

Features

- Frequency: 2~8 GHz
- Gain: 30dB
- Noise Figure: 0.6dB Typ., 0.8dB Max
- Output P_{-1dB}: 17dBm@+5V
- Supply Voltage: +5V/60mA
- Package Size: 3mmx3mmx0.75mm
- Die Size: 1.25mmx1.25mmx0.1mm

Typical Applications

- Microwave module
- Radar

General Description

SAC3096QP3 is a GaAs MMIC Low Noise Amplifier in QFN surface mount package, which operates between in 2~8GHz.

The amplifier can provide 30dB of gain, 17dBm of output P_{-1dB} and 0.6dB noise figure and from a 60mA supply current.

SAC3096QP3 is assembled in a 3mm x 3mm x 0.75(Typ.) mm QFN plastic package.

Electrical Performance

TA=25°C, V_D=+5V, I_D=60mA, Z₀=50Ω

Parameter	Min.	Typ.	Max.	Units
Frequency Range	2~8			GHz
Gain	26	30	34	dB
Gain Flatness	—	±1	±2	dB
Input VSWR	—	1.5	2	:1
Output VSWR	—	1.8	2.5	:1
Noise Figure	—	0.6	0.8	dB
Reverse Isolation	—	-40	—	dB
Output Power for 1 dB Compression (OP _{-1dB})	16	17	—	dBm
P _{SAT} Output Power	—	21	—	dBm
Output IP ₃	—	30	—	dBm
Supply Current (I _b)	—	60	75	mA

Absolute Maximum Ratings

Maximum Input Power	+23dBm, CW	Operating Temperature	-55°C~+85°C
Channel Temperature	+150°C	Storage Temperature	-55°C~+150°C
Supply Voltage V _D	+7V	ESD Rating	Class 1A

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SAC3096QP3



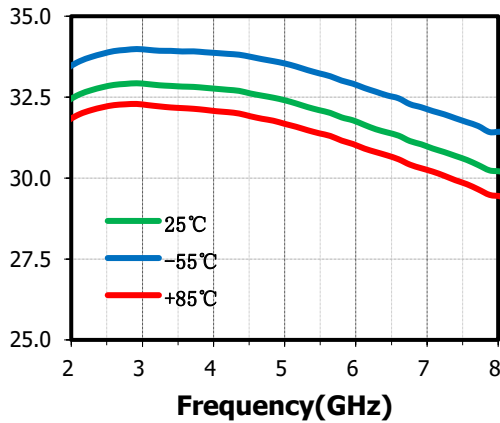
GaAs MMIC Low Noise Amplifier
2~8GHz

Rev 1.2

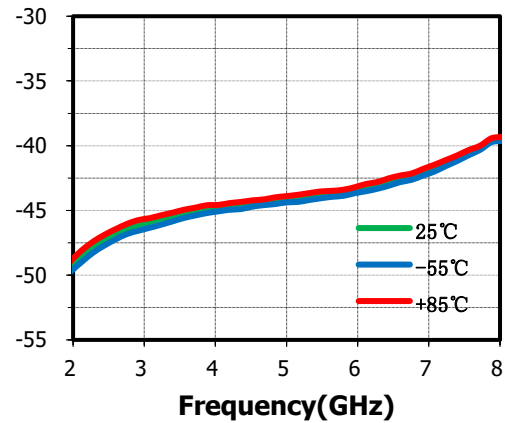
Typical Performance Curve

$V_D=+5V$ $I_{DQ}=60mA$, the following curves are taken from SAC3096QP3 evaluation board. De-embedding operation has been implemented.

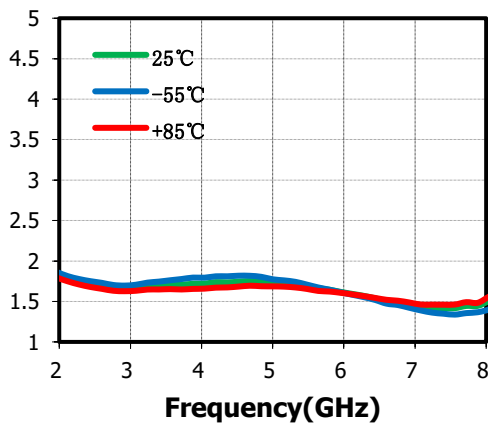
Small Signal Gain(dB) vs.Temperature



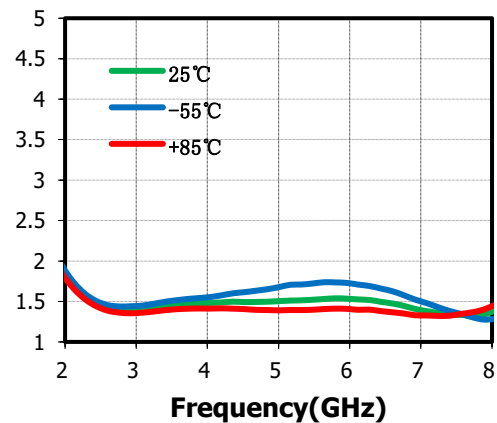
Reverse Isolation(dB) vs.Temperature



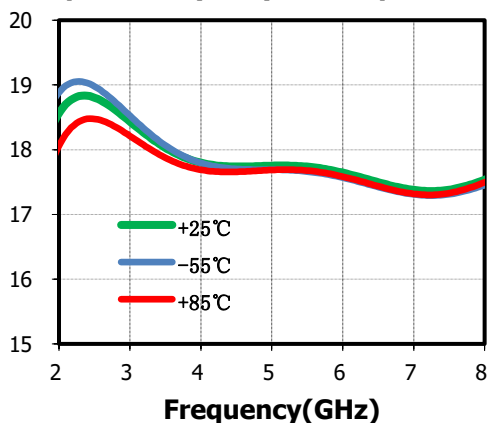
Input VSWR(:1) vs.Temperature



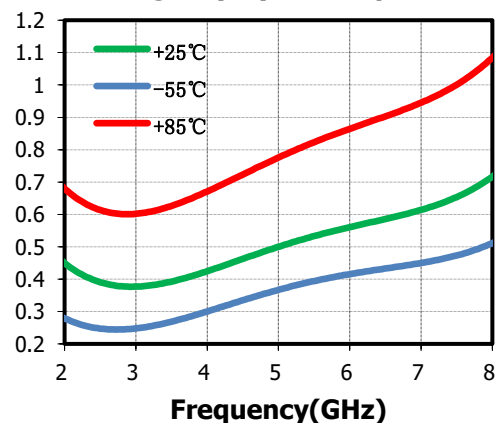
Output VSWR(:1) vs.Temperature



Output P-1dB(dBm) vs.Temperature



Noise Figure(dB) vs.Temperature



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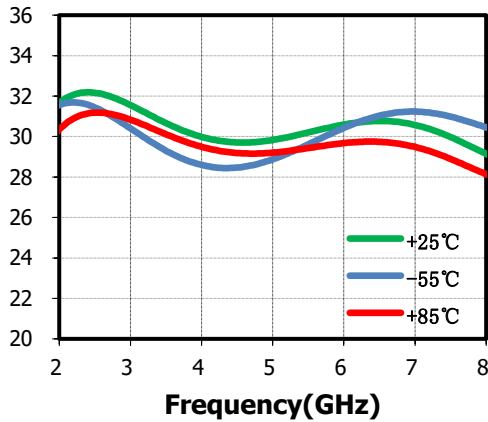
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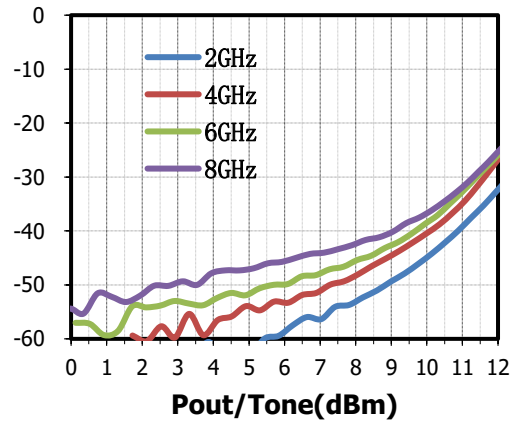
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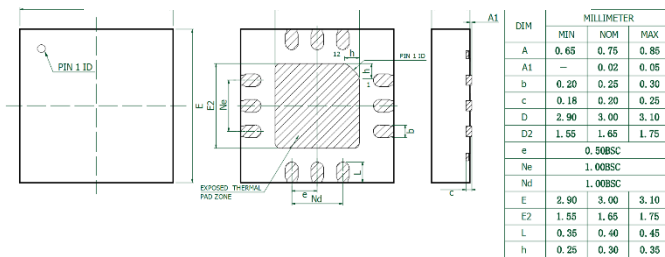
Output IP₃(dBm) vs.Temperature



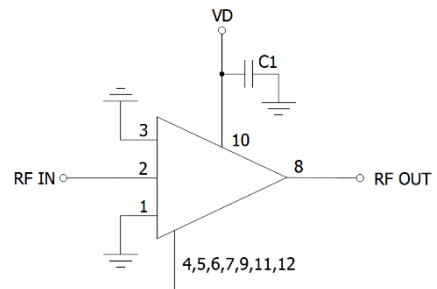
IM₃(dBc) vs.Pout/Tone



**Outline Drawing
(All dimensions in mm)**



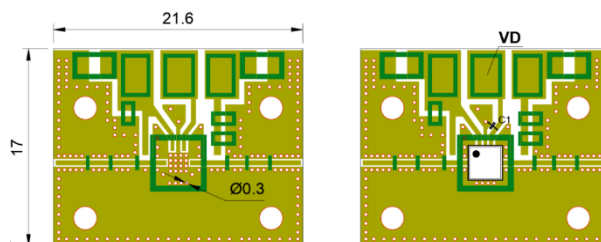
Application Circuit



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 supply
5	Connect to ground	11	NC or connect to ground
6	Connect to ground	12	NC or connect to ground

SAC3096QP3 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.

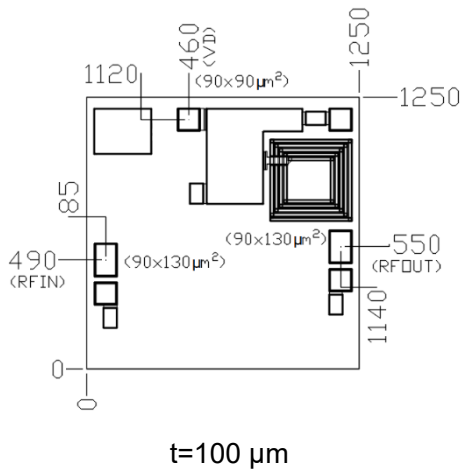
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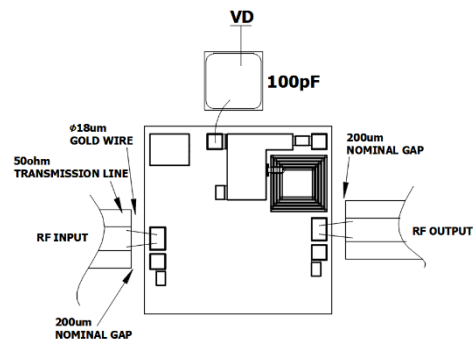
Components List

Reference Des.	Value	Part Number	Manuf.
C1	0.01 μ F	GRM0336R61A103KE	Murata

Die Outline Drawing (All dimensions in μ m)



Die Assembly Diagram



Attention:

1. The moisture resistant grade of SAC3096QP3 is 2a, the storage environment $\leq 30^{\circ}$ C/60% 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;
4. The back of bare chip is RF and DC ground;
5. RF connections should be made as short as possible to reduce the inductive effect of the bond wire. Use of a 1 mil thermosonic wedge bonding is highly recommended as the loop height will be minimized;
6. The RF input and output ports of the chip have integrated coupled capacitors, with a withstand voltage of 15V.

Revision History

Revision	Date	Comment
1.0	2022-02-27	First Release
1.1	2023-10-09	Revise the maximum value of Output VSWR
1.2	2024-05-30	Added P _{SAT} data, Updated Maximum Input Power value
1.2	2024-07-03	Revise typo