

SAC3089QP3

GaAs MMIC Low Noise Amplifier
0.03~3.5GHz

Rev 1.0

Features

- Frequency: 0.03~3.5GHz
- Gain: 22dB
- Noise Figure: 0.9dB Typ. 1.4dB Max.
- Output P_{-1dB}: 17dBm
- Output IP₃: 36dBm@1GHz
- Power Supply: +5V@35~70mA
- Package Size: 3mmx3mmx1.1mm

Typical Applications

- Broadband low noise amplifier
- Test and Measurement

General Description

SAC3089QP3 is a GaAs MMIC Low Noise Amplifier, which operates between in 0.03~3.5GHz.

The amplifier can provide 22dB of gain, 17dBm of output P_{-1dB} and 0.9dB noise figure and from a 70mA supply current.

SAC3089QP3 is assembled in a 3mm x 3mm QFN plastic package.

Picture



Electrical Performance 1 (T_A=25°C, V_D=+5V, I_D=35mA, Z₀=50Ω)

Parameter	Min.	Typ.	Max.	Units
Frequency Range	0.03~3.5			GHz
Gain	17	20	23	dB
Gain Flatness	—	±1.3	±2	dB
Input VSWR/ Output VSWR	—	1.5	2.5	:1
Noise Figure	—	0.9	1.4	dB
Reverse Isolation	—	-24	—	dB
Output P _{-1dB}	13	14	—	dBm
Output IP ₃	—	24*	—	dBm
Supply Current(I _D)	—	35	45	mA

Electrical Performance 2 (T_A=25°C, V_D=+5V, I_D=70mA, Z₀=50Ω)

Parameter	Min.	Typ.	Max.	Units
Frequency Range	0.03~3.5			GHz
Gain	17	21	24	dB
Gain Flatness	—	±1.3	±2	dB
Input VSWR/ Output VSWR	—	1.5	2.5	:1
Noise Figure	—	0.9	1.4	dB
Reverse Isolation	—	-27	—	dB
Output P _{-1dB}	17	18	—	dBm
Output IP ₃	—	36*	—	dBm
Supply Current(I _D)	—	70	100	mA

*Pin/Tone=-15dBm fc=1GHz, Δf=4MHz

SuperApex,LLC

1580 S. Milwaukee Ave. Suite 405, Libertyville, IL 60048, USA
Tel: 1-847-505-8319, 1-847-573-9866
E-mail: sales@superapexco.com
Website: www.superapexco.com

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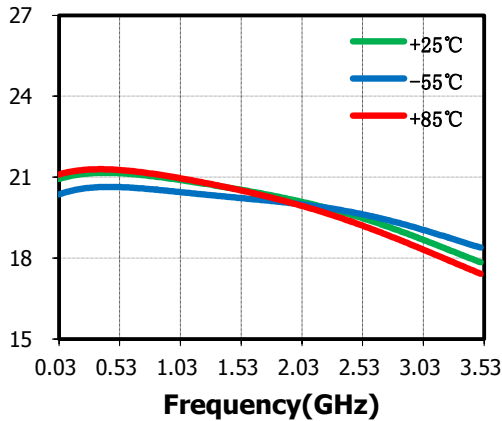
Absolute Maximum Ratings

Maximum Input Power	+15dBm,CW 30s	Operating Temperature	-55°C~+85°C
Channel Temperature	+150°C	Storage Temperature	-55°C~+150°C
Supply Voltage	+8V		

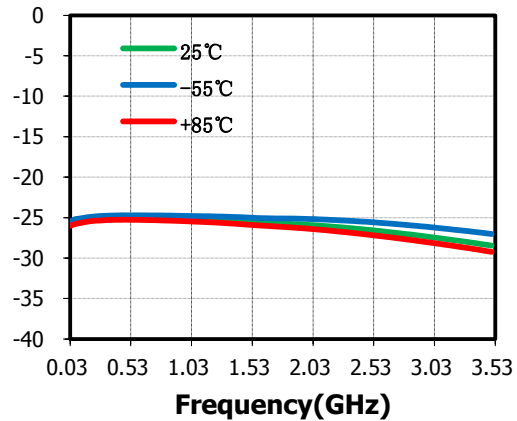
Typical Performance Curve

$V_D=+5V, I_{DQ}=35mA$, The following curves are taken from SAC3089QP3 evaluation board. No De-embedding operation has been Implemented.

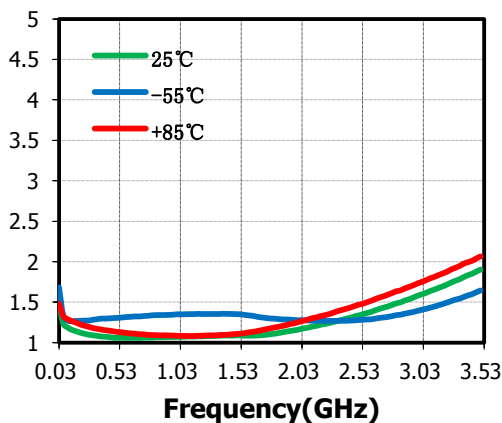
Small Signal Gain(dB) vs.Temperature



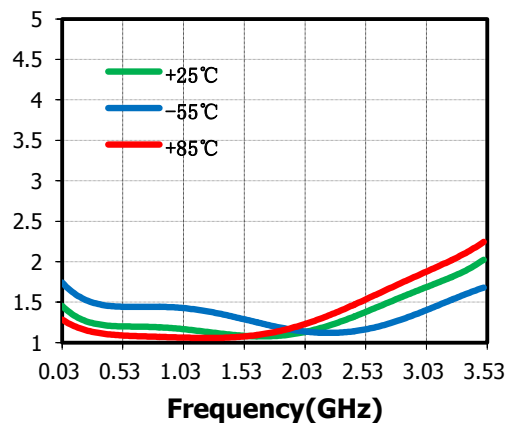
Reverse Isolation(dB) vs.Temperature



Input VSWR(:1) vs.Temperature



Output VSWR(:1) vs.Temperature



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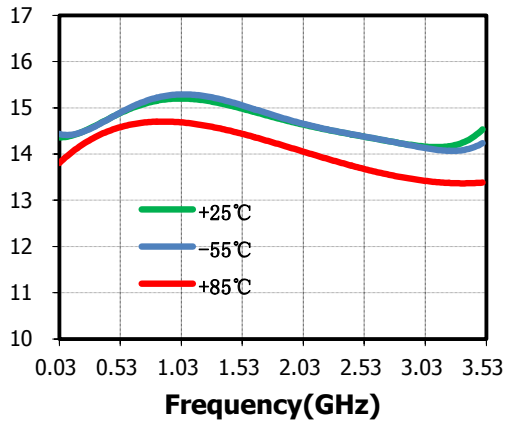
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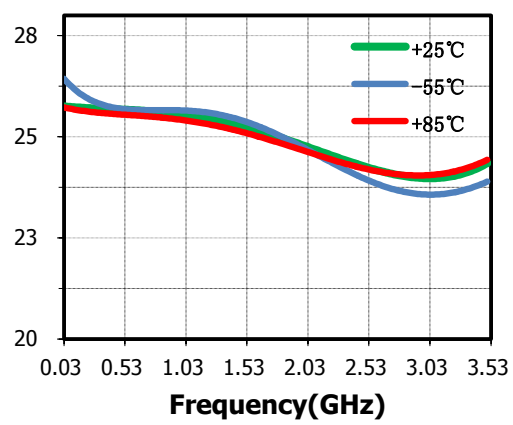
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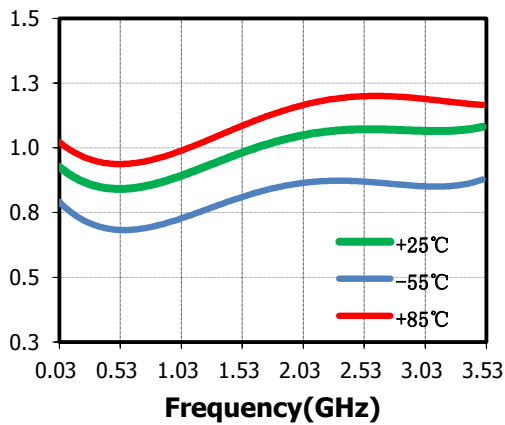
Output P-1dB(dBm) vs.Temperature



Output IP₃(dBm) vs.Temperature

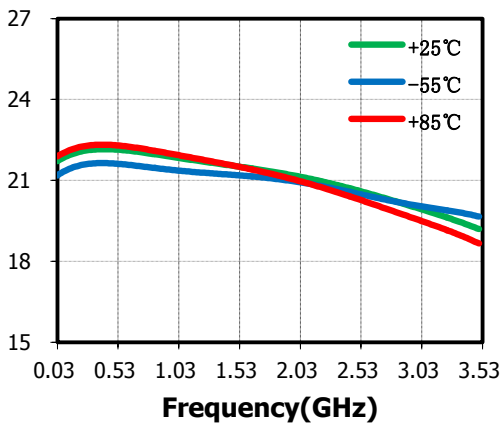


Noise Figure(dB) vs.Temperature

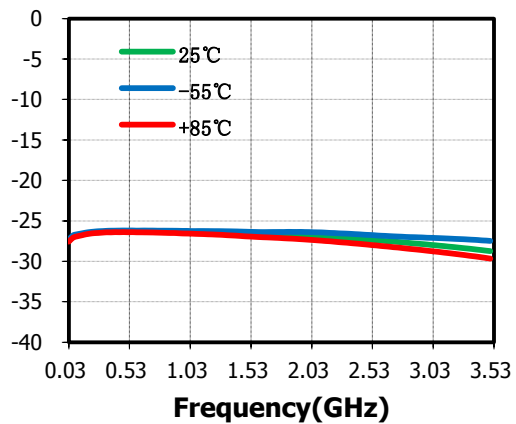


$V_D=+5V, I_{DQ}=70mA$, The following curves are taken from SAC3089QP3 evaluation board. No De-embedding operation has been implemented.

Small Signal Gain(dB) vs.Temperature



Reverse Isolation(dB) vs.Temperature



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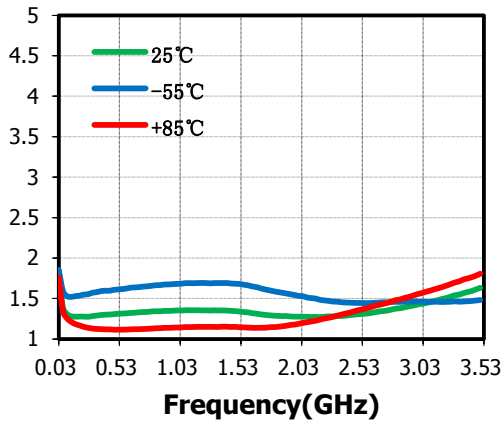
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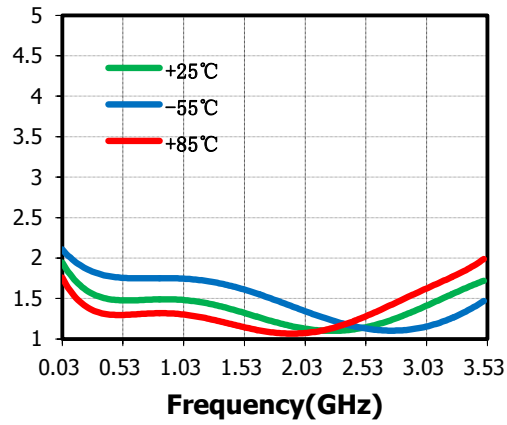
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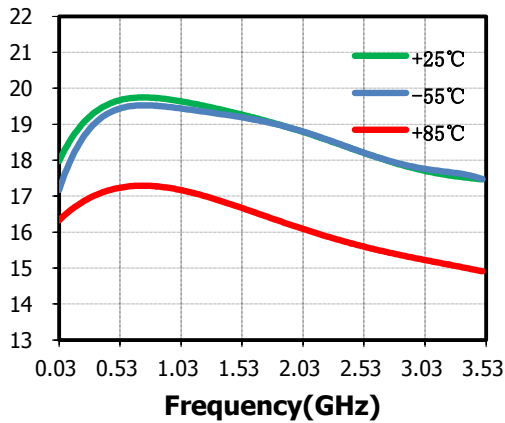
Input VSWR(:1) vs.Temperature



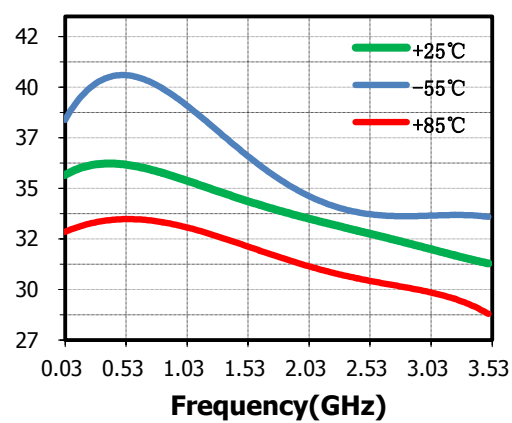
Output VSWR(:1) vs.Temperature



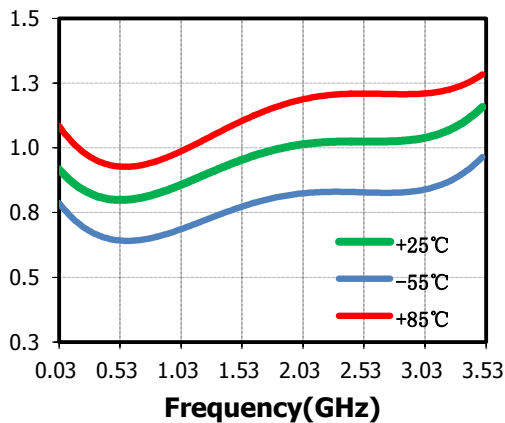
Output P-1dB(dBm) vs.Temperature



Output IP3(dBm) vs.Temperature



Noise Figure(dB) vs.Temperature



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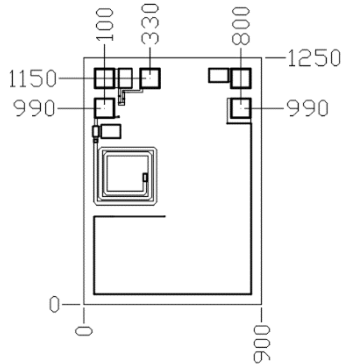


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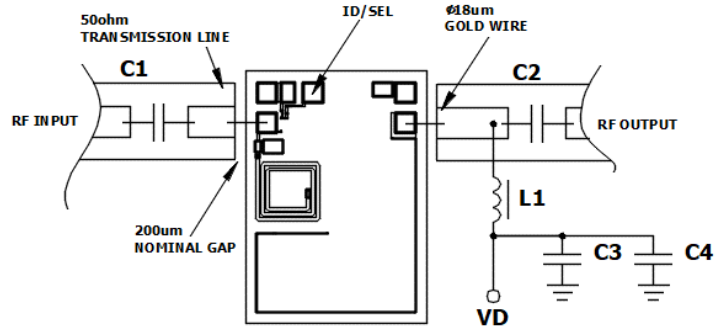
Die Outline

(All dimensions in μm)



Pads size: 90x90

Assembly Diagram

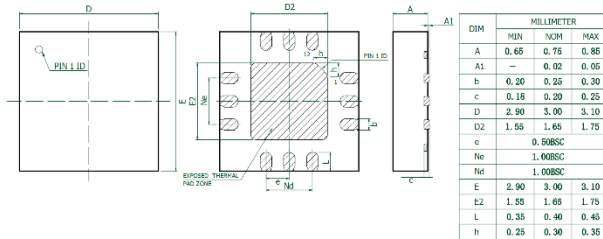


I_{DQ}/SEL connect to GND, $I_{DQ}=35\text{mA}$

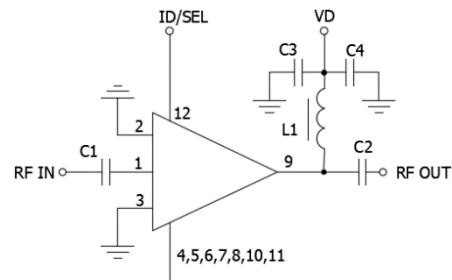
I_{DQ}/SEL Floating, $I_{DQ}=70\text{mA}$

Package Outline Drawing

(All dimensions in mm)



Application Circuit



Pin Function

Pin No.	Description	Pin No.	Description
1	RF input, DC Coupled	7	Connect to ground
2	Connect to ground	8	Connect to ground
3	Connect to ground	9	RF input/Bias, DC Coupled
4	Connect to ground	10	NC or Connect to ground
5	Connect to ground	11	NC or Connect to ground
6	Connect to ground	12	I_{DQ} select

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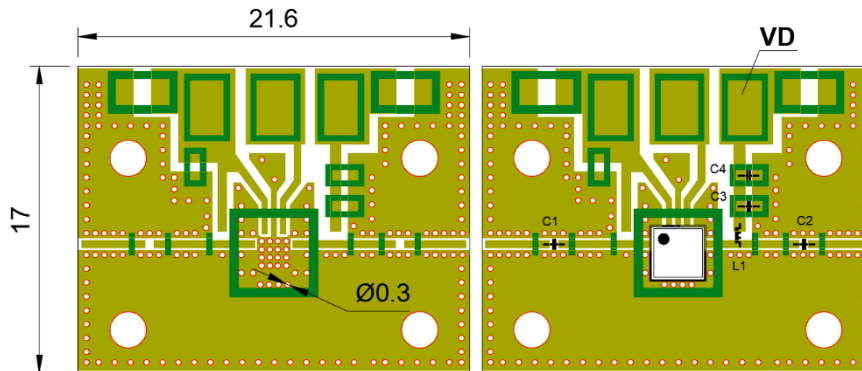
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SAC3089QP3 Evaluation Board



The Evaluation board is a 2-layer board fabricated using Rogers 4350 $t=0.254$ and using best practices for high frequency RF design. The RF input and RF output traces have a 50Ω characteristic impedance.

Components List

Reference Des.	Value	Part Number	Manuf.
C1、C2、C3	1000pF	GRM1555C1H102JA	Murata
C4	1uF	GRM0336R61A105KE	Murata
L1	-	BLM15HG102SN	Murata

Attention:

1. The moisture resistant grade of products is 2a, the storage environment $\leq 30^{\circ} \text{C}/60\% \text{RH}$, The surrounding workshop life is 4 weeks.
2. After un-packing, It is necessary to bake the parts for 6 hours in 125 ± 5 degree environment before soldering.
3. GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.