



# 50 MHz to 4000 MHz ACTIVE BIAS SILICON GERMANIUM CASCADABLE GAIN BLOCK

Package: SOT-363

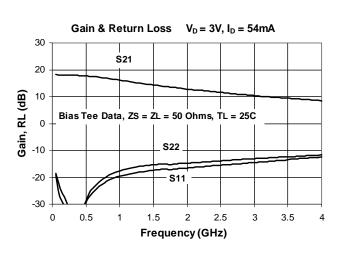




### **Product Description**

RFMD's SGC4363Z is a high performance SiGe HBT MMIC amplifier utilizing a Darlington configuration with a patented active bias network. The active bias network provides stable current over temperature and process Beta variations. Designed to run directly from a 3V supply, the SGC4363Z does not require a dropping resistor as compared to typical Darlington amplifiers. The SGC4363Z is designed for high linearity 3V gain block applications that require small size and minimal external components. It is internally matched to  $50\,\Omega$ .





#### **Features**

- Single Fixed 3V Supply
- No Dropping Resistor Required
- Patented Self-Bias Circuitry
- P<sub>1dB</sub>=12.4dBm at 1950MHz
- $\bullet$  OIP<sub>3</sub>=26.5dBm at 1950MHz
- Robust 1000V ESD, Class 1C HBM

### **Applications**

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

Parameter	Specification			Heit	Open disting		
Farameter	Min.	Тур.	Max.	Unit	Condition		
Small Signal Gain, (G)	15.6	17.1	18.6	dB	850MHz		
	11.2	12.7	14.2	dB	1950MHz		
		11.8		dB	2400MHz		
Output Power at 1dB Compression (P <sub>1dB</sub> )		13.3		dBm	850MHz		
	11.4	12.4		dBm	1950MHz		
		11.8		dBm	2400 MHz		
Output Third Order Intercept Point (OIP <sub>3</sub> )		28.5		dBm	850 MHz		
	24.5	26.5		dBm	1950MHz		
		25.5		dBm	2400MHz		
Input Return Loss, (IRL)	9.5	13.5		dB	1950MHz		
Output Return Loss, (ORL)	8.5	12.5		dB	1950MHz		
Noise Figure (NF)		4.0	5.0	dB	1930MHz		
Thermal Resistance (Junction - Lead) (Rth, j-I)		180		°C/W			
Device Operating Voltage, (V <sub>D</sub> )		3.0		V			
Device Operating Current, (I <sub>D</sub> )	48.0	54.0	60.0	mA			

Test Conditions:  $V_D$ =3V,  $I_D$ =54 mA Typ.,  $OIP_3$  Tone Spacing=1MHz,  $P_{OUT}$  per tone=-5 dBm,  $T_L$ =25 °C,  $Z_S$ = $Z_L$ =50 $\Omega$ , Bias Tee Data



#### **Absolute Maximum Ratings**

Parameter	Rating	Unit
Device Current (I <sub>CE</sub> )	110	mA
Device Voltage (V <sub>CE</sub> )	4	V
RF Input Power* (See Note)	12	dBm
Junction Temp (T <sub>J</sub> )	+150	°C
Operating Temp Range (T <sub>L</sub> )	-40 to +85	°C
Storage Temp	+150	°C
ESD Rating - Human Body Model (HBM)	Class 1C	
Moisture Sensitivity Level	MSL 1	

<sup>\*</sup>Note: Load condition  $Z_L = 50\Omega$ 

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:



#### 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 to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions to the device may reduce the device under Absolute Maximum Rating conditions to the device may reduce the device under Absolute Maximum Rating conditions to the device under Absolute Maximum Rating co tions is not implied.

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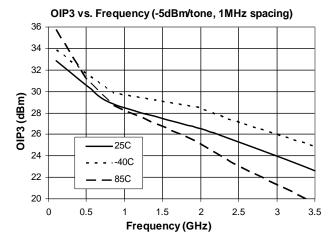
RFMD Green: RoHS compliant per EU Directive 2002/95/EC, halogen free per IEC 61249-2-21, < 1000 ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in

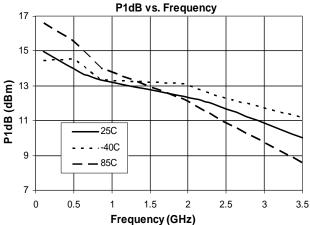
Typical RF Performance with Application Circuit at Key Operating Frequencies (Bias Tee)

Parameter	Unit	100	500	850	1950	2400	3500
		MHz	MHz	MHz	MHz	MHz	MHz
Small Signal Gain (G)	dB	18.0	17.7	17.1	12.7	11.8	9.4
Output Third Order Intercept Point (OIP <sub>3</sub> )	dBm	33.5	30.5	28.5	26.5	25.5	22.5
Output Power at 1dB Compression (P <sub>1dB</sub> )	dBm	14.9	14.0	13.3	12.4	11.8	10.0
Input Return Loss (IRL)	dB	26.5	21.5	18.5	13.5	14.0	12.0
Output Return Loss (ORL)	dB	25.0	21.0	17.5	12.5	12.0	11.0
Reverse Isolation (S <sub>12</sub> )	dB	20.0	21.0	21.5	20.0	19.5	19.0
Noise Figure (NF)	dB	2.9	3.1	3.5	4.0	4.2	5.1

Test Conditions:  $V_D = 3V$   $I_D = 54 \text{ mA Typ.}$   $OIP_3$  Tone Spacing = 1 MHz,  $P_{OUT}$  per tone = -5 dBm  $T_L = 25 \degree C Z_S = Z_L = 50 \Omega$ 

#### Typical Performance with Bias Tee, V<sub>D</sub>=3V, I<sub>D</sub>=54mA

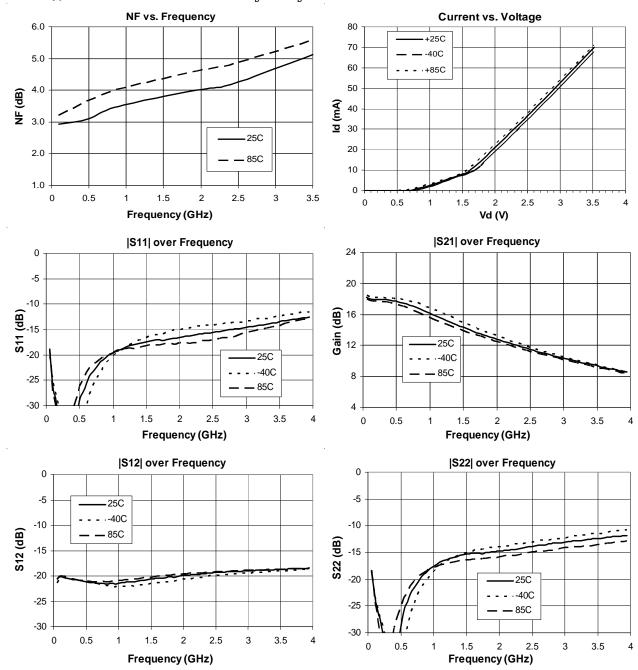




 $I_DV_D < (T_J - T_L)/R_{TH}$ , j-I and  $T_L = T_{LEAD}$ 

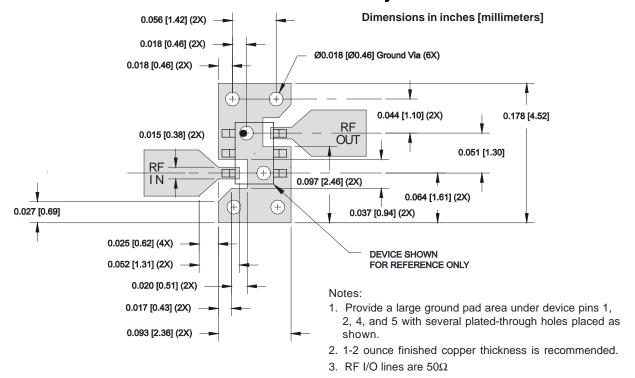






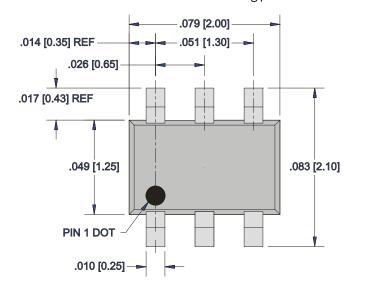


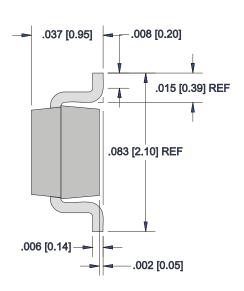
### **SOT-363 PCB Pad Layout**



### **Package Drawing**

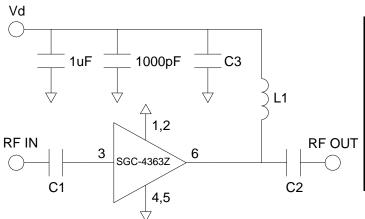
Dimensions in inches (millimeters)
Refer to drawing posted at www.rfmd.com for tolerances.





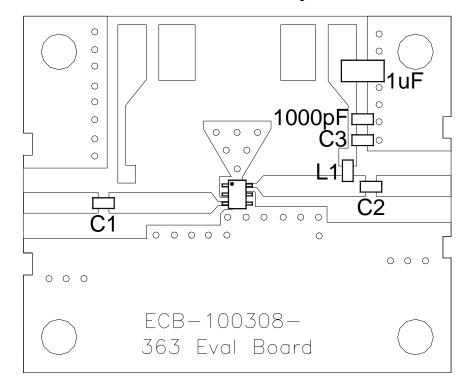


### **Application Schematic**



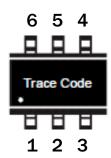
Application Circuit Element Values				
Reference Designator	100-2000MHz	2000-4000MHz		
C1	1000pF	2.7pF		
C2	100pF	6.8pF		
C3	100pF	6.8pF		
L1	120nH	39nH		

### **Evaluation Board Layout**





# **Part Identification Marking**



## **Ordering Information**

Ordering Code	Description
SGC4363Z	7" Reel with 3000 pieces
SGC4363ZSQ	Sample bag with 25 pieces
SGC4363ZSR	7" Reel with 100 pieces
SGC4363ZPCK1	100MHz to 2000MHz PCBA with 5-piece sample bag
SGC4363ZPCK2	2000 MHz to 4000 MHz PCBA with 5-piece sample bag