SAC3094QP3

GaAs MMIC Low Noise Amplifier
7~13GHz

Rev 1.0

Features

- Frequency：7~13GHz
- Gain：23dB
- Noise Figure：0.7dB Typ. ,1dB Max.
- $OP_{-1}dB$: 14dBm
- Supply Voltage：+3V@20mA, +5V@40mA
- Package Size：3mm×3mm×1.1mm

Typical Applications

- Radar and ECM
- RF/ Microwave radio
- Military and Space

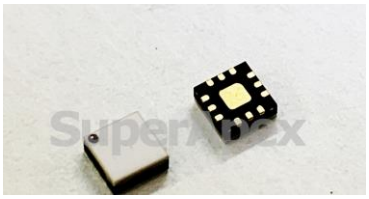
General Description

SAC3094QP3 is a GaAs MMIC Low Noise Amplifier in QFN surface mount package, which operates between in 7~13GHz.

The amplifier can provide 23dB of gain, 14dBm of output $P_{-1}dB$ and 0.7dB noise figure and from a 20mA supply current.

SAC3094QP3 is assembled in a 3mm x 3mm QFN plastic package.

Picture



Electrical Performance 1 (T_A=25℃, V_D=+3V, I_D=20mA, Z_0=50Ω)

Parameter	Min	Typ.	Max	Units
Frequency Range		7~13		GHz
Gain	18	21	25	dB
Gain Flatness	—	±1	±1. 5	dB
Input/Output VSWR	—	1.5	2.2	:1
Noise Figure	—	0.7	1	dB
Reserve Isolation	—	-37	—	dB
Output Power for 1 dB Compression ($OP_{-1}dB$)	5	8	—	dBm
Output Third Order Intercept (OIP_3)	—	20	—	dBm
Supply Current(I_D)	—	20	30	mA

Electrical Performance 1 (T_A=25℃, V_D=+5V, I_D=40mA, Z_0=50Ω)

Parameter	Min	Typ.	Max	Units
Frequency Range		7~13		GHz
Gain	19	23	26	dB
Gain Flatness	—	±1	±1.5	dB
Input/Output VSWR	—	1.5	2.2	:1
Noise Figure	—	0.7	1	dB
Reserve Isolation	—	-37	—	dB
Output Power for 1 dB Compression ($OP_{-1}dB$)	13	15	—	dBm
Output Third Order Intercept (OIP_3)	—	28	—	dBm
Supply Current(I_D)	—	40	52	mA

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

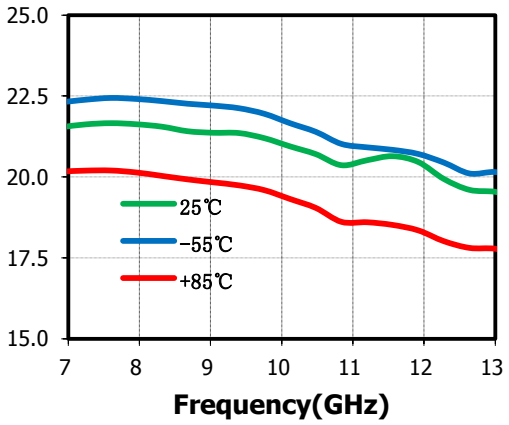
Absolute Maximum Ratings

Maximum Input Power	+18dBm,CW 30s	Operating Temperature	-55℃~+85℃
Channel Temperature	+150℃	Storage Temperature	-65℃~+150℃
Supply Voltage	+7V		

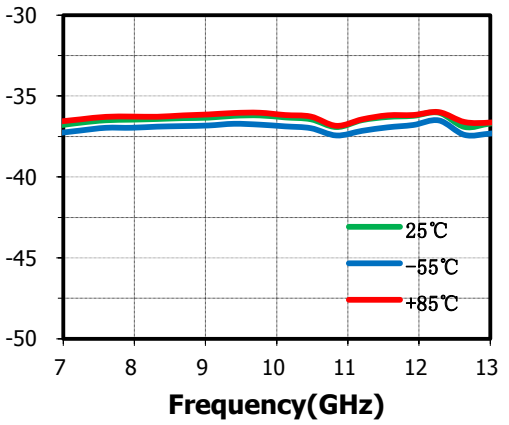
Typical Performance Curve

V_D=+3V,I_{DQ}=20mA, The following curves are taken from SAC3094QP3 evaluation board. De-embedding operation has been Implemented.

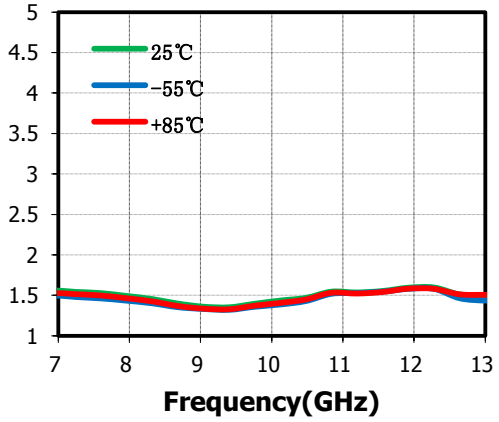
Small Signal Gain(dB) vs.Temperature



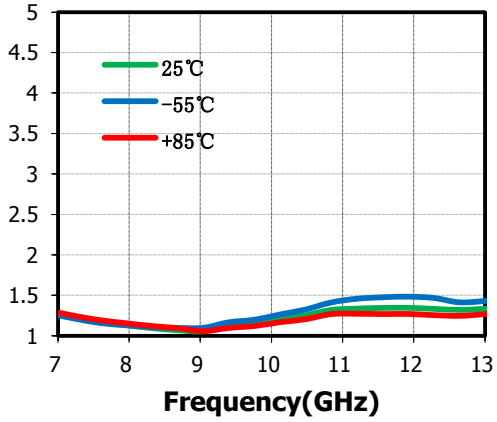
Reverse Isolation(dB) vs.Temperature



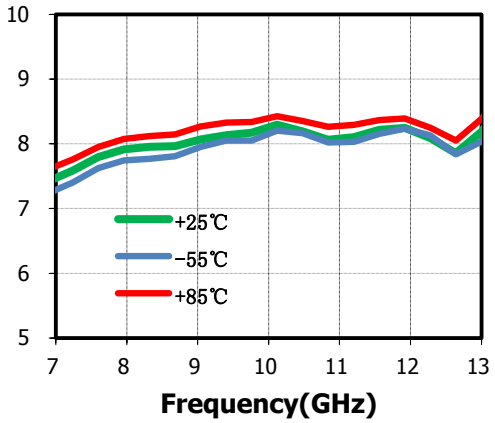
Input VSWR(:1) vs.Temperature



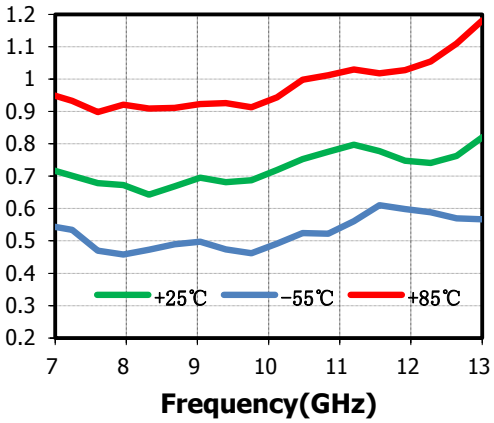
Output VSWR(:1) vs.Temperature



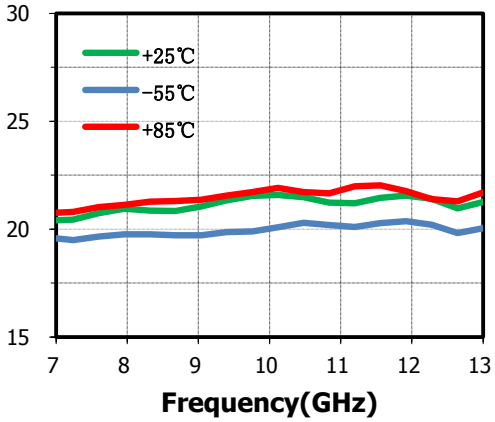
Output P-1dB(dBm) vs.Temperature



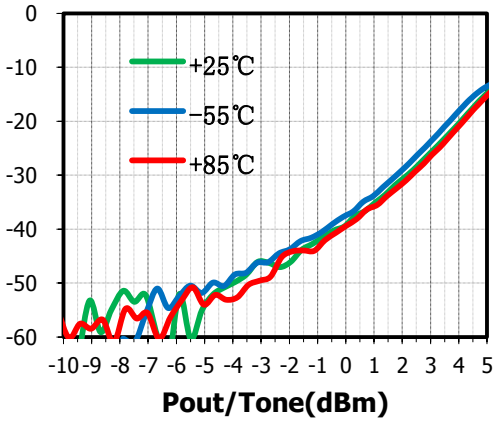
Noise Figure(dB) vs.Temperature



Output IP3(dBm) vs.Temperature

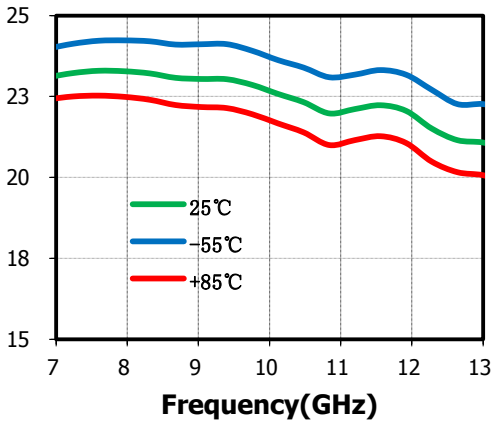


IM3(dBc)vs.Pout/Tone,f=9GHz

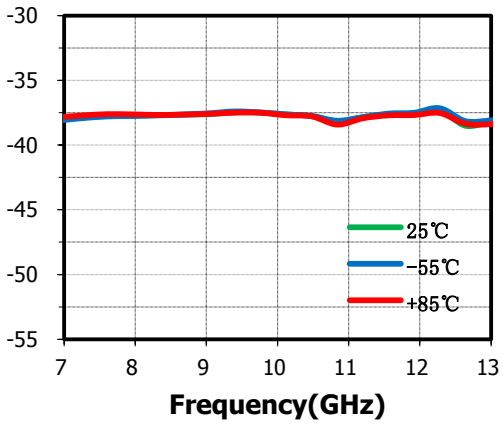


V_D=+5V,I_{DQ}=40mA, The following curves are taken from SAC3094QP3 evaluation board. De-embedding operation has been Implemented.

Small Signal Gain(dB) vs.Temperature

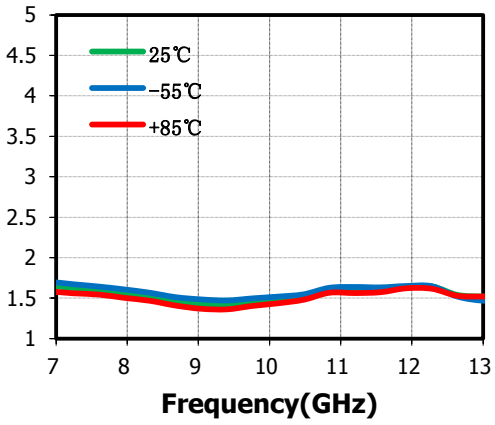


Reverse Isolation(dB) vs.Temperature

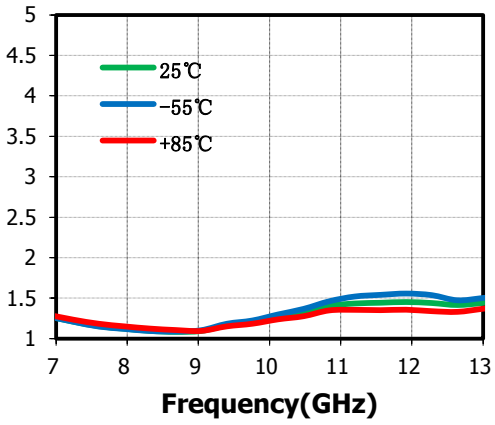


SuperApex, LLC
1580 S. Milwaukee Ave. Suite 405, Libertyville, IL 60048, USA
Tel: 1-847-505-8319, 1-847-573-9866
E-mail: sales@superapexco.com
Website: www.superapexco.com

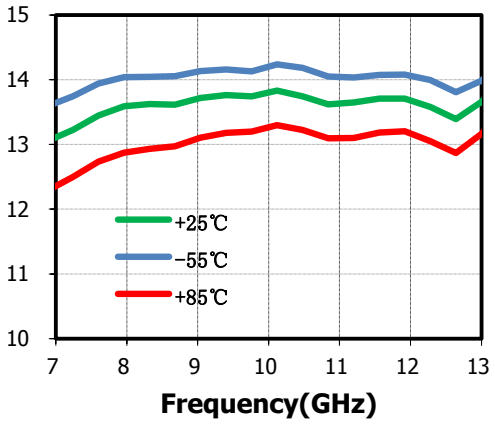
Input VSWR(:1) vs.Temperature



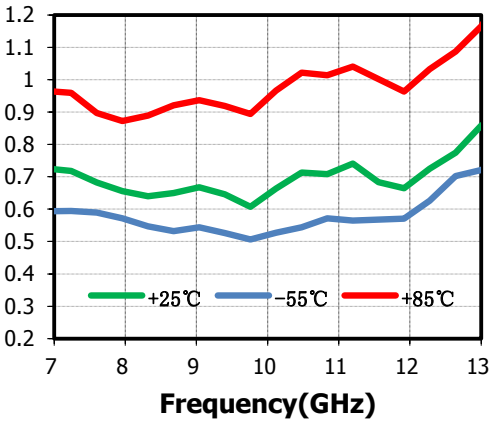
Output VSWR(:1) vs.Temperature



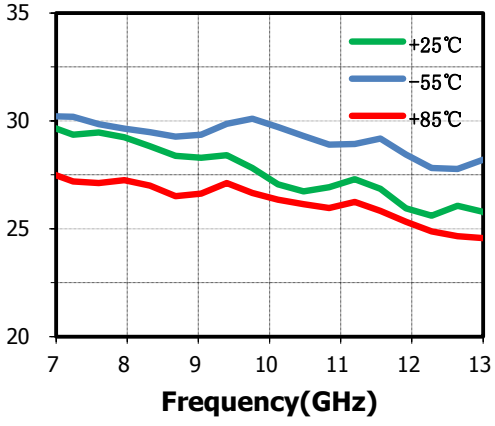
Output P-1dB(dBm) vs.Temperature



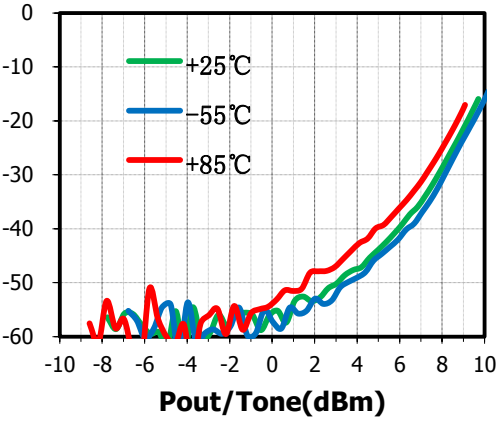
Noise Figure(dB) vs.Temperature



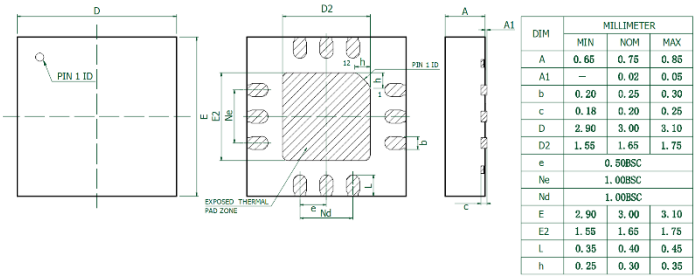
Output IP3(dBm) vs.Temperature



IM3(dBc)vs.Pout/Tone,f=9GHz

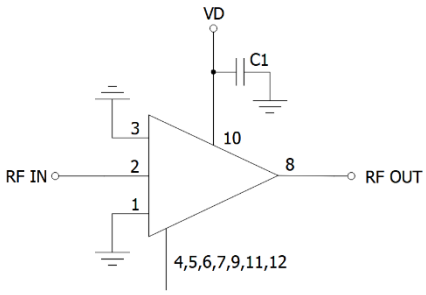


Outline Drawing



DIM	MILLIMETER		
	MIN	NOM	MAX
A	0.65	0.75	0.85
A1	–	0.02	0.05
b	0.20	0.25	0.30
c	0.18	0.20	0.25
D	2.90	3.00	3.10
D2	1.55	1.65	1.75
e	0.50BSC		
Ne	1.00BSC		
Nd	1.00BSC		
E	2.90	3.00	3.10
E2	1.55	1.65	1.75
L	0.35	0.40	0.45
h	0.25	0.30	0.35

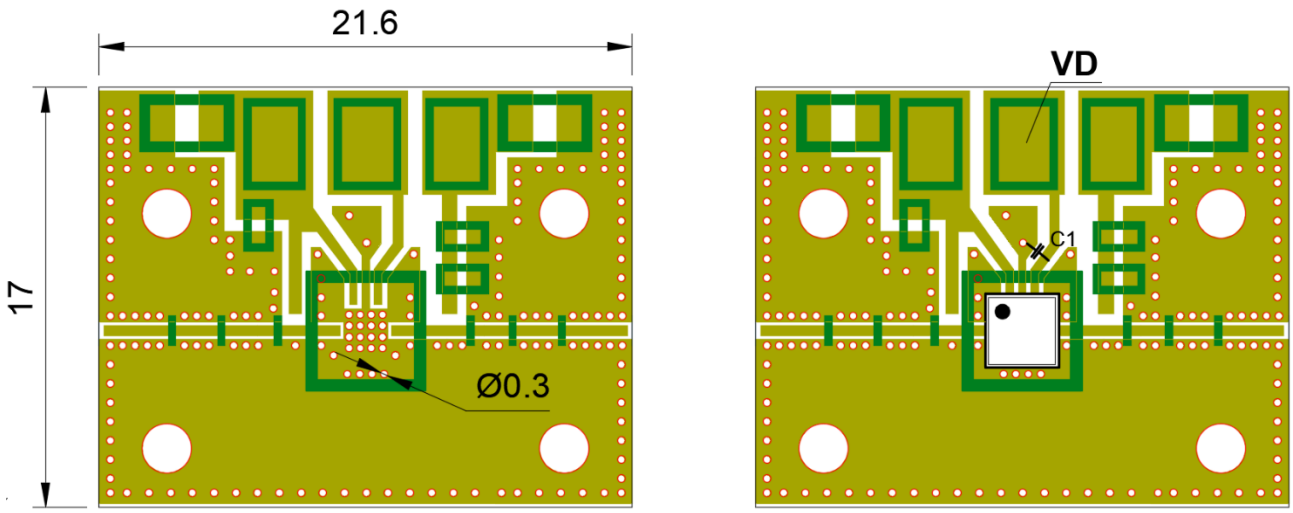
Application Circuit



Pin Function

Pin No.	Description	Pin No.	Description
1	Connect to ground	7	Connect to ground
2	RF input, AC Coupled	8	RF output, AC Coupled
3	Connect to ground	9	Connect to ground
4	Connect to ground	10	Drain(VD)
5	Connect to ground	11	NC or Connect to ground
6	Connect to ground	12	NC or Connect to ground

SAC3094QP3 Evaluation Board



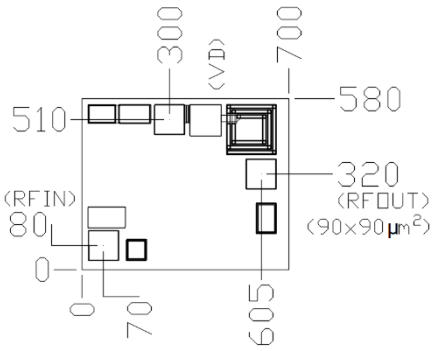
The Evaluation board is a 2-layer board fabricated using Rogers 4350 t=0.254 and using best practices for high frequency RF design. The RF input and RF output traces have a 50 Ω characteristic impedance

Components List

Reference Des.	Value	Part Number	Manuf.
C1	0.01uF	GRM0336R61A103KE	Murata

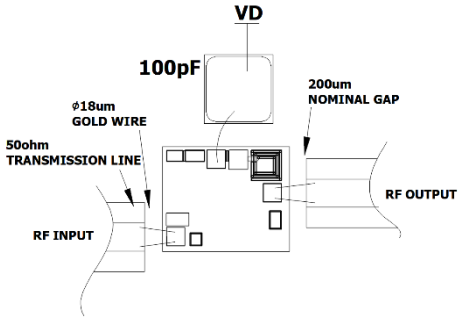
SuperApex, LLC
1580 S. Milwaukee Ave. Suite 405, Libertyville, IL 60048, USA
Tel: 1-847-505-8319, 1-847-573-9866
E-mail: sales@superapexco.com
Website: www.superapexco.com

Die Outline (μm)



t=100 **μm**

Assembly Diagram



Notes

1. The back of chip is RF ground;
2. RF connections should be made as short as possible to reduce the inductive effect of the bond wire. Use of a 0.8 mil thermosonic wedge bonding is highly recommended as the loop height will be minimized;
3. Bypass SLCs should be placed as close as possible to the chip;
4. GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test;
5. The MSL level of products is 2a, the storage environment ≤30° C/60% RH，The surrounding workshop life is 4 weeks.

Revision History

Revision	Date	Comment
1.0	Feb. 2022	First Release