

SAC3086IQP3

GaAs MMIC Low Noise Amplifier
10~13GHz

Rev 1.0

Features

- Frequency: 10~13GHz
- Gain: 18dB
- Noise Figure: 1.1dB Typ. 1.5dB Max.
- Output P₁dB: 0~5dBm
- Power Supply: +3~5V, 8~15mA/ Per channel
- Package Size: 3mmx3mmx1.1mm

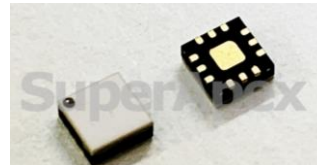
Typical Applications

- Radar and ECM
- RF/ Microwave radio
- Satcom

General Description

SAC3086IQP3 is a dual channel GaAs MMIC low noise amplifier covering 10~13 GHz, SAC3086IQP3 provides 18 dB small signal gain and 1.1 dB noise figure and 0dBm output P₁dB with +3V bias, the quiescent current is 8mA per channel.

SAC3086IQP3 is housed in a miniature 3mm x 3mm x 1.1mm QFN package, the package is full SMT compatible with backside grounding and I/O to simplify assembly.



Electrical Performance 1 (T_A=25°C, V_D=+3V, I_D=8mA/Channel, Z₀=50Ω)

Parameter	Min	Typ.	Max	Units
Frequency Range	10~13			GHz
Gain	16	18	22	dB
Gain Flatness	—	±1	±1.5	dB
Input/Output VSWR	—	1.5	2	:1
Noise Figure	—	1.1	1.5	dB
Reverse Isolation	—	-35	—	dB
Output P ₁ dB	-2	1	—	dBm
Output IP ₃	—	12	—	dBm
Supply Current	—	8	13	mA

Electrical Performance 2 (T_A=25°C, V_D=+4V, I_D=11mA/Channel, Z₀=50Ω)

Parameter	Min	Typ.	Max	Units
Frequency Range	10~13			GHz
Gain	16	19	23	dB
Gain Flatness	—	±1	±1.5	dB
Input/Output VSWR	—	1.5	2	:1
Noise Figure	—	1.1	1.5	dB
Reverse Isolation	—	-35	—	dB
Output P ₁ dB	3	5	—	dBm
Output IP ₃	—	17	—	dBm
Supply Current	—	11	18	mA

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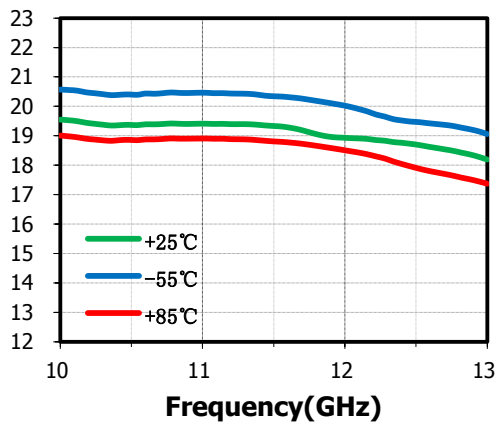
Absolute Maximum Ratings

Maximum RF input power	+20dBm,CW 30s	Operating Temperature	-55°C~+85°C
Channel Temperature	+150°C	Storage Temperature	-55°C~+125°C
Supply Voltage (VD)	+5.25V		

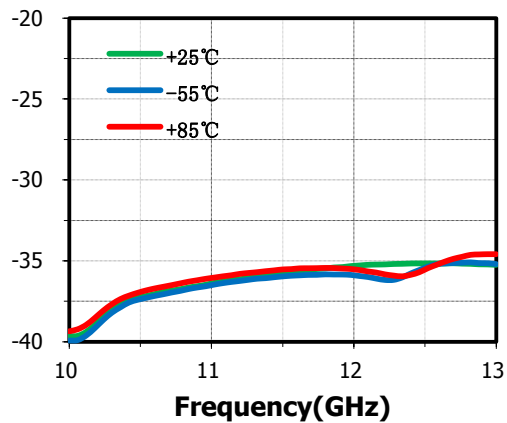
Typical Performance Plots

VD=+3V, I_{DD}=15mA, The following curves are taken from SAC3086IQP3 evaluation board. De-embedding operation has been Implemented.

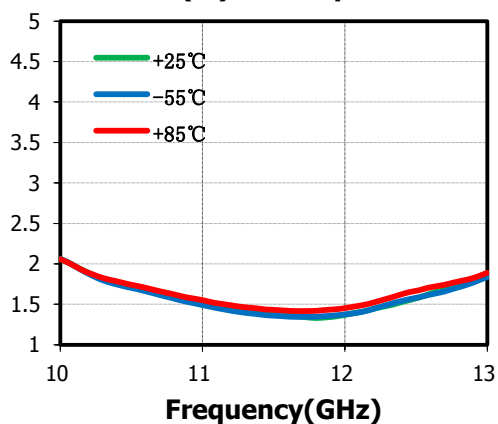
Small Signal Gain(dB) vs.Temperature



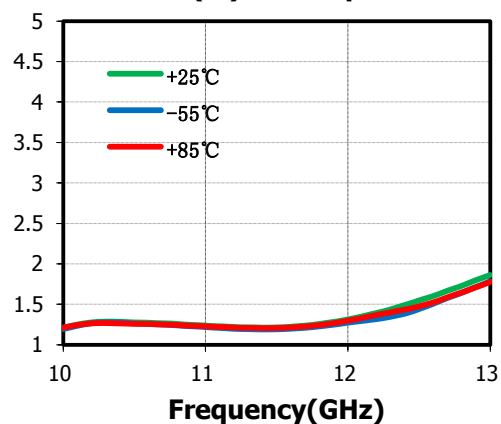
Reverse Isolation(dB) vs.Temperature



VSWRi(:1) vs.Temperature



VSWRo(:1) vs.Temperature



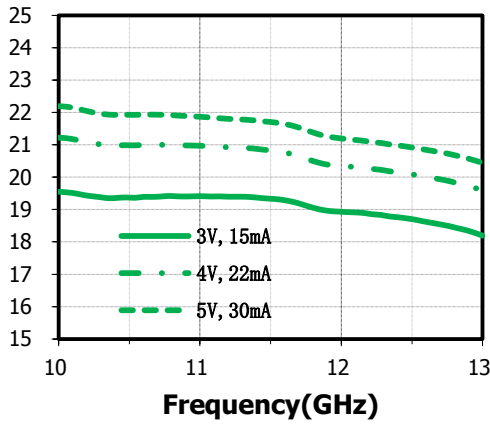
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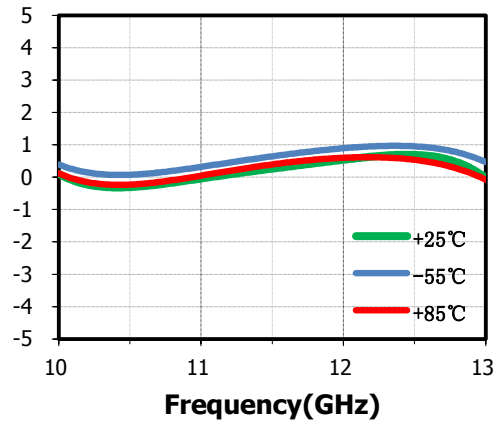
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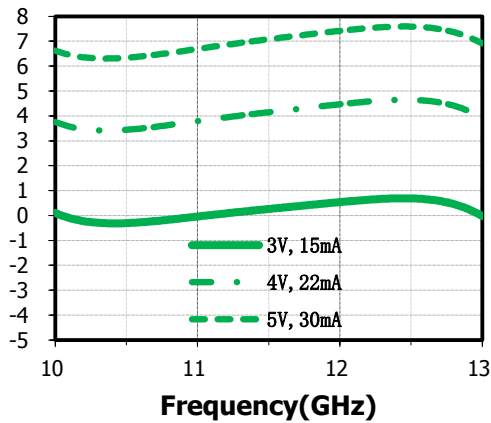
Small Signal Gain(dB) vs.Bias



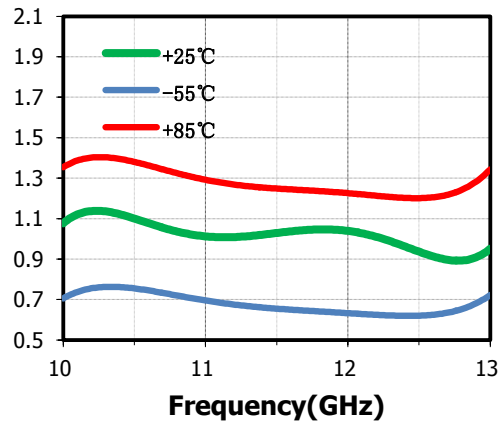
Output P-1dB(dBm) vs.Temperature



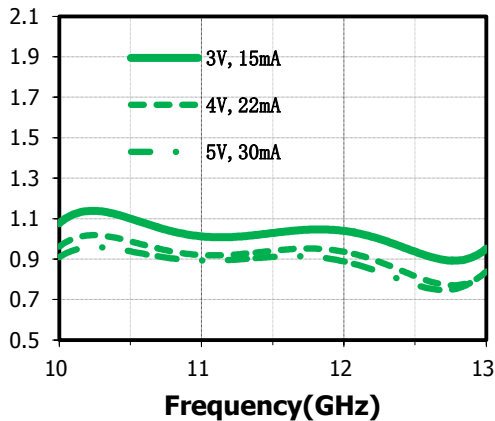
Output P-1dB(dBm) vs.Bias



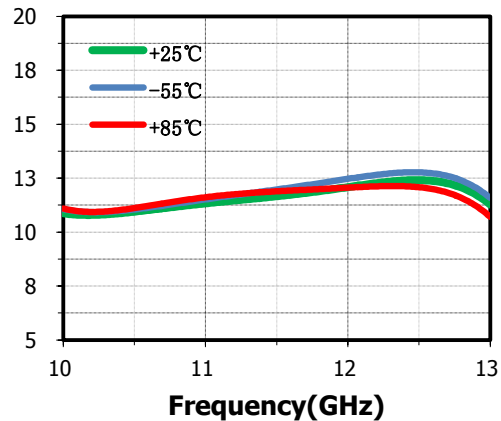
Noise Figure(dB) vs.Temperature



Noise Figure(dB) vs.Bias



Output IP3(dBm) vs.Temperature

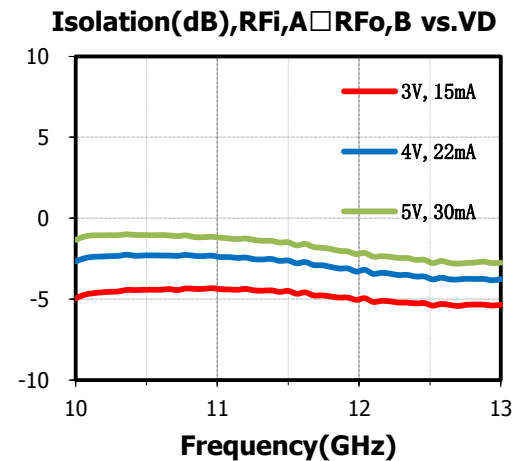
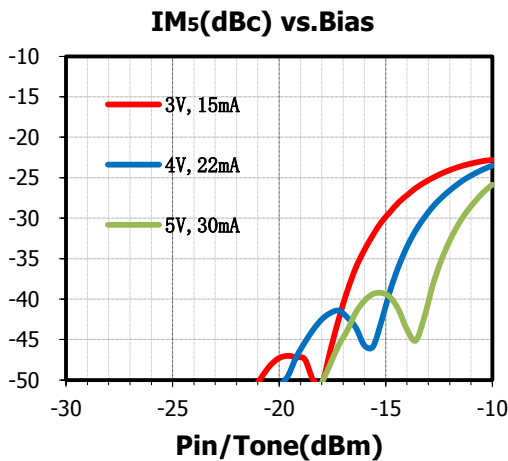
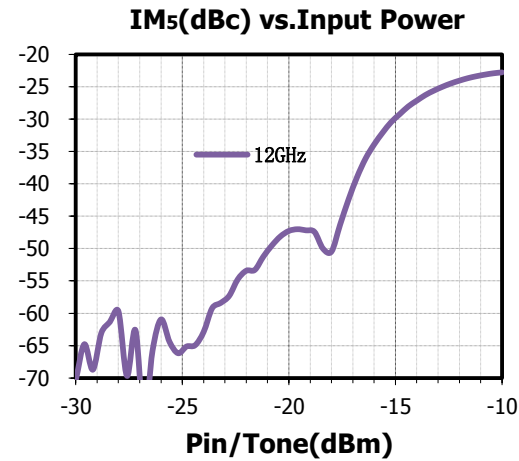
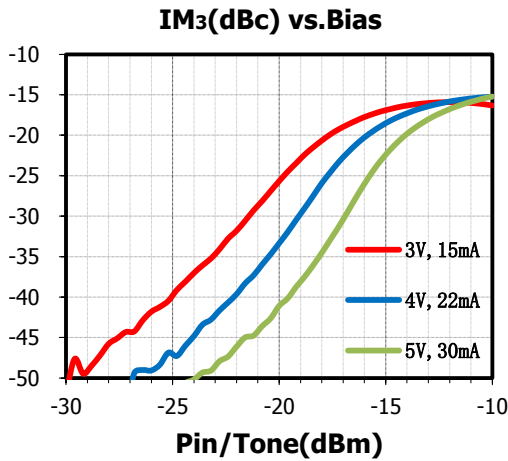
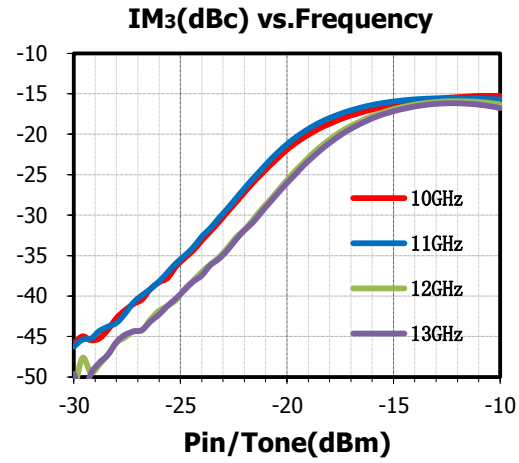
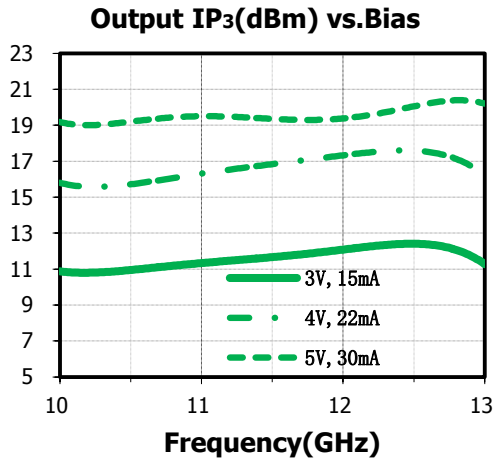


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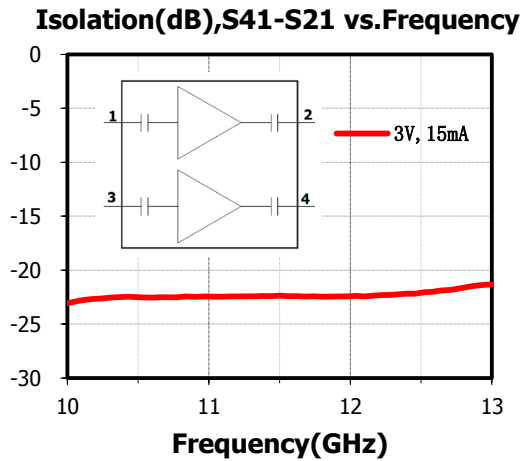
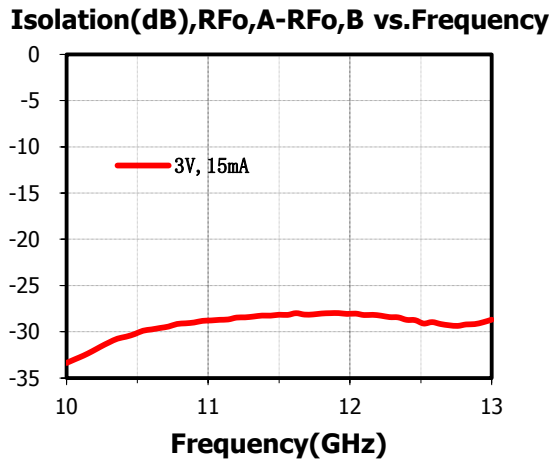
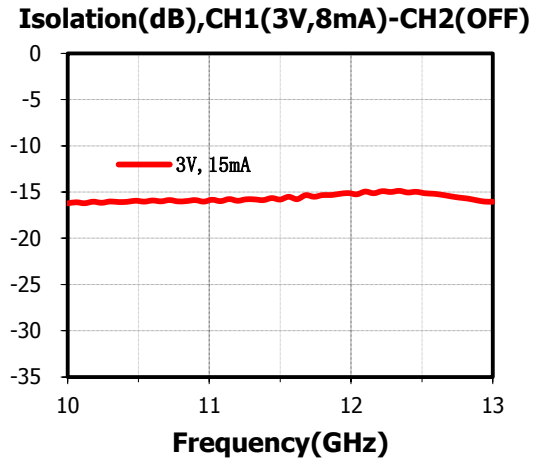
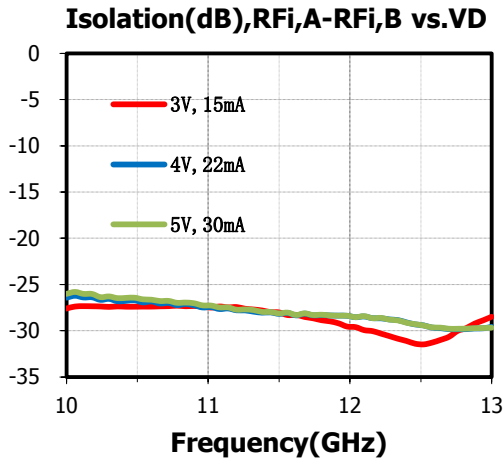
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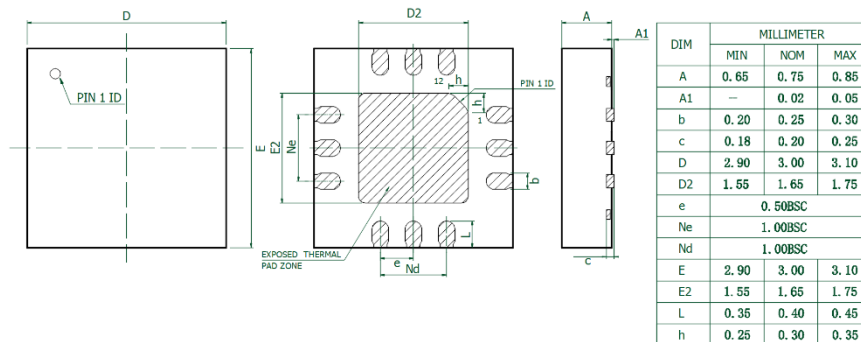
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Outline Drawing

(All dimensions in mm)



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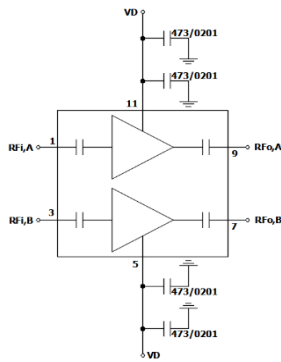
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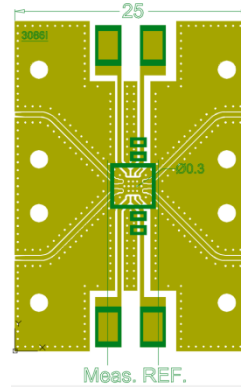
Pin Function

Pin No.	Func.	Pin No.	Func.
1	RF input A, AC Coupled	7	RF output B, AC Coupled
2	Connect to ground	8	Connect to ground
3	RF input B, AC Coupled	9	RF output A, AC Coupled
4	NC(Keep floating)	10	Connect to ground
5	Drain supply (VDB)	11	Drain supply (VDA)
6	Connect to ground	12	NC(Keep floating)

Application Circuit



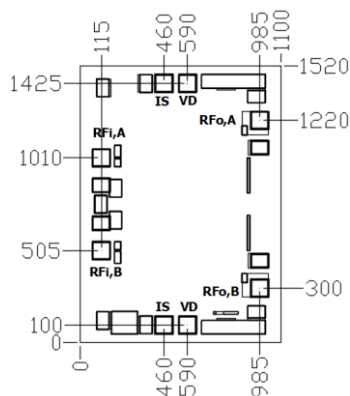
Evaluation Board



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 $50\ \Omega$ characteristic impedance.

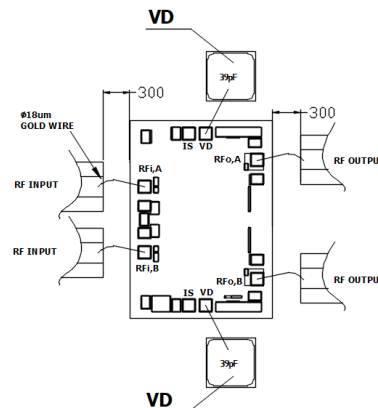
Bare Die Outline Drawing

(All dimensions in μm)



Bonding pads size: 90SQ. , $t=100\mu\text{m}$

Bare Die Assembly Diagram



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NOTES:

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 $125\pm 5^{\circ}\text{C}$ environment before soldering.
3. The bare chip shall be stored in dry and nitrogen environment and used in super clean environment.
4. GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.
5. The backside of the chip is RF ground. Die attach should be accomplished with electrically and thermally conductive epoxy only.

Revision History

Revision	Date	Comment
1.0	March 10, 2021	First Release

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