RFMD
rfmd.com

SGA5263Z

DC to 4500MHz, Silicon Germanium Cascadable Gain Block

Package: SOT-363

Product Description

The SGA5263Z is a high performance SiGe HBT MMIC Amplifier. A Darlington configuration featuring one-micron emitters provides high F_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

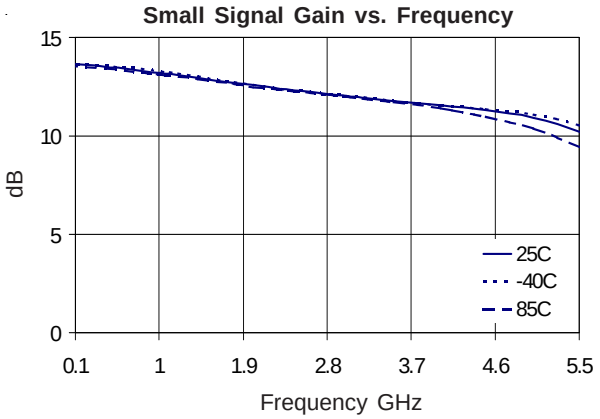
- DC to 4500MHz Operation
- Single Voltage Supply
- Low Current Draw: 60mA at 3.4V Typ.
- High Output Intercept: 29dBm Typ. at 1950MHz

Applications

- Oscillator Amplifiers
- Broadband Gain Block
- IF/RF Buffer Amplifiers

Optimum Technology Matching® Applied

- ☐ GaAs HBT
- ☐ GaAs MESFET
- ☐ InGaP HBT
- ☐ SiGe BiCMOS
- ☐ Si BiCMOS
- ☑ SiGe HBT
- ☐ GaAs pHEMT
- ☐ Si CMOS
- ☐ Si BJT
- ☐ GaN HEMT
- ☐ RF MEMS



Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Small Signal Gain	12.0	13.3	14.6	dB	850MHz
		12.6		dB	1950MHz
		12.3		dB	2400MHz
Output Power at 1dB Compression		16.3		dBm	850MHz
		15.0		dBm	1950MHz
		14.0		dBm	2400MHz
Third Order Intercept Point		32.5		dBm	850MHz, P_{OUT} per tone = -10dBm
		29.3		dBm	1950MHz, P_{OUT} per tone = -10dBm
		27.3		dBm	2400MHz, P_{OUT} per tone = -10dBm
S_{11}, S_{22}		4500		MHz	Minimum 10dB Return Loss (typ.)
Input VSWR		1.2:1			1950MHz
Output VSWR		1.4:1			1950MHz
Reverse Isolation		18.3		dB	850MHz
		19.2		dB	1950MHz
		19.5		dB	2400MHz
Noise Figure		4.0		dB	1950MHz
Device Operating Voltage		3.4		V	
Device Operating Current	54	60	66	mA	
Thermal Resistance (Junction - Lead)		255		°C/W	

Test Conditions: Z_0 = 50Ω, I_D = 60mA, T = 25°C

7628 Thorndike Road, Greensboro, NC 27409-9421 · For sales or technical support, contact RFMD at (+1) 336-678-5570 or sales-support@rfmd.com.

Absolute Maximum Ratings

Parameter	Rating	Unit
Max Device Current (I_D)	120	mA
Max Device Voltage (V_D)	6	V
Max RF Input Power	+16	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 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:

$I_D V_D < (T_J - T_L)/R_{TH}$, j - l

Caution! ESD sensitive device.

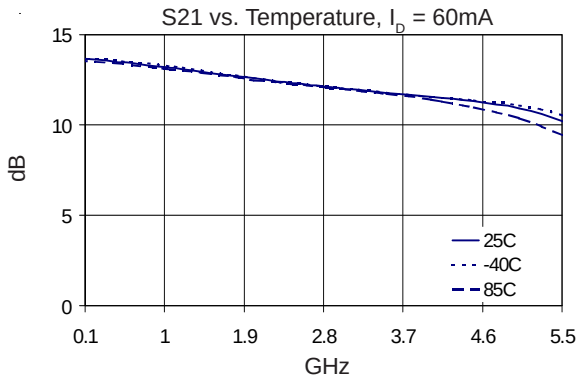
Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

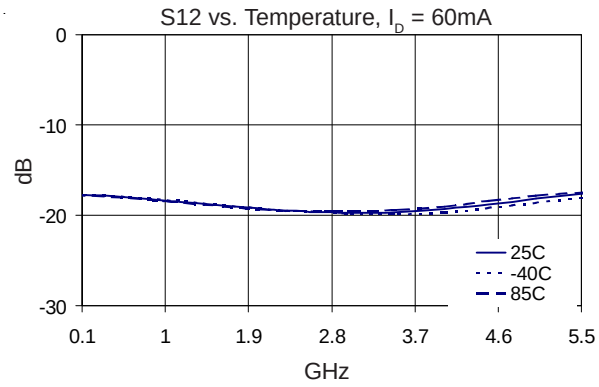
RFMD Green: RoHS compliant per EU Directive 2002/95/EC, halogen free per IEC 61249-2-21, < 1000ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

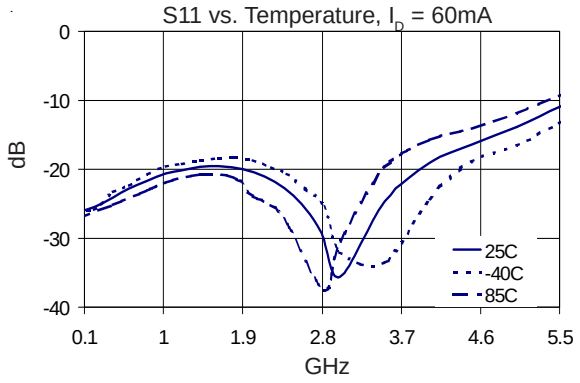
Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Gain		13.6		dB	100MHz
		13.5		dB	500MHz
		13.3		dB	850MHz
		12.6		dB	1950MHz
		12.3		dB	2400MHz
		11.8		dB	3500MHz
Output IIP3		33.6		dBm	100MHz, Tone spacing = 1MHz, P_{OUT} per tone = -10dBm
		33.0		dBm	500MHz, Tone spacing = 1MHz, P_{OUT} per tone = -10dBm
		32.5		dBm	850MHz, Tone spacing = 1MHz, P_{OUT} per tone = -10dBm
		29.3		dBm	1950MHz, Tone spacing = 1MHz, P_{OUT} per tone = -10dBm
		27.3		dBm	2400MHz, Tone spacing = 1MHz, P_{OUT} per tone = -10dBm
		23.1		dBm	3500MHz, Tone spacing = 1MHz, P_{OUT} per tone = -10dBm
Output P1dB		16.1		dBm	100MHz
		16.4		dBm	500MHz
		16.3		dBm	850MHz
		15.0		dBm	1950MHz
		14.0		dBm	2400MHz
		11.6		dBm	3500MHz
Input Return Loss		26.0		dB	100MHz
		23.5		dB	500MHz
		21.4		dB	850MHz
		20.2		dB	1950MHz
		23.0		dB	2400MHz
		24.6		dB	3500MHz
Reverse Isolation		17.7		dB	100MHz
		18.0		dB	500MHz
		18.3		dB	850MHz
		19.2		dB	1950MHz
		19.5		dB	2400MHz
		19.6		dB	3500MHz
Noise Figure		3.9		dB	100MHz, $Z_S = 50\Omega$
		3.9		dB	500MHz, $Z_S = 50\Omega$
		4.0		dB	850MHz, $Z_S = 50\Omega$
		4.0		dB	1950MHz, $Z_S = 50\Omega$

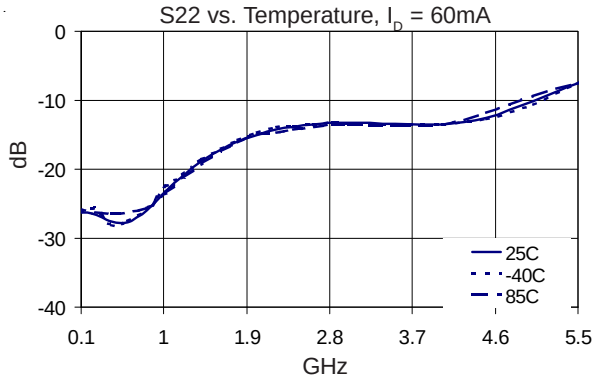
Test Conditions: $Z_0 = 50\Omega$, $I_D = 60$mA, T = 25°C

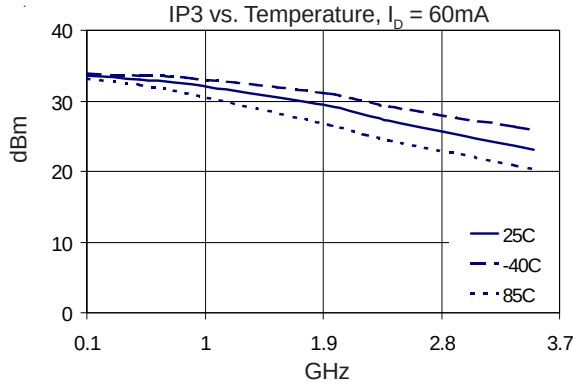
7628 Thorndike Road, Greensboro, NC 27409-9421 · For sales or technical support, contact RFMD at **(+1) 336-678-5570** or **sales-support@rfmd.com**.

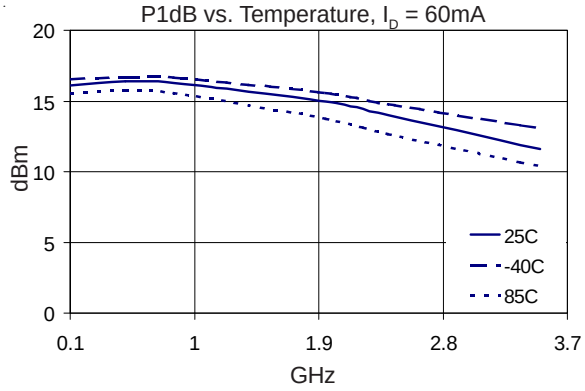

S21 vs. Temperature, I_D = 60mA
dB
15
10
5
0
0.1
1
1.9
2.8
3.7
4.6
5.5
GHz
25C
-40C
85C


S12 vs. Temperature, I_D = 60mA
dB
0
-10
-20
-30
0.1
1
1.9
2.8
3.7
4.6
5.5
GHz
25C
-40C
85C


S11 vs. Temperature, I_D = 60mA
dB
0
-10
-20
-30
-40
0.1
1
1.9
2.8
3.7
4.6
5.5
GHz
25C
-40C
85C


S22 vs. Temperature, I_D = 60mA
dB
0
-10
-20
-30
-40
0.1
1
1.9
2.8
3.7
4.6
5.5
GHz
25C
-40C
85C

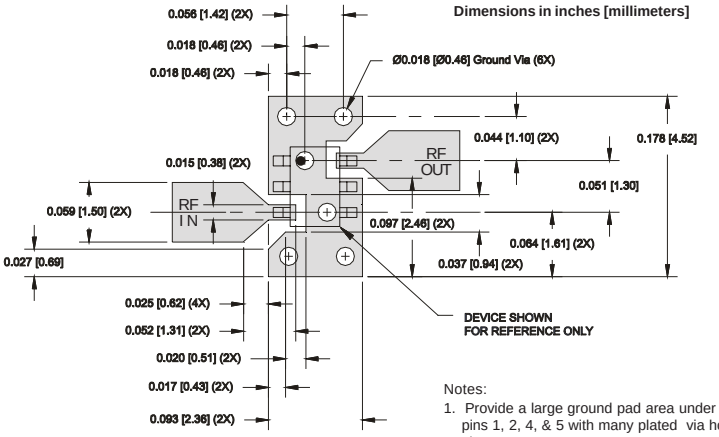

IP3 vs. Temperature, I_D = 60mA
dBm
40
30
20
10
0
0.1
1
1.9
2.8
3.7
GHz
25C
-40C
85C


P1dB vs. Temperature, I_D = 60mA
dBm
20
15
10
5
0
0.1
1
1.9
2.8
3.7
GHz
25C
-40C
85C

Pin Names and Descriptions

Pin	Name	Description
1, 2, 4, 5	GND	Connection to ground. For best performance use via holes as close to ground leads as possible to reduce lead inductance.
3	RF IN	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.
6	RF OUT	RF output and bias pin. Bias should be supplied to this pin through an external series resistor and RF choke inductor. Because DC biasing is present on this pin, a DC-blocking capacitor should be used in most applications. (See application schematic.) The supply side of this bias network should be well bypassed.

SOT-363 PCB Pad Layout

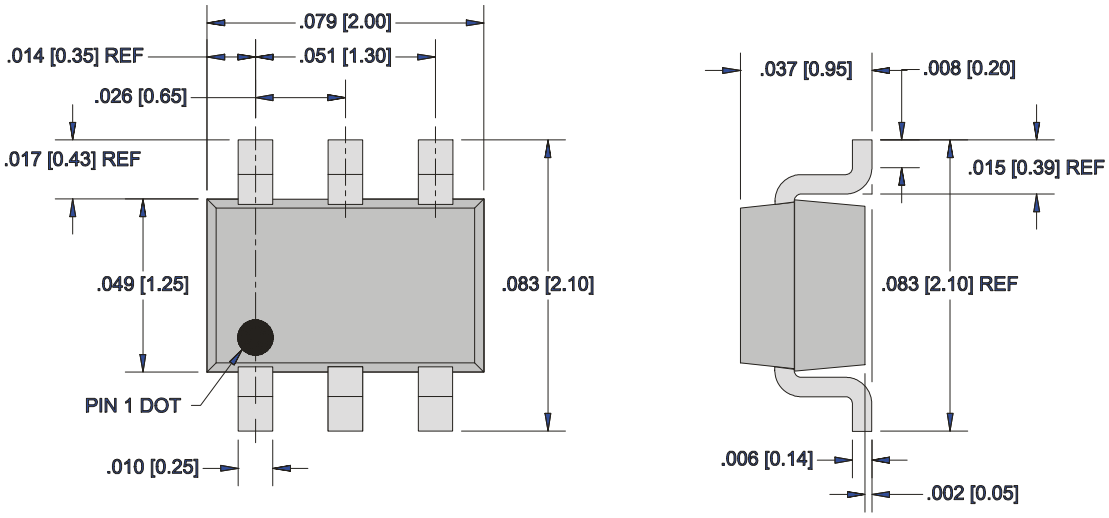


Notes:
1. Provide a large ground pad area under device pins 1, 2, 4, & 5 with many plated via holes as shown.
2. Dimensions given for 50 Ohm RF I/O lines are for 31 mil thick Getek. Scale accordingly for different board thicknesses and dielectric contants.
3. We recommend 1 or 2 ounce copper. Measurements 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.

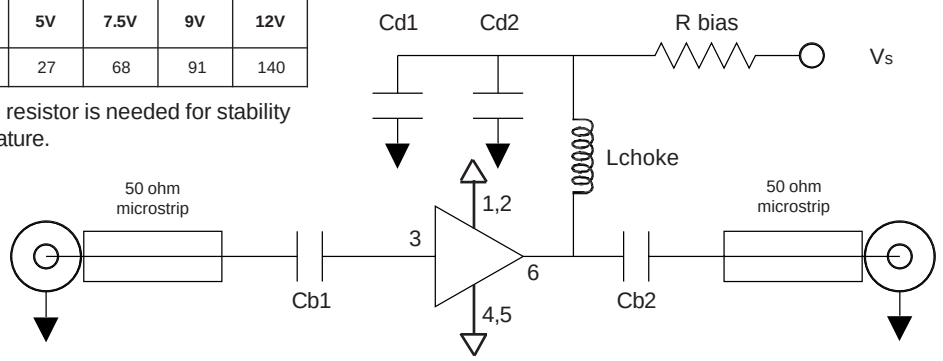


7628 Thorndike Road, Greensboro, NC 27409-9421 · For sales or technical support, contact RFMD at (+1) 336-678-5570 or sales-support@rfmd.com.

Application Schematic

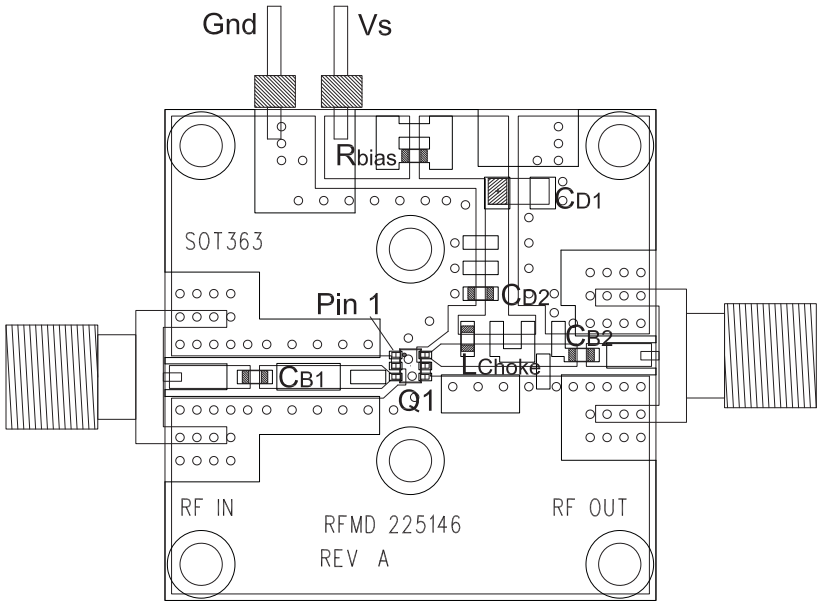
Recommended Bias Resistor Values				
Supply Voltage(Vs)	5V	7.5V	9V	12V
Rbias (Ohms)	27	68	91	140

Note: A bias resistor is needed for stability over temperature.



Reference Designator	Function	500 MHz	850 MHz	1950 MHz	2400 MHz
Cb1	DC Blocking	220 pF	100 pF	68 pF	56 pF
Cb2	DC Blocking	220 pF	100 pF	68 pF	56 pF
Cd1	Decoupling	1 uF	1 uF	1 uF	1 uF
Cd2	Decoupling	100 pF	68 pF	22 pF	22 pF
Lchoke	AC Blocking	68 nH	33 nH	22 nH	18 nH

Evaluation Board Layout

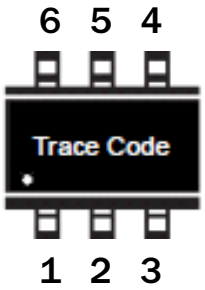


Mounting Instructions:

1. Use a large droung pad area near device pins 1, 2, 4, and 5 with 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 copper on both sides.

Part Identification Marking



Ordering Information

Ordering Code	Description
SGA5263Z	7” Reel with 3000 pieces
SGA5263ZSQ	Sample bag with 25 pieces
SGA5263ZSR	7” Reel with 100 pieces
SGA5263ZPCK1	850MHz, 8V Operation PCBA with 5-piece sample bag

7628 Thorndike Road, Greensboro, NC 27409-9421 · For sales or technical support, contact RFMD at (+1) 336-678-5570 or sales-support@rfmd.com.