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SGC4263Z

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

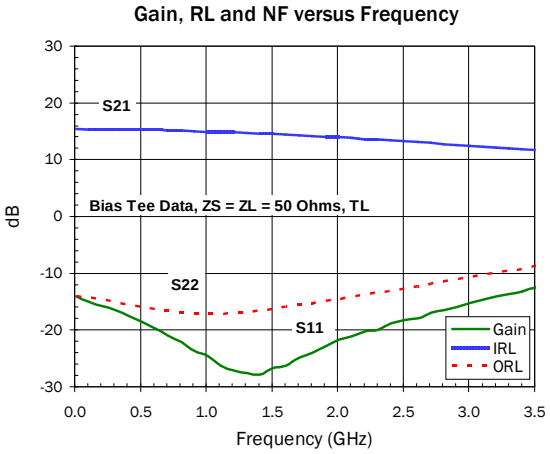
Package: SOT-363

Product Description

RFMD's SGC4263Z 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 SGC4263Z does not require a dropping resistor as compared to typical Darlington amplifiers. The SGC4263Z is designed for high linearity 3V gain block applications that require small size and minimal external components. It is internally matched to 50Ω.

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



Features

- Single Fixed 3V Supply
- No Dropping Resistor Required
- Patented Self-Bias Circuitry
- P_{1dB}=15.1dBm at 1950MHz
- OIP_3=30dBm at 1950MHz
- Robust 1000V ESD, Class 1C HBM

Applications

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

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Small Signal Gain, (G)		15.0		dB	500MHz
	13.2	14.7	16.2	dB	*850MHz
	12.6	14.0	15.4	dB	1950MHz
Output Power at 1dB Compression (P_{1dB})		15.2		dBm	500MHz
		15.1		dBm	850MHz
	13.6	15.1		dBm	1950MHz
Output Third Order Intercept Point (OIP_3)		32.0		dBm	500MHz
		30.5		dBm	850MHz
	27.0	30.0		dBm	1950MHz
Input Return Loss, (IRL)	17.0	23.5		dB	1950MHz
Output Return Loss, (ORL)	17.0	21.0		dB	1950MHz
Noise Figure (NF)		3.3	4.5	dB	1930MHz
Device Operating Voltage, (V_D)		3.0		V	
Device Operating Current, (I_D)	47	55	63	mA	
Thermal Resistance		130		°C/W	(Junction - Lead) (Rth, j-l)

Test Conditions: V_D=3V, I_D=55mA Typ., T_L=25°C, OIP_3 Tone Spacing=1MHz. *Bias Tee Data, Z_S=Z_L=50Ω, P_{OUT} per tone=0dBm, Application Circuit Data Unless Otherwise Noted

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Absolute Maximum Ratings

Parameter	Rating	Unit
Max Device Current (I_D)	110	mA
Max Device Voltage (V_D)	4	V
Max RF Input Power[1]	12	dBm
Max RF Input Power[2]	18	dBm
Max Junction Temp (T_J)	+150	°C
Operating Temp Range (T_L)	-40 to +85	°C
Max Storage Temp	+150	°C
ESD Rating - Human Body Model (HBM)	Class 1C	
Moisture Sensitivity Level	MSL 1	

Notes
1. Load condition: VSWR ≤ 10:1; V_{CC} ≤ 3.5V
2. Load condition: VSWR ≤ 3:1; V_{CC} ≤ 3.2V

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 and T_L=Source Lead Temperature

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.

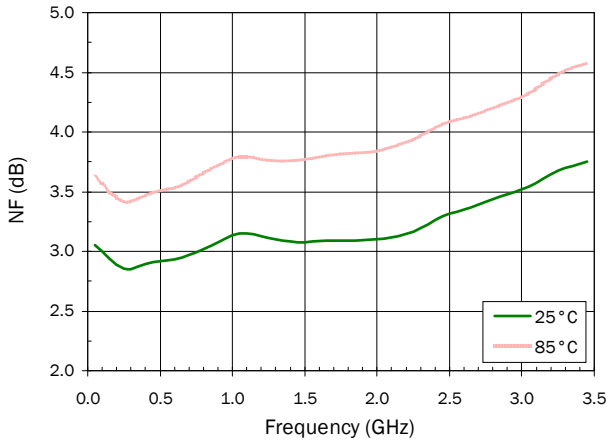
Typical RF Performance with Application Circuit at Key Operating Frequencies (App Circuit Data Unless Noted Otherwise)

Parameter	Unit	*100 MHz	500 MHz	850 MHz	1950 MHz	2500 MHz	*3500 MHz
Small Signal Gain (G)	dB	15.4	15.0	14.7	14.0	13.1	11.6
Output Third Order Intercept Point (OIP_3)	dBm	33.0	32.0	30.5	30.0	29.5	27.0
Output Power at 1dB Compression (P_{1dB})	dBm	15.4	15.2	15.1	15.1	15.3	14.3
Input Return Loss (IRL)	dB	14.5	16.0	21.5	23.5	16.0	13.0
Output Return Loss (ORL)	dB	13.5	13.5	17.0	21.0	20.5	9.0
Reverse Isolation (S_{12})	dB	18.5	19.0	19.5	19.5	19.5	18.5
Noise Figure (NF)	dB	2.8	3.2	3.1	3.3	3.5	3.8

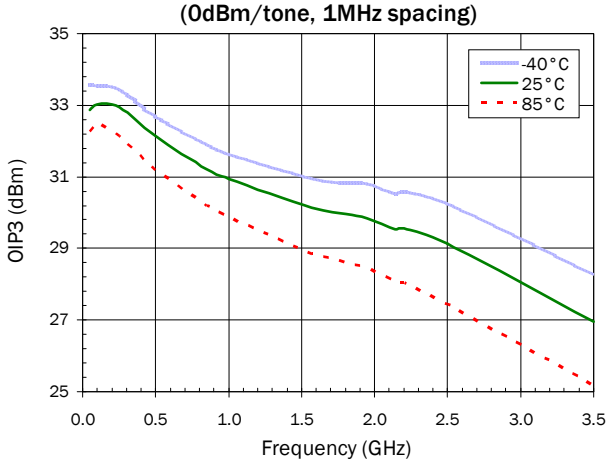
Test Conditions: V_D=3V, I_D=55mA Typ. OIP_3 Tone Spacing=1MHz, P_{OUT} per tone=0dBm, T_L=25°C, Z_S=Z_L=50Ω, *Bias Tee Data

Typical Performance with Bias Tee, V_D=3V, I_D=55mA

Noise Figure versus Frequency



OIP3 versus Frequency
(0dBm/tone, 1MHz spacing)



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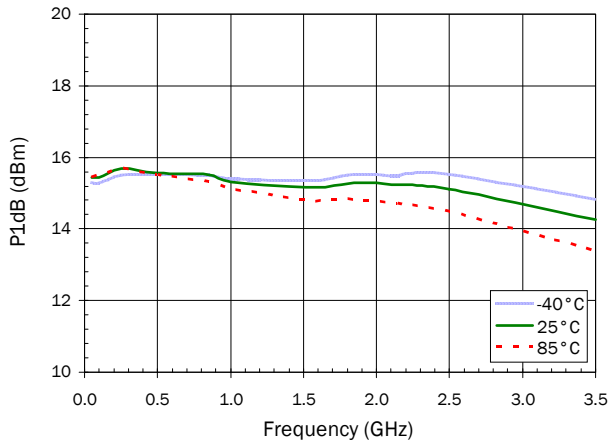
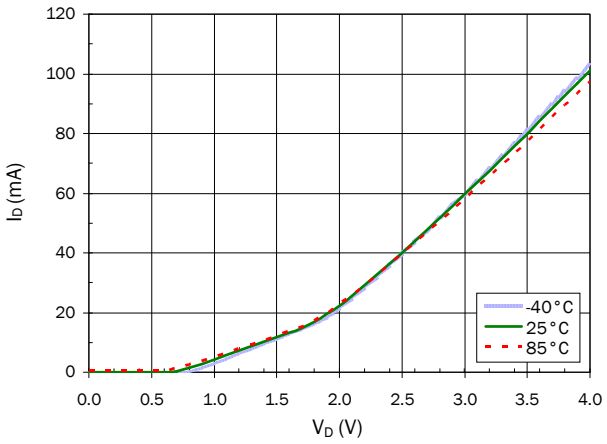
Typical Performance with Bias Tee, V_D=3V, I_D=55mA

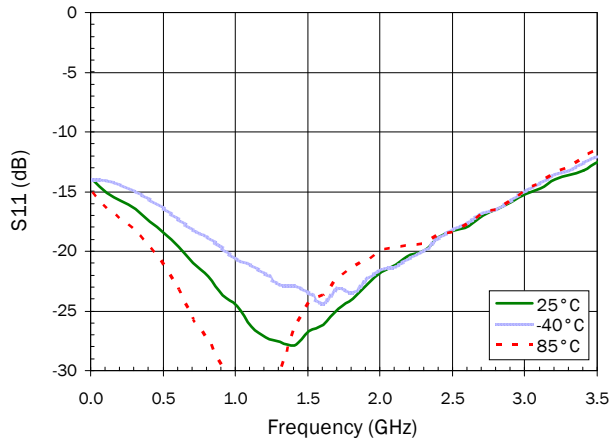
P1dB versus Frequency



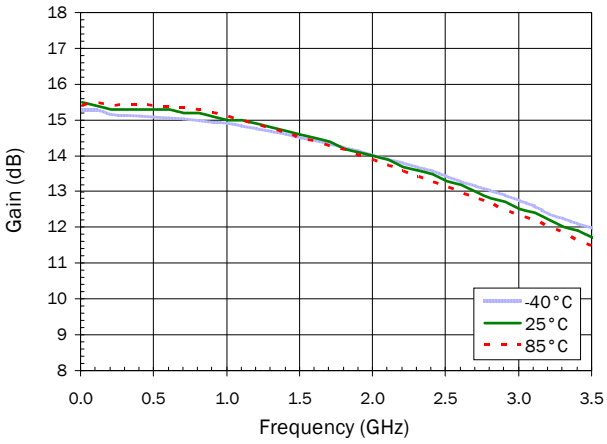
DCIV



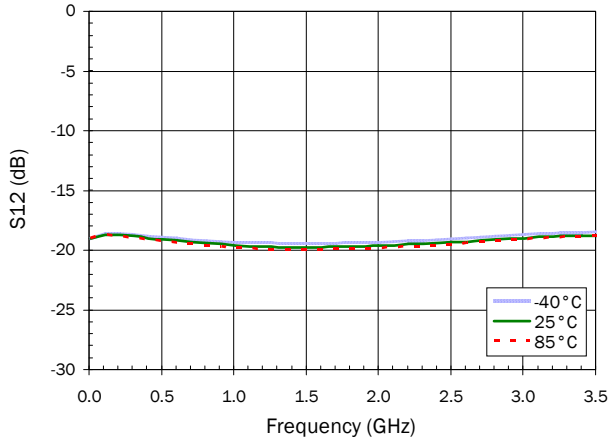
S11 versus Frequency



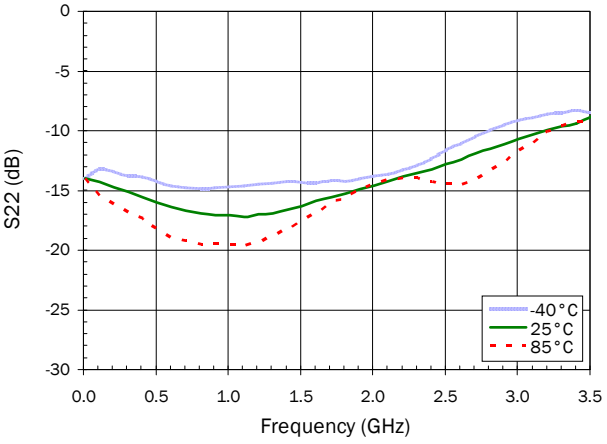
S21 versus Frequency



S12 versus Frequency

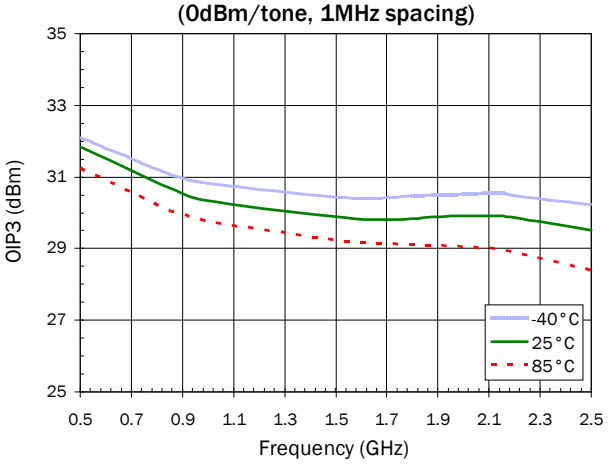


S22 versus Frequency

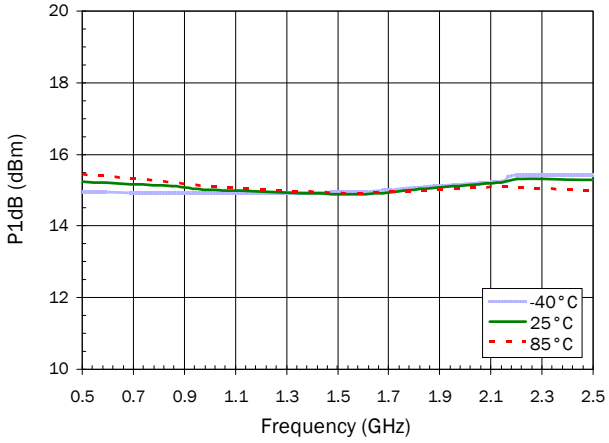


Typical Performance with Application Circuit, V_D=3V, I_D=55mA

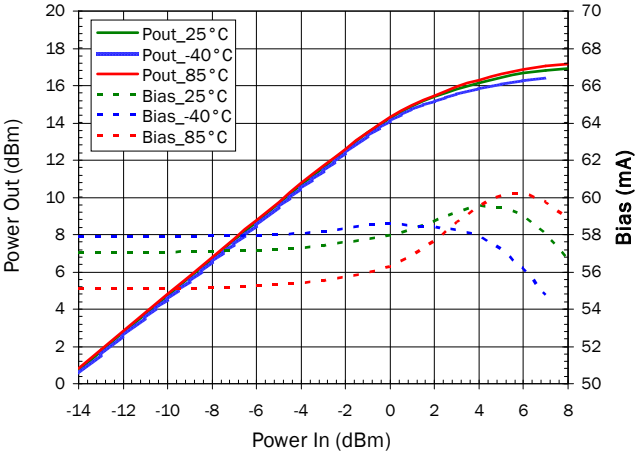
OIP3 versus Frequency
(0dBm/tone, 1MHz spacing)



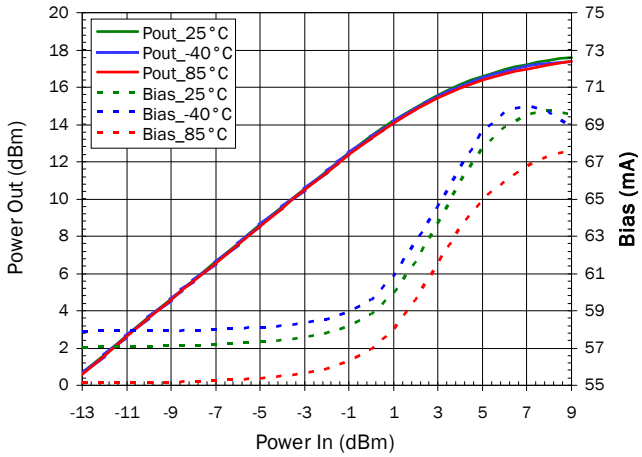
P1dB versus Frequency



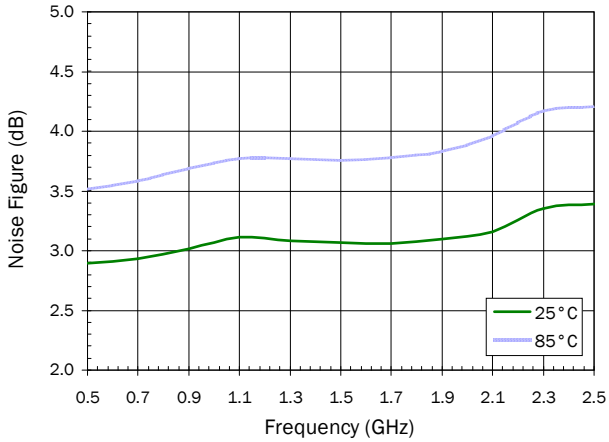
P_{OUT} versus P_{IN} @ 850MHz



P_{OUT} versus P_{IN} @ 2140MHz



Noise Figure versus Frequency



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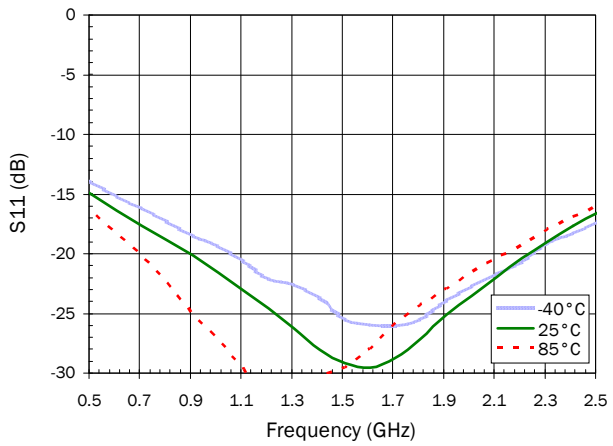
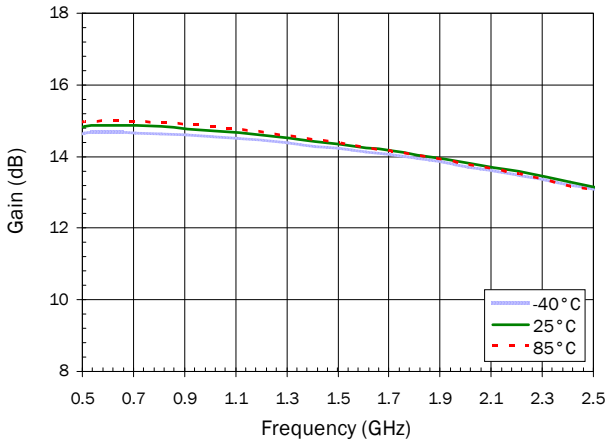
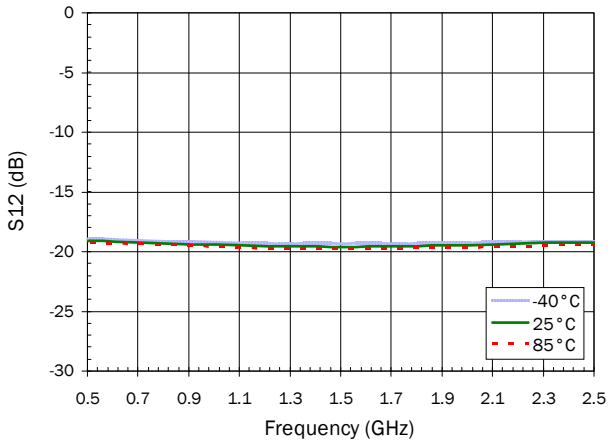
S11 versus Frequency



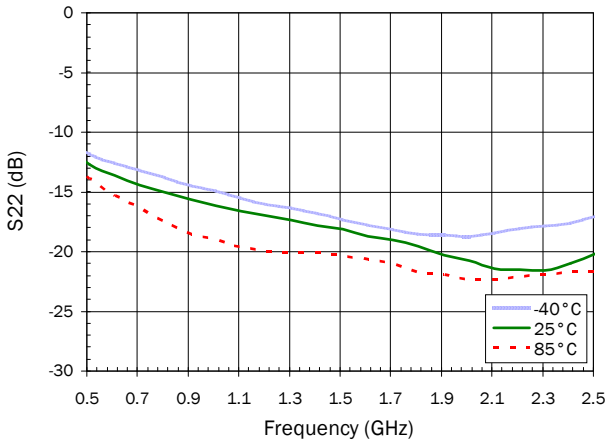
S21 versus Frequency



S12 versus Frequency

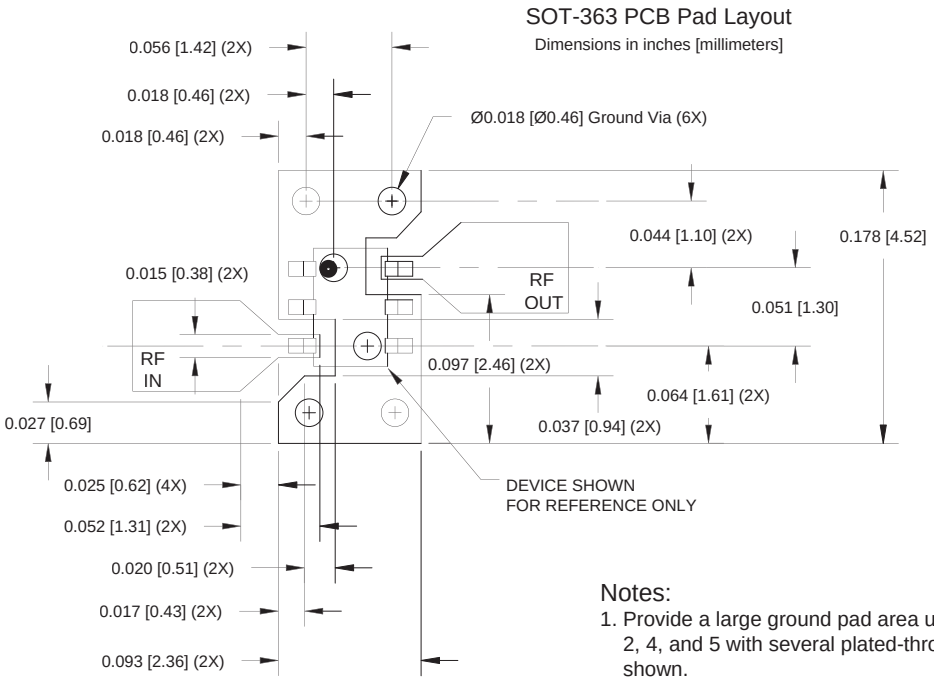


S22 versus Frequency



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. Use via holes as close to the device ground leads as possible to reduce ground inductance and achieve optimum RF performance.
6	RF OUT/ DC BIAS	RF output and bias pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.

SOT-363 PCB Pad Layout



Notes:
1. Provide a large ground pad area under device pins 1, 2, 4, and 5 with several plated-through holes placed as shown.
2. 1/2 ounce finished copper thickness is recommended.
3. RF I/O lines are 50Ω

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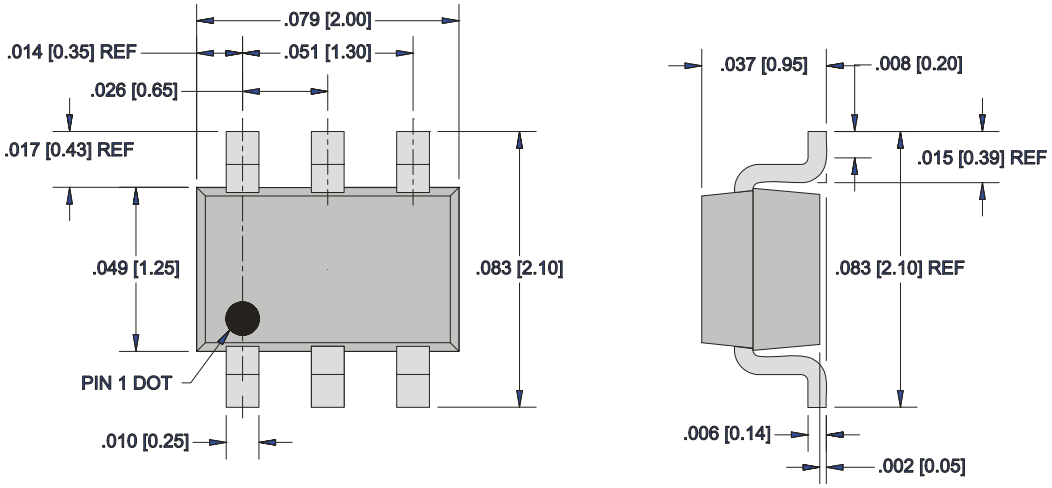
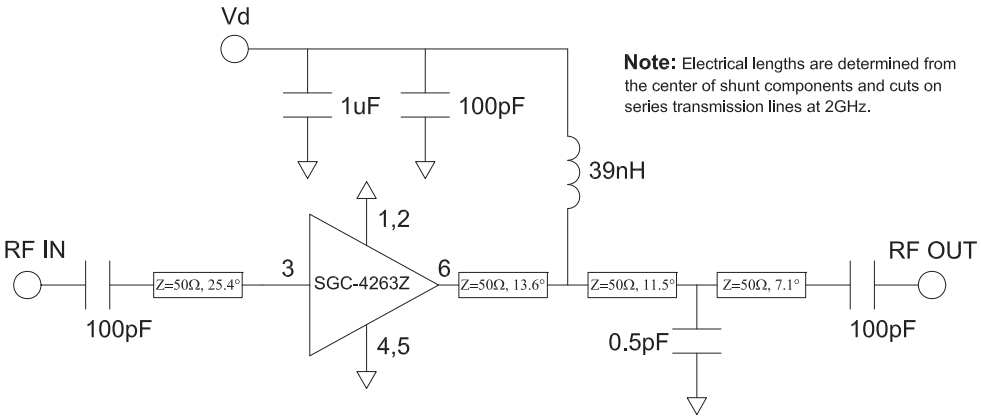
Package Drawing

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



Application Schematic



Note: Electrical lengths are determined from the center of shunt components and cuts on series transmission lines at 2GHz.

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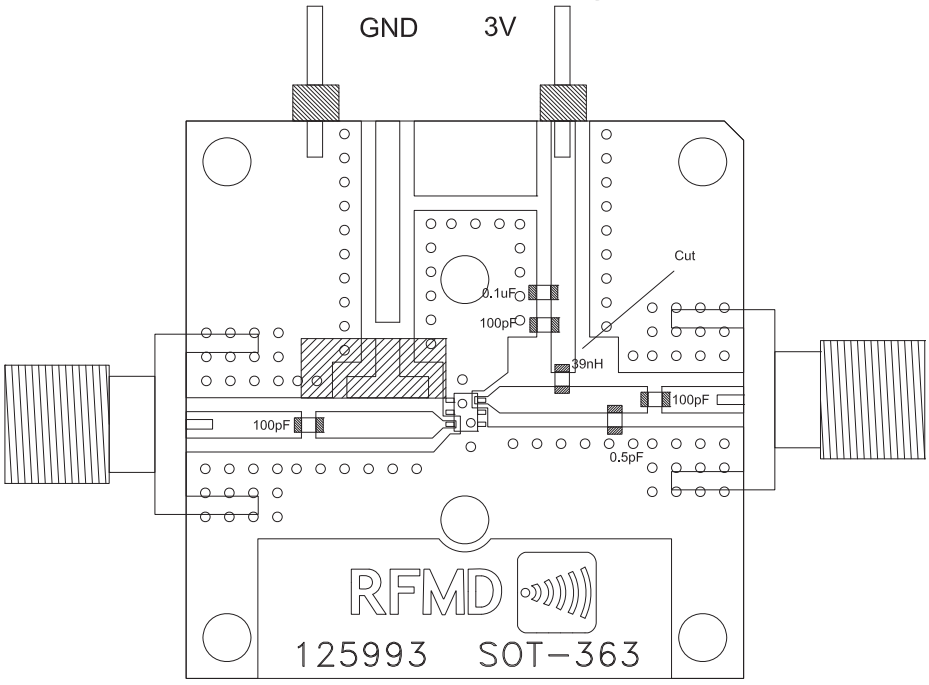
Evaluation Board Layout



PCB Assy. 800 to 2200 MHz

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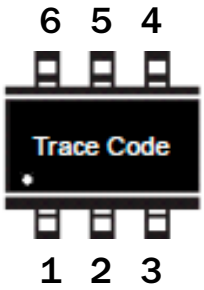
Part Identification Marking



Ordering Information

Ordering Code	Description
SGC4263Z	7” Reel with 3000 pieces
SGC4263ZSQ	Sample bag with 25 pieces
SGC4263ZSR	7” Reel with 100 pieces
SGC4263ZPCK	800MHz to 2200MHz PCBA with 5-piece sample bag

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