

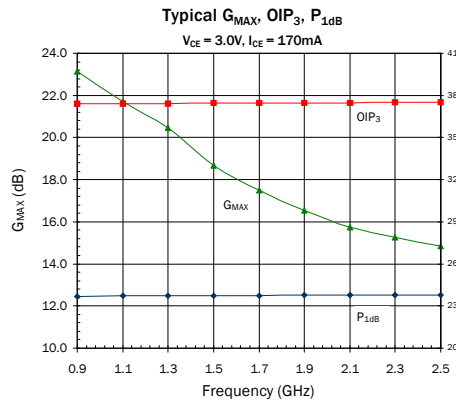


Product Description

RFMD's SGA-9089Z is a high performance Silicon Germanium Heterostructure Bipolar Transistor (SiGe HBT) designed for operation from 50MHz to 4.0GHz. The SGA-9089Z is optimized for 3V operation. The device provides excellent linearity at a low cost. It can be operated over a wide range of currents depending on the power and linearity requirements.

Optimum Technology Matching® Applied

- GaAs HBT
- GaAs MESFET
- InGaP HBT
- SiGe BiCMOS
- Si BiCMOS
- SiGe HBT
- GaAs pHEMT
- Si CMOS
- Si BJT
- GaN HEMT
- InP HBT
- RF MEMS
- LDMOS



Features

- 0.05GHz to 4 GHz Operation
- 15.0dB G_{MAX} at 2.44GHz
- P_{1dB} = +23.8dBm at 2.44GHz
- OIP₃ = +37.5dBm at 2.44GHz
- 3.1dB NF at 2.44GHz
- Low Cost, High Performance, Versatility

Applications

- Analog and Digital Wireless Systems
- 3G, Cellular, PCS, RFID
- Fixed Wireless, Pager Systems
- PA Stage for Medium Power Applications

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Maximum Available Gain, Z _S =Z _S [*] , Z _L =Z _L [*]		23.2		dB	880MHz
		16.4		dB	1960MHz
		15.0		dB	2440MHz
Output Power at 1dB Compression ^[2] , Z _S =Z _{SOPT} , Z _L =Z _{LOPT}		23.7		dBm	880MHz and 1960MHz
		23.8		dBm	2440MHz
Output Third Order Intercept Point, Z _S =Z _{SOPT} , Z _L =Z _{LOPT}		37.4		dBm	880MHz
		37.5		dBm	1960MHz and 2440MHz
Power Gain, Z _S =Z _{SOPT} , Z _L =Z _{LOPT}		18.0		dB	880MHz ^[1]
		13.0		dB	1960MHz ^[2]
		11.0		dB	2440MHz ^[2]
Noise Figure ^[2] , Z _S =Z _{SOPT} , Z _L =Z _{LOPT}		3.2		dB	880MHz
		3.1		dB	1960MHz
		3.1		dB	2440MHz
DC Current Gain	100	180	300		
Thermal Resistance		48		°C/W	Junction - lead
Breakdown Voltage	5.7	6.0		V	Collector - Emitter
Device Operating Voltage			3.8	V	Collector - Emitter
Device Operating Current			220	mA	Collector - Emitter

Test Conditions: V_{CE} = 3V, I_{CE} = 170mA Typ. (unless otherwise noted), T_L = 25°C OIP₃ Tone Spacing = 1MHz, P_{OUT} per tone = 10dBm
 [1] 100% production tested with Application Circuit [2] Data with Application Circuit

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Absolute Maximum Ratings

Parameter	Rating	Unit
Device Current (I_{CE})	235	mA
Base Current (I_B)	2.5	mA
Device Voltage (V_{CE})	4.5	V
Collector - Base Voltage (V_{CB})	12	V
Emitter - Base Voltage (V_{EB})	4.5	V
RF Input Power* (See Note)	24	dBm
Junction Temp (T_J)	+150	°C
Operating Temp Range (T_L)	See Graph	°C
Storage Temp	+150	°C
ESD Rating - Human Body Model (HBM)	Class 1C	
Moisture Sensitivity Level	MSL 2	



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.

RoHS status based on EU Directive 2002/95/EC (at time of this document revision).

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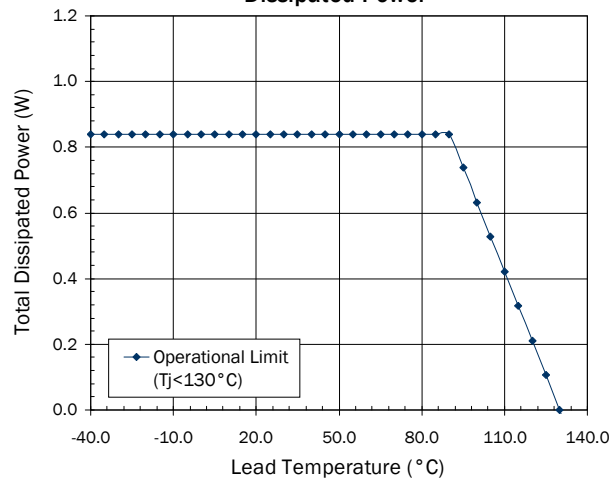
*Note: Load condition $Z_L = 50\Omega$

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:

$$I_B V_D < (T_J - T_L) / R_{TH, j-l} \text{ and } T_L = T_{LEAD}$$

Maximum Recommended Operational Dissipated Power

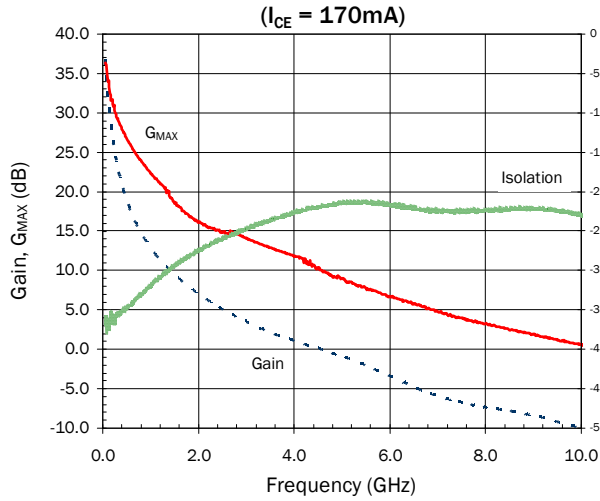


Typical Performance with 2.45GHz Application Circuit

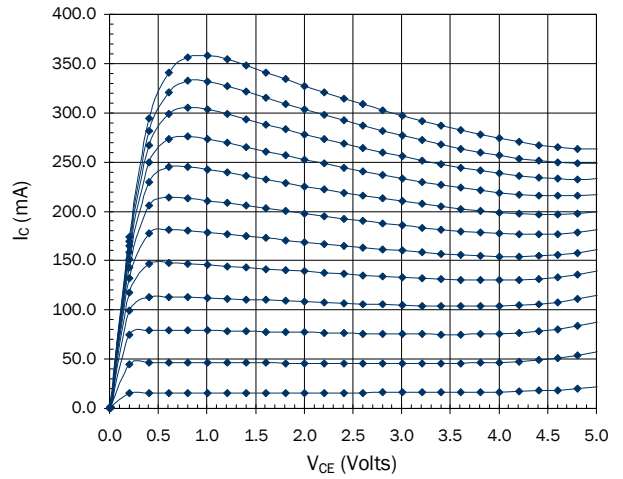
Freq (MHz)	VCE (v)	ICE (mA)	P1dB (dBm)	OIP3 (dBm)	Gain (dB)	S11 (dB)	S22 (dB)	NF (dB)	ZSOPT (Ω)	ZLOPT (Ω)
880	3.0	170.0	23.7	37.4	18.0	-18.6	-18.7	3.2	15 - j5.9	14.2 - j2.8
2440	3.0	170.0	23.8	37.5	11.0	-18.7	-23.9	3.1	11.8 - j27.6	16.4 - j14.2

Test Conditions: $V_S = 5V$ $I_S = 180mA$ Typ. OIP₃ Tone Spacing = 1MHz, P_{OUT} per tone = 10dBm $T_L = 25^\circ C$

Insertion Gain and Isolation

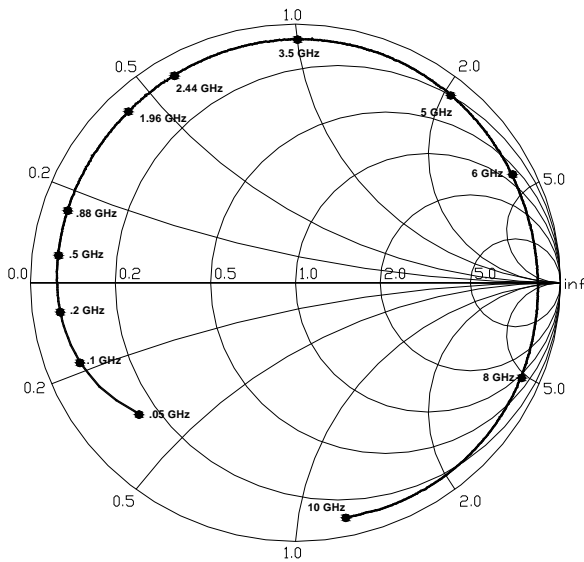


DCIV Curves



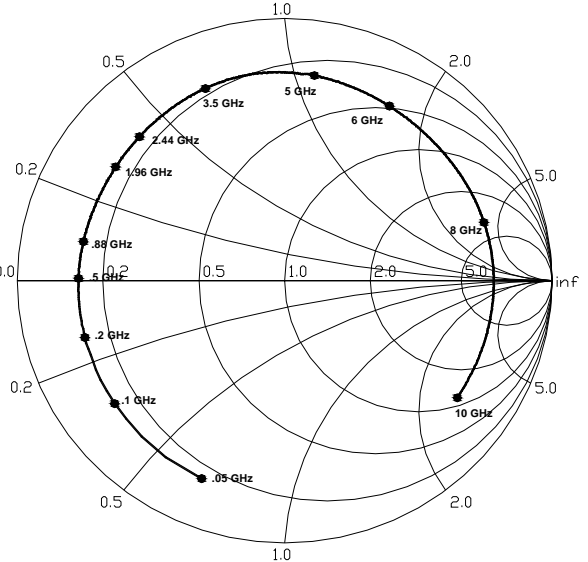
S11 versus Frequency

S11 Vs. Frequency



S22 versus Frequency

S22 Vs. Frequency

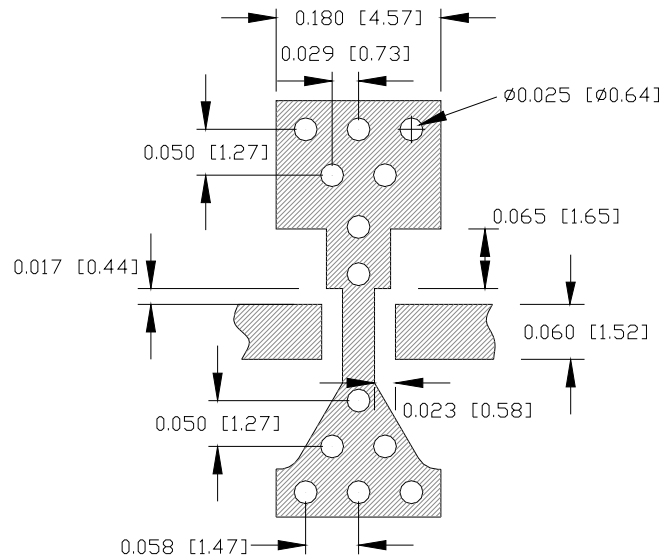


Note:

S-parameters are de-embedded to the device leads with $Z_S=Z_L=50\Omega$. De-embedded S-parameters can be downloaded from our website (www.rfmd.com)

Pin	Function	Description
1	RF IN	RF input / Base Bias. External DC blocking capacitor required.
2, 4	GND	Connection to ground. Use via holes to reduce lead inductance. Place via holes as close to lead as possible.
3	RF OUT	RF Out / Collector bias. External DC blocking capacitor required.

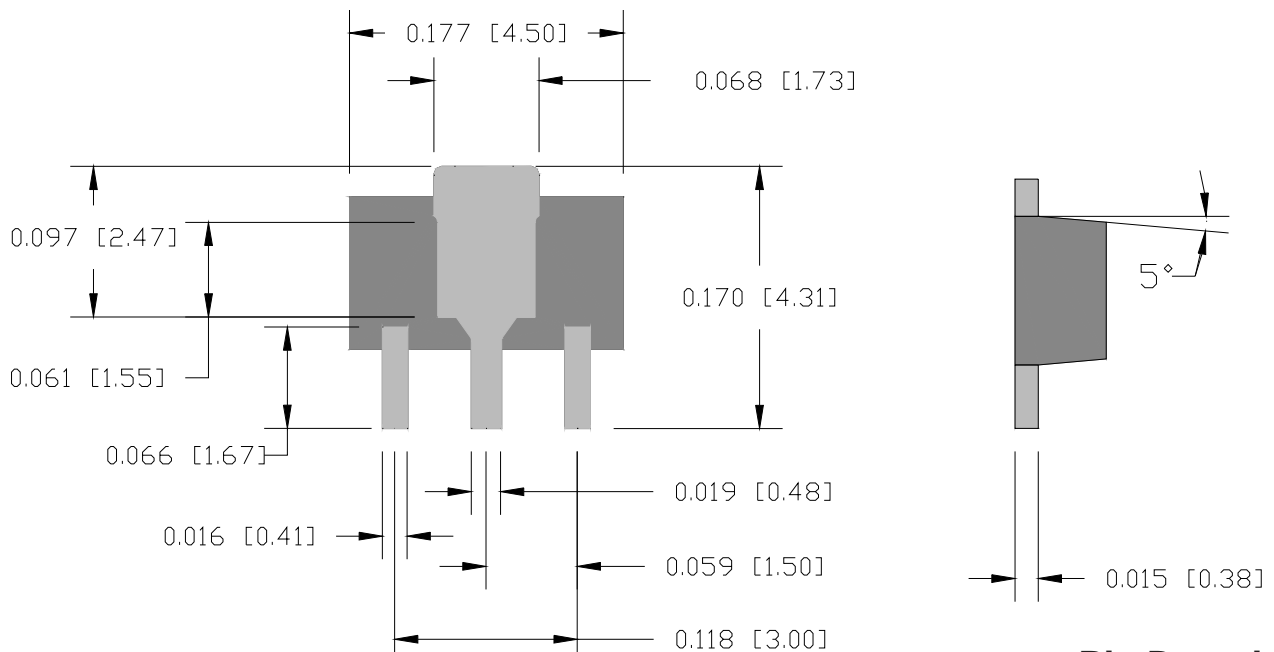
Suggested Pad Layout



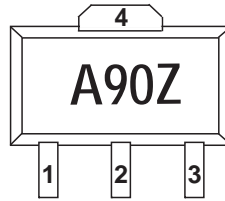
Package Drawing

Dimensions in inches (millimeters)

Refer to drawing posted at www.rfmd.com for tolerances.



Part Identification



Alternate marking "SGA9089Z" on line one with Trace Code on line two.

Ordering Information

Part Number	Reel Size	Devices/Reel
SGA-9089Z	7"	1000

SGA-9089Z

