBm
		14.0		dBm	1950MHz, Tone spacing=1MHz, P _{OUT} per tone= -12dBm
		13.1		dBm	2400 MHz, Tone spacing=1MHz, P _{OUT} per tone= -12dBm
		11.5		dBm	3500 MHz, Tone spacing=1MHz, P _{OUT} per tone= -12 dBm
Output P1dB		3.2		dBm	100 MHz
		2.9		dBm	500MHz
		2.3		dBm	850MHz
		2.3		dBm	1950MHz
		1.6		dBm	2400MHz
		0.8		dBm	3500MHz
Input Return Loss		9.3		dB	100 MHz
		9.4		dB	500MHz
		9.4		dB	850MHz
		10.4		dB	1950MHz
		10.8		dB	2400MHz
		11.3		dB	3500MHz
Reverse Isolation		23.9		dB	100MHz
		23.9		dB	500MHz
		24.0		dB	850MHz
		22.8		dB	1950MHz
		22.1		dB	2400MHz
		20.1		dB	3500MHz
Noise Figure		2.9		dB	100 MHz, $Z_S = 50 \Omega$
		2.8		dB	500 MHz, $Z_S = 50$ Ω
		3.0		dB	850MHz, Z_S = 50Ω
		3.0		dB	1950MHz, Z _S =50Ω

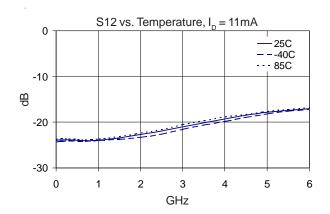
Test Conditions: ID=8mA, unless otherwise noted

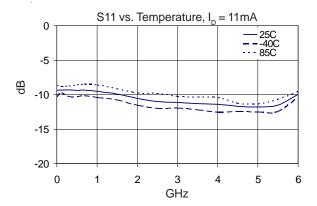


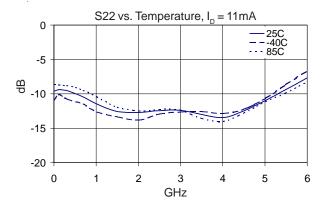


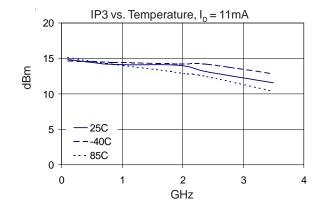
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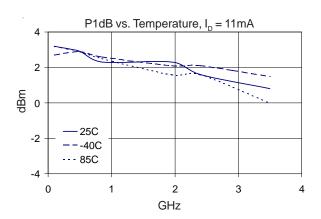








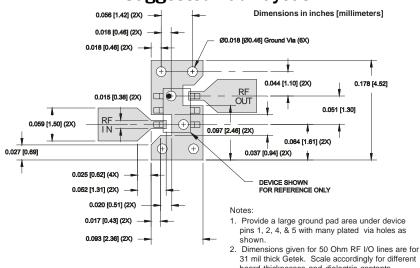






Pin	Function	Description
3	RF IN	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.
1, 2,	GND	Connection to ground. Use via holes for best performance to reduce lead inductance as close to ground leads as possible.
4, 5		DIE.
6	RF OUT/BIAS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

Suggested Pad Layout

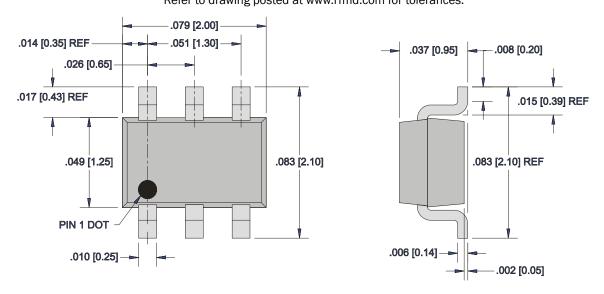


- 31 mil thick Getek. Scale accordingly for different board thicknesses and dielectric contants.

 3. We recommend 1 or 2 ounce copper. Measure-
- ments for this data sheet were made on a 31 mil thick Getek with 1 ounce copper on both sides.

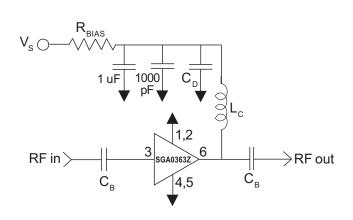
Package Drawing

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





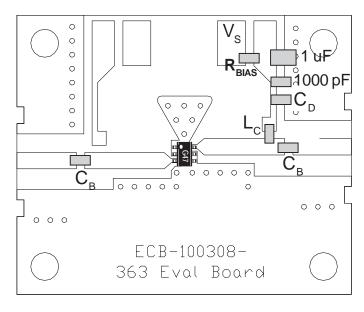
Application Schematic



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 =11mA R_{BIAS} =(V_S - V_D) / I_D				
Supply Voltage(V _s)	5 V	7.5 V	9 V	12 V
R_{BIAS} 220 Ω 470 Ω 620 Ω 910 Ω				
Note: R _{RIAS} provides DC bias stability over temperature.				

Evaluation Board Layout

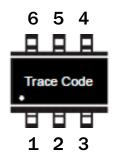


Mounting Instructions

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



Ordering Information

Ordering Code	Description
SGA0363Z	7" Reel with 3000 pieces
SGA0363ZSQ	Sample bag with 25 pieces
SGA0363ZSR	7" Reel with 100 pieces
SGA0363Z-EVB1	850MHz, 5V Operation PCBA