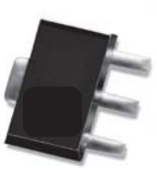
Preliminary

SGA-9089Z

High IP3, Medium Power Discrete SiGe Transistor

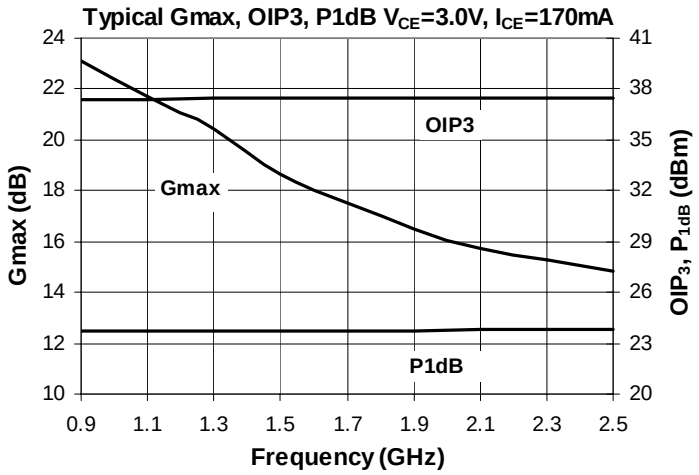
RoHS Compliant & Green Package



Product Description

Sirenza Microdevices' SGA-9089Z is a high performance Silicon Germanium Heterostructure Bipolar Transistor (SiGe HBT) designed for operation from DC to 4.0 GHz. The SGA-9089Z is optimized for 3.0V 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.

The matte tin finish on Sirenza's lead-free "Z" package is applied using a post annealing process to mitigate tin whisker formation and is RoHS compliant per EU Directive 2002/95. The package body is manufactured with green molding compounds that contain no antimony trioxide or halogenated fire retardants.



Product Features

- DC-4 GHz Operation
- Lead Free, RoHS Compliant & Green Package
- 15.0 dB Gmax @ 2.44 GHz
- P_{1dB} = +23.8 dBm @ 2.44 GHz
- OIP_3 = +37.5 dBm @ 2.44 GHz
- 3.1 dB NF @ 2.44 GHz
- 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

Symbol	Parameters	Units	Frequency	Min.	Typ.	Max.
G_{MAX}	Maximum Available Gain $Z_S=Z_S^*$, $Z_L=Z_L^*$	dB	880 MHz 1960 MHz 2440 MHz		23.2 16.4 15.0	
G	Power Gain $Z_S=Z_{SOPT}$, $Z_L=Z_{LOPT}$	dB	880 MHz [1] 1960 MHz [2] 2440 MHz [2]		18.0 13.0 11.0	
P_{1dB}	Output Power at 1dB Compression [2] $Z_S=Z_{SOPT}$, $Z_L=Z_{LOPT}$	dBm	880 MHz 1960 MHz 2440 MHz		23.7 23.7 23.8	
OIP_3	Output Third Order Intercept Point [2] $Z_S=Z_{SOPT}$, $Z_L=Z_{LOPT}$	dBm	880 MHz 1960 MHz 2440 MHz		37.4 37.5 37.5	
NF	Noise Figure [2] $Z_S=Z_{SOPT}$, $Z_L=Z_{LOPT}$	dB	880 MHz 1960 MHz 2440 MHz		3.2 3.1 3.1	
h_{FE}	DC Current Gain			100	180	300
BV_{CEO}	Collector - Emitter Breakdown Voltage	V		5.7	6	
Rth, j-l	Thermal Resistance (Junction - lead)	°C/W			48	
V_{CE}	Device Operating Voltage (collector- emitter)	V				3.8
I_{CE}	Device Operating Current (collector - emitter)	mA				220

Test Conditions: V_{CE} = 3.0V, I_{CE} = 170mA Typ. (unless noted otherwise), T_L = 25°C OIP_3 Tone Spacing = 1MHz, Pout per tone = 10 dBm

[1] 100% production tested with Application Circuit [2] Data with Application Circuit

Absolute Maximum Ratings

Parameter	Absolute Limit
Max Device Current (I_{CE})	235 mA
Max Base Current (I_B)	2.5 mA
Max Device Voltage (V_{CE})	4.5 V
Max Collector - Base Voltage (V_{CB})	12 V
Max Emitter - Base Voltage (V_{EB})	4.5 V
Max. RF Input Power* (See Note)	+24 dBm
Max. Junction Temp. (T_J)	+150°C
Operating Temp. Range (T_L)	See Graph
Max. Storage Temp.	+150°C

***Note:** Load condition, Z_L = 50 Ohms

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:

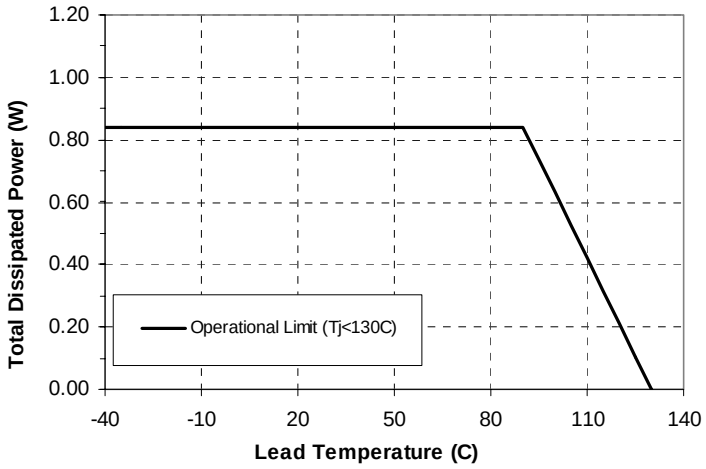
$I_D V_D < (T_J - T_L) / R_{TH}, j\text{-}l \qquad T_L = T_{LEAD}$

Reliability & Qualification Information	
Parameter	**Rating**
ESD Rating - Human Body Model (HBM)	Class 1C
Moisture Sensitivity Level	MSL 1

This product qualification report can be downloaded at *www.sirenza.com*

Caution: ESD sensitive
Appropriate precautions in handling, packaging and testing devices must be observed.

Maximum Recommended Operational Dissipated Power

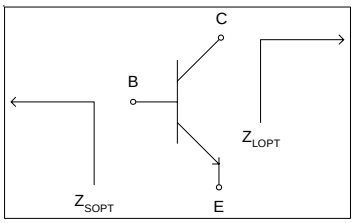


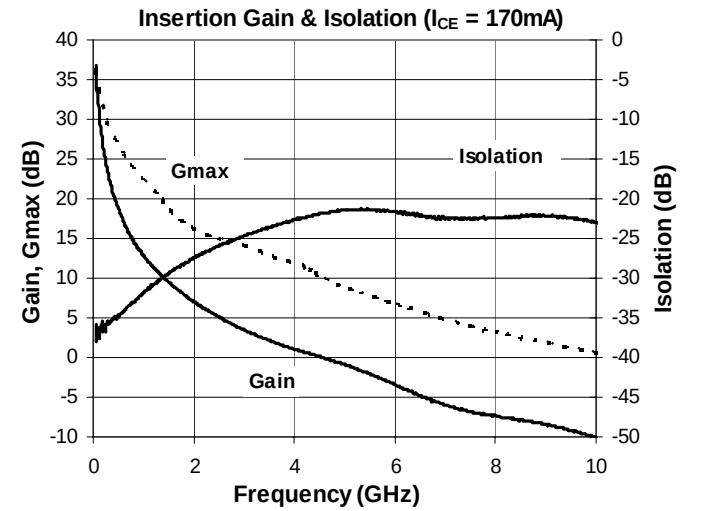
Typical performance - Engineering Application Circuits

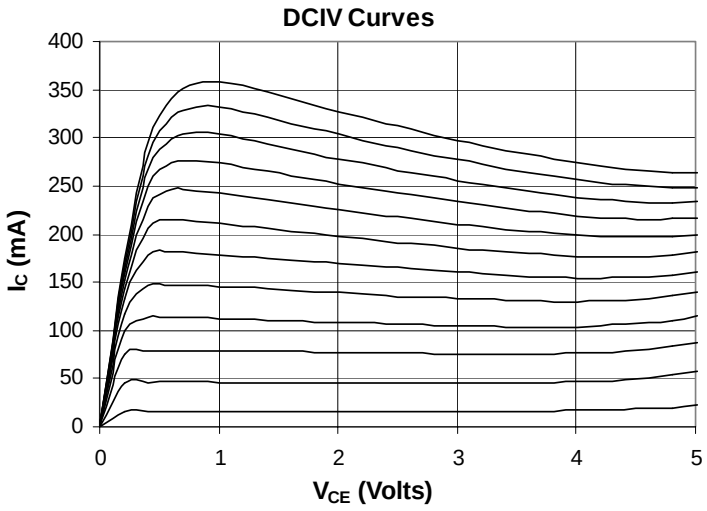
Freq (MHz)	V_{CE} (V)	I_{CE} (mA)	P_{1dB} (dBm)	OIP_3 (dBm)	Gain (dB)	S11 (dB)	S22 (dB)	NF (dB)	Z_{SOPT} (Ω)	Z_{LOPT} (Ω)
880	3	170	23.7	37.4	18.0	-18.6	-18.7	3.2	14.8 - j5.6	16.7 - j0.105
2440	3	170	23.8	37.5	11.0	-18.7	-23.9	3.1	11.1 - j23.5	16.4 - j14.2

Test Conditions: V_S = 5V I_S = 180mA Typ. OIP_3 Tone Spacing = 1MHz, Pout per tone = 10 dBm TL = 25°C

Data above represents typical performance of the application circuits. Refer to the application note for additional RF data, PCB layouts, and BOMs for each application circuit. The application note also includes biasing instructions and other key issues to be considered. For the latest application notes please visit our site at www.sirenza.com or call your local sales representative.





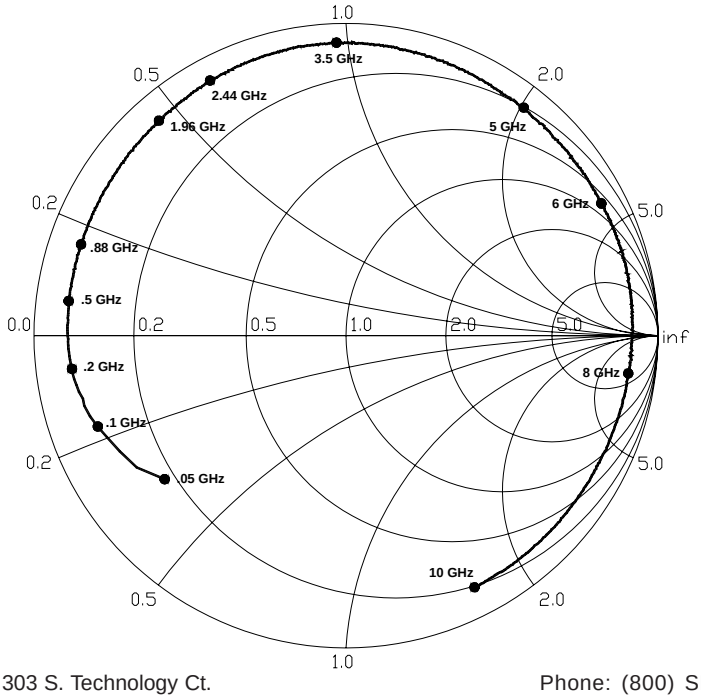


I_B = 0.0 - 2.8 mA, T=25°C

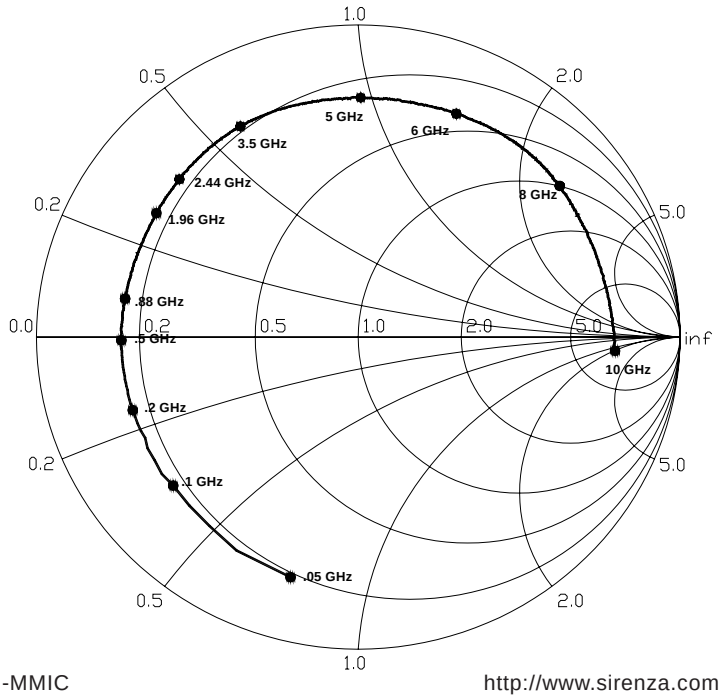
Typical Performance - De-embedded S-parameters

Note: S-parameters are de-embedded to the device leads with Z_S=Z_L=50Ω. The device was mounted on Sirenza's recommended evaluation board. De-embedded S-parameters can be downloaded from our website (www.sirenza.com)

S11 Vs. Frequency

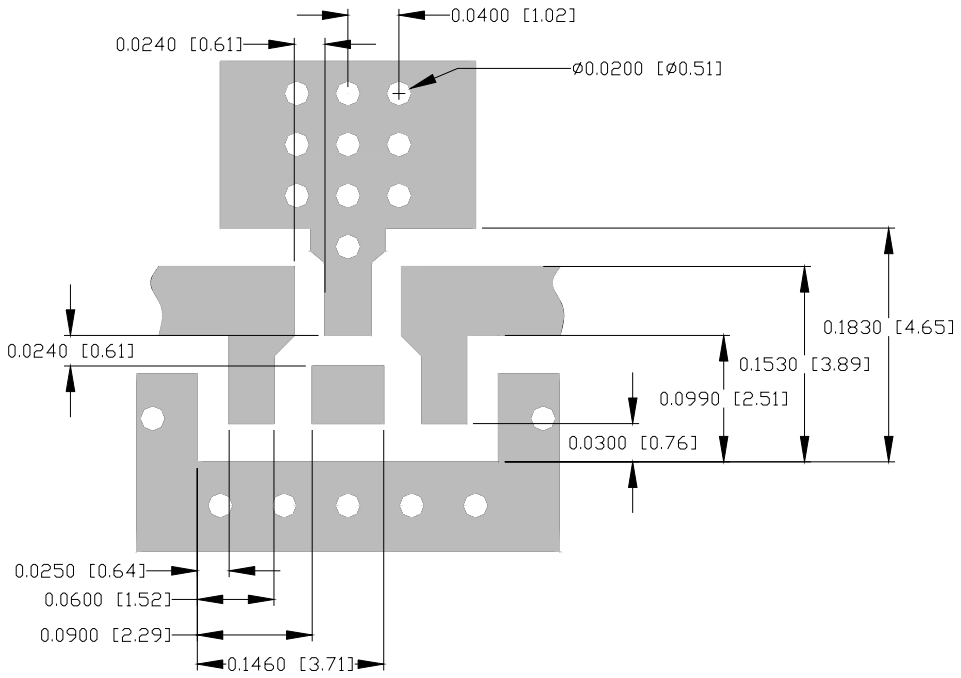


S22 Vs. Frequency



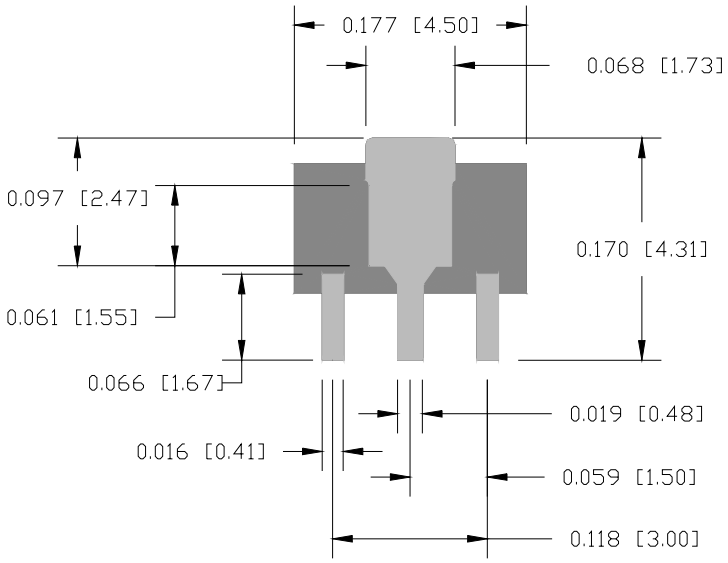
Suggested PCB Pad Layout

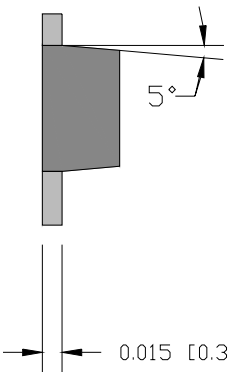
Dimensions in inches [millimeters]



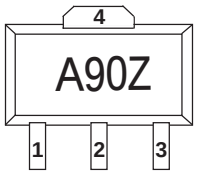
Nominal Package Dimensions

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





Package Marking



Pin Description

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

Part Number Ordering Information

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