SAC3095QP3

GaAs MMIC Low Noise Amplifier
2~8GHz

Rev 1.0

Features

- Frequency: 2~8GHz
- Gain: 24dB
- Noise Figure: 0.6dB Typ. 1dB Max
- Output P-1dB: 15dBm@+5V
- Supply Voltage: +3V/25mA, +5V/45mA
- Package Size: 3mmx3mmx1.1mm
- Die Size: 1.25mmx1.25mmx0.1mm

Typical Applications

- Microwave module
- Radar

General Description

SAC3095QP3 is a GaAs MMIC Low Noise Amplifier die which operates between 2 GHz~8 GHz. The amplifier can provide 24 dB gain, 13 dBm OutputP_{-1}dB, 0.6 dB noise figure from a 25mA supply current.

The chip offers full passivation for increased reliability and moisture protection. This amplifier is the perfect alternative to higher cost hybrid amplifiers.

Electrical Performance (T_A=25℃, V_D=+3V, I_D=25mA, Z0=50Ω)

Parameter	Min.	Typ.	Max.	Units
Frequency Range		2~8		GHz
Gain	21	23	28	dB
Gain Flatness	—	±1	±1.75	dB
Input/Output VSWR	—	1.5	2	:1
Noise Figure	—	0.6	1	dB
Reverse Isolation	—	-40	—	dB
Output Power for 1 dB Compression (OP$_{-1}$dB)	7	10	—	dBm
Output IP_3	—	15	—	dBm
Supply Current (I_D)	—	25	32	mA

Electrical Performance (T_A=25℃, V_D=+5V, I_D=45mA, Z_0=50Ω)

Parameter	Min.	Typ.	Max.	Units
Frequency Range		2~8		GHz
Gain	24	27	31	dB
Gain Flatness	—	±1	±1.75	dB
Input/Output VSWR	—	1.5	2	:1
Noise Figure	—	0.6	1	dB
Reverse Isolation	—	-40	—	dB
Output Power for 1 dB Compression (OP$_{-1}$dB)	13	15	—	dBm
Output IP_3	—	28	—	dBm
Supply Current (I_D)	—	45	55	mA

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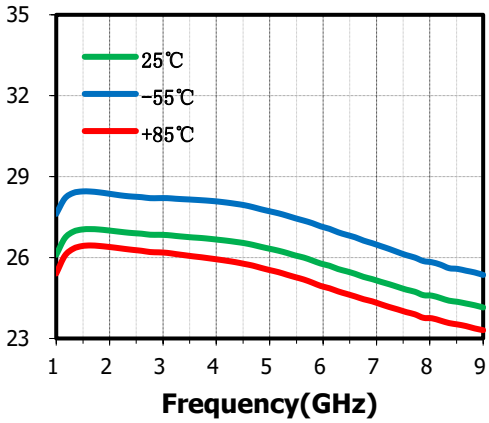
Absolute Maximum Ratings

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

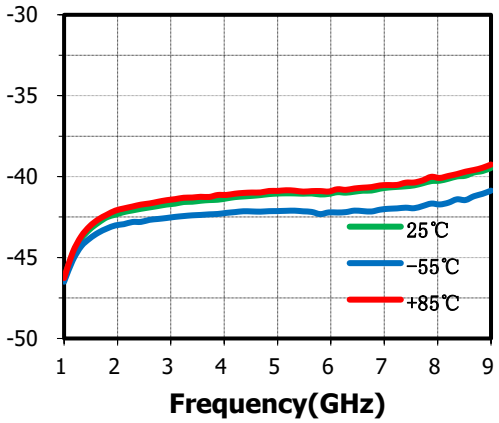
Typical Performance Curve

V_D=+3V I_{DQ}=25mA, The following curves are taken from SAC3095QP3 evaluation board. De-embedding operation has been Implemented.

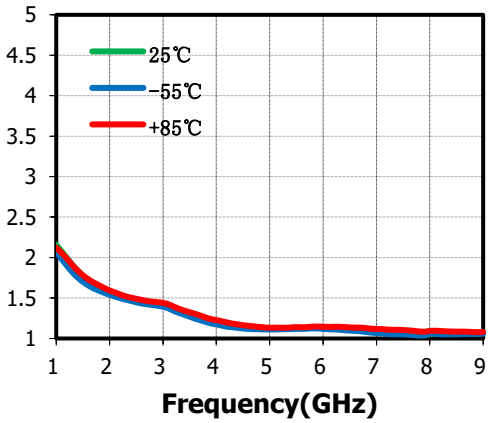
Small Signal Gain(dB) vs.Temperature



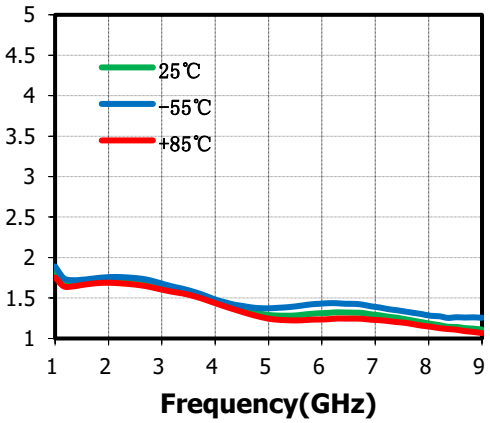
Reverse Isolation(dB) vs.Temperature



Input VSWR(:1) vs.Temperature



Output VSWR(:1) vs.Temperature



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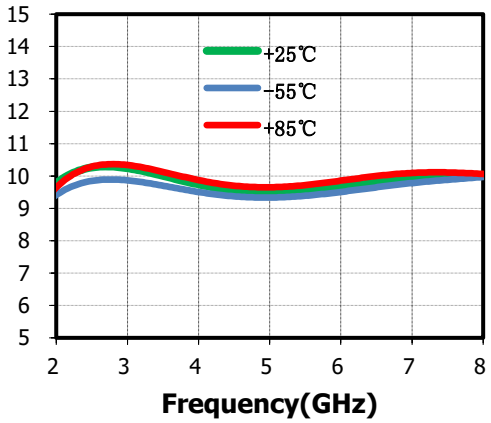
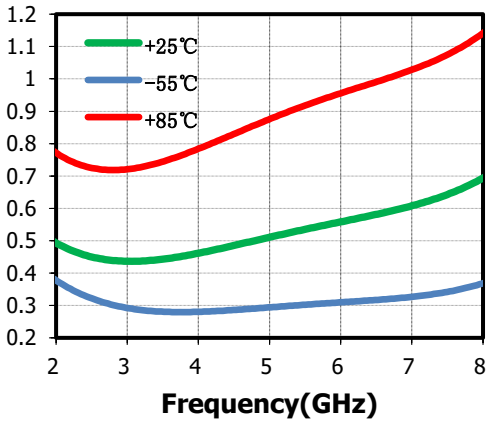
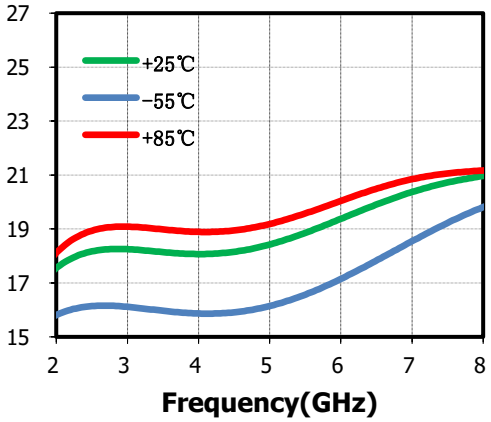
Output P-1dB(dBm) vs.Temperature



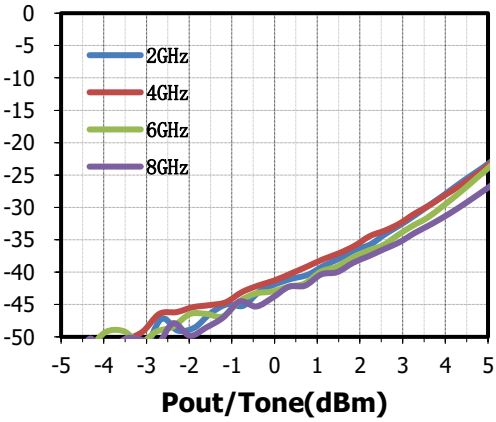
Noise Figure(dB) vs.Temperature



Output IP3(dBm) vs.Temperature

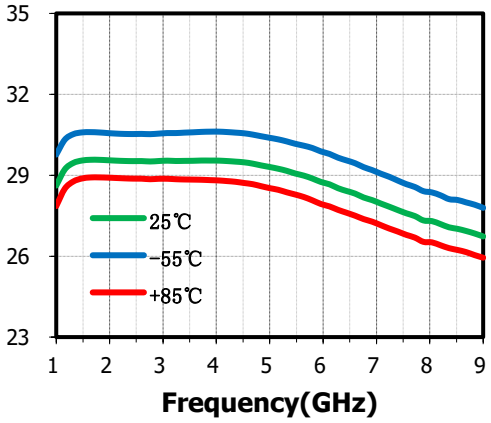


IM3(dBc)vs.Pout/Tone

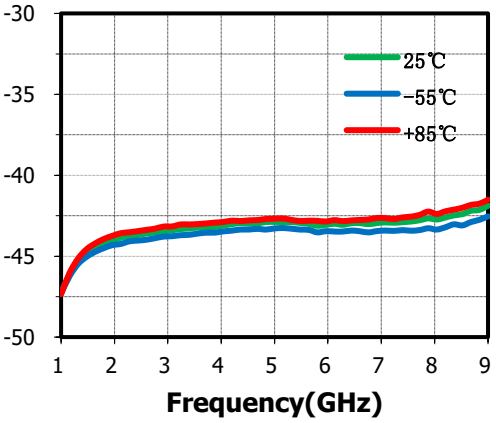


V_D=+5V I_{DQ}=45mA, The following curves are taken from SAC3095QP3 evaluation board. De-embedding operation has been Implemented.

Small Signal Gain(dB) vs.Temperature



Reverse Isolation(dB) vs.Temperature



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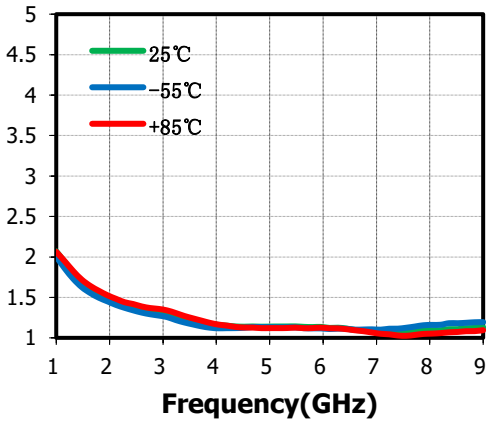
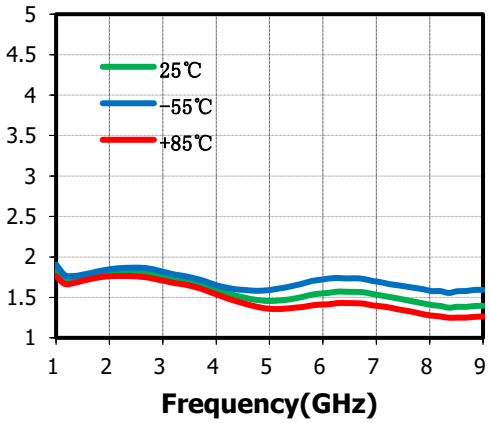
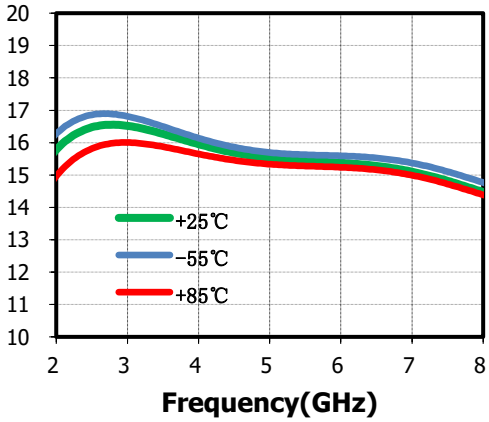
Input VSWR(:1) vs.Temperature



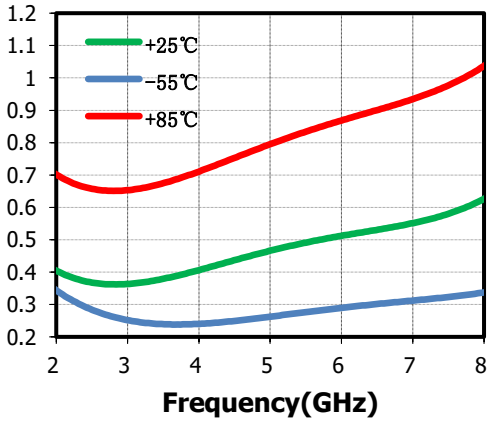
Output VSWR(:1) vs.Temperature



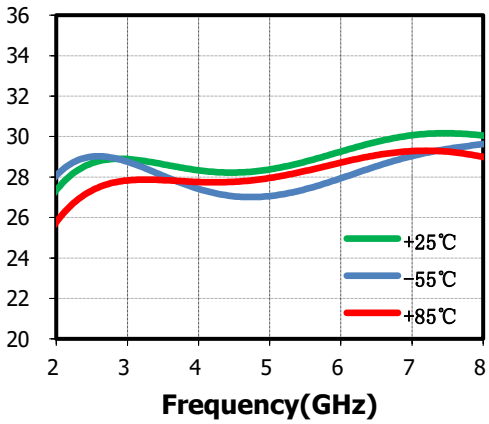
Output P-1dB(dBm) vs.Temperature



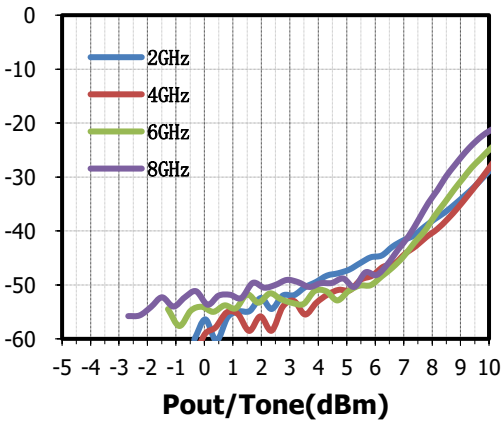
Noise Figure(dB) vs.Temperature



Output IP3(dBm) vs.Temperature

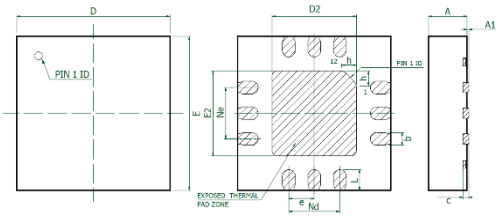


IM3(dBc)vs.Pout/Tone



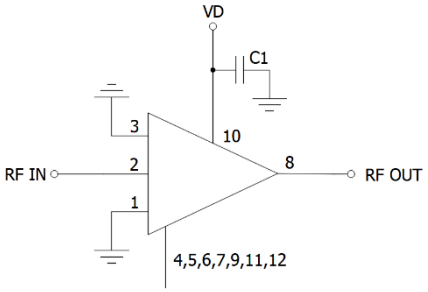
Outline Drawing

(All dimensions in mm)



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

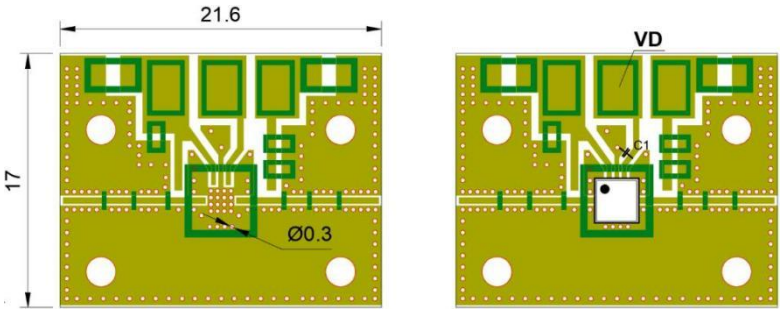
Assembly Diagram



Pin Function

Pin No.	Description	Pin No.	Description
1	Connect to ground	7	Connect to ground
2	RF input, DC Coupled	8	RF output, DC 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

SAC3095QP3 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

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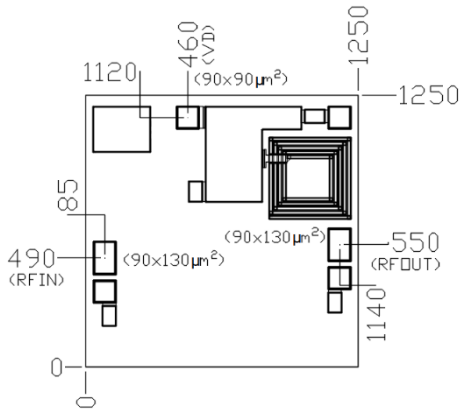
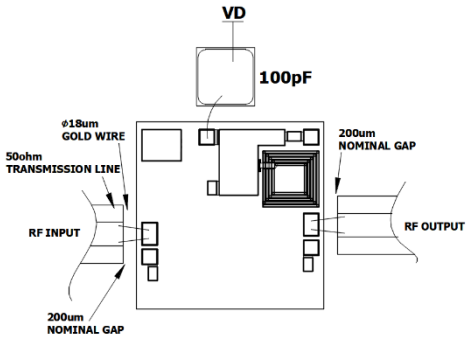
Die Outline Drawing

(All dimensions in µm)



t=100 µm

Die Assembly Diagram



Attention:

1. The bare chip shall be stored in dry and nitrogen environment and used in ultra clean environment;
2. GaAs material is brittle and cannot touch the chip surface. Care must be taken when using it;
3. The chip shall be sintered with conductive adhesive or alloy (the alloy temperature shall not exceed 300 ℃, and the time shall not exceed 30 seconds) to make it fully grounded;
4. The gap between the chip microwave port and the substrate shall not exceed 0.45mm Φ18µm gold wire bonding, recommended gold wire length 350 ~ 450 µm;
5. The chip is sensitive to static electricity. Pay attention to anti-static during storage and use;
6. The RF input and output ports of the chip have integrated DC isolation capacitors;
7. The moisture-proof grade of the packaged product is grade 2a, the storage environment is less than or equal to 30 °C/60% RH, and the four-week workshop life;
8. When using packaged products, try to use thin RF plates and increase the number of groundings vias at the bottom of the device as much as possible to reduce the grounding inductance;
9. remove the vacuum package and bake for 6 hours at 125+/-5°.

Revision History

Revision	Date	Comment
1.0	2022-02-27	First Release

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