SAC5001

GaN MMIC Power Amplifier
0.05GHz~2GHz 38dBm

Rev 1.0

Features

- Frequency: 0.05~2GHz
- Small Signal Gain: 13dB
- Output Power: 38dBm
- PAE: 33%
- IM3: -25dBc@Pout/Tone 32dBm
- Die Size: 2.1mm×2.67mm×0.1mm
- Package: Bare die
- Supply Voltage: +24V/-Vg

Typical Applications

- Point-to-Point Radios
- SATCOM

General Description

SAC5001 is a high linearity power amplifier operates from 0.05–2GHz and provides 6W of saturated output power with 10dB of large signal gain and greater than 30% power-added efficiency, no external matching is required to achieve full-band operation

Electrical Performance

T_{BASE}=23℃, V_D=+24V, I_{DQ}=60mA, Z_0=50Ω, CW

Parameter	Min.	Typ.	Max.	Units
Frequency Range	0.05	—	2	GHz
Small Signal Gain	10	13	—	dB
Power Gain	—	10	—	dB
Reverse Isolation	—	-30	—	dB
RF Input Port Return Loss	—	1.7	—	:1
Output Power	—	38	—	dBm
Drain Voltage (V_D)	—	24	—	V
Gate Current	—	1	5	mA
Supply Current (I_D)*	—	—	1.2	A

*Adjust Vg between -2.8V to -1.5V to achieve I_{DQ}= 60mA, and typical Vg voltage is -2.4V

Absolute Maximum Ratings

Maximum Input Power	+31dBm	Operating Temperature (T_{BASE})	-55℃~+85℃
Channel Temperature	230℃	Storage Temperature	-55℃~+180℃
Maximum V_D	+32V	V_G Range	-5V~-1.5V
Mounting Temperature	310℃,50s		

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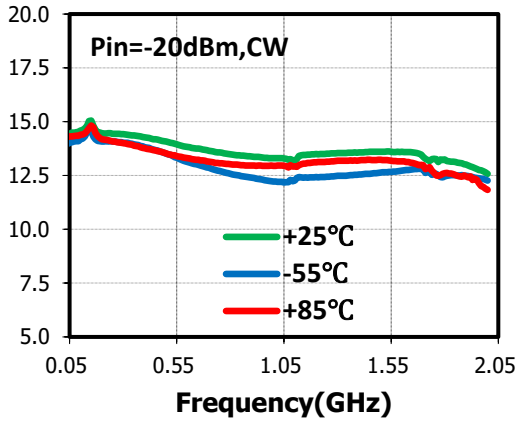
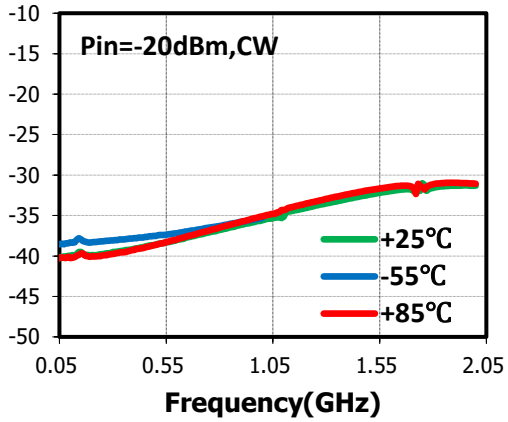
Typical Performance Curve

The following data was tested using the SAC5001 evaluation board, VD=+24V, I_{DQ}=60mA, T_{BASE}=+23℃, C_{Block}=1000pF, L_{Bias}=11 Turns

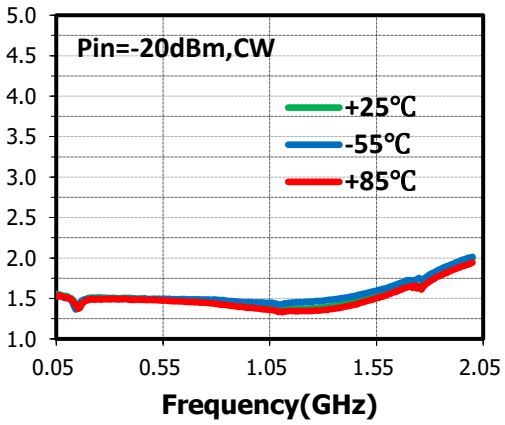
Small Signal Gain(dB) vs.Frequency



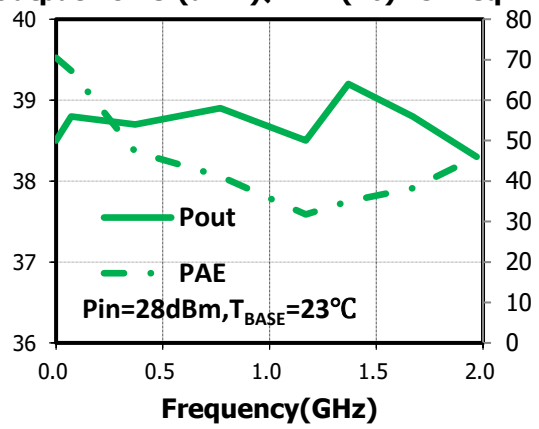
Isolation(dB) vs.Frequency



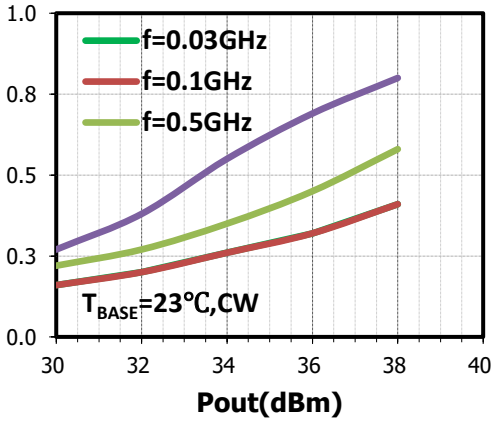
RF Input VSWR(:1) vs.Frequency



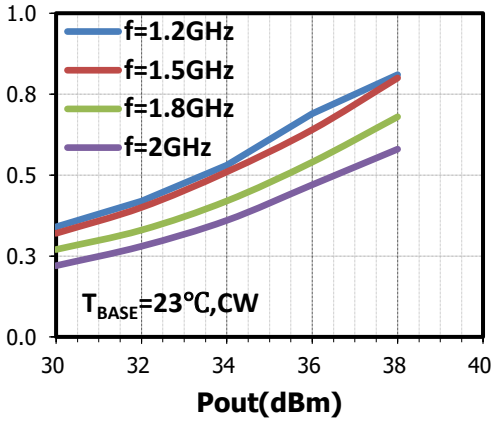
Output Power(dBm)、PAE(%) vs.Freq.

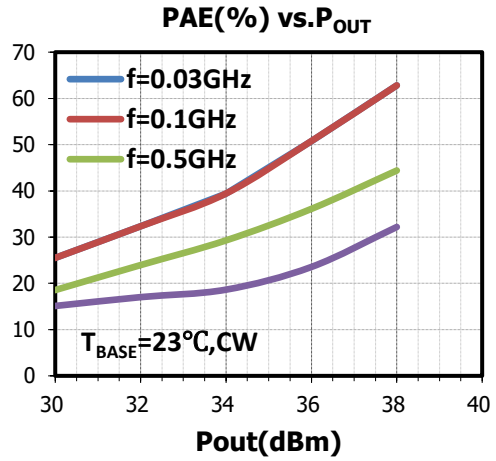


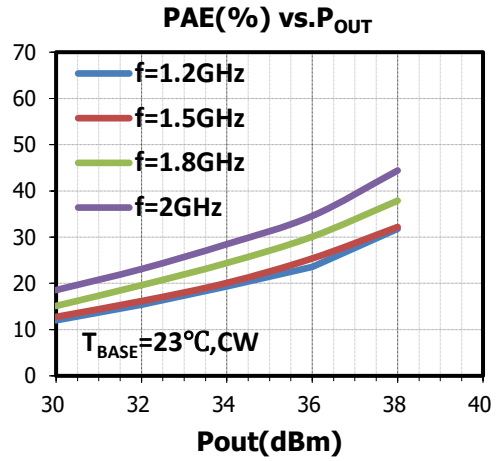
I_{Drain}(A) vs.P_{OUT}

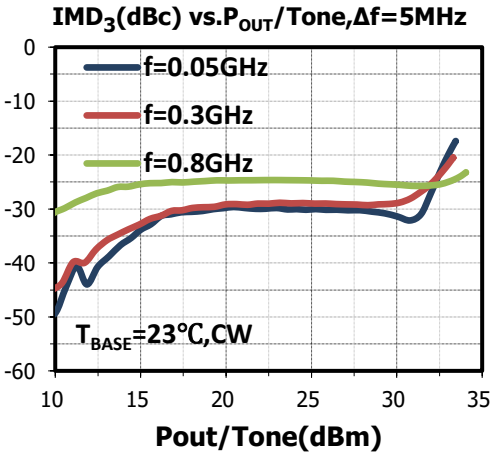


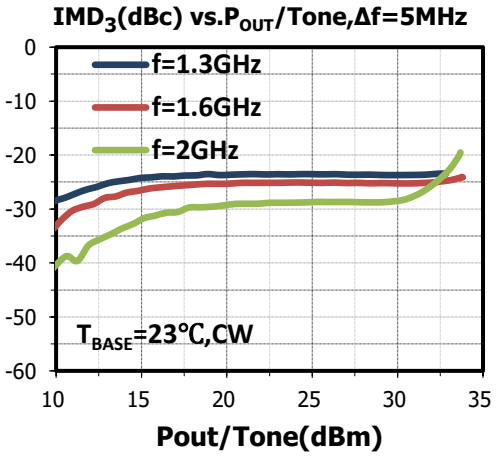
I_{Drain}(A) vs.P_{OUT}

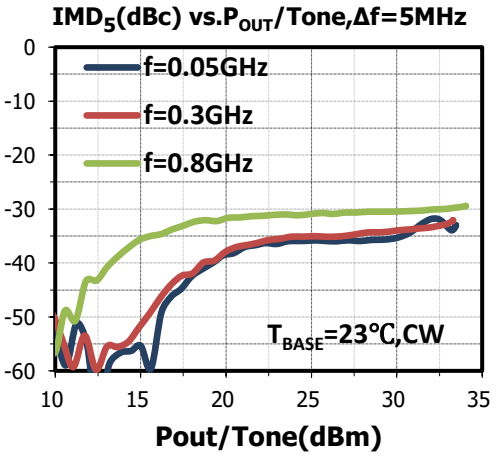


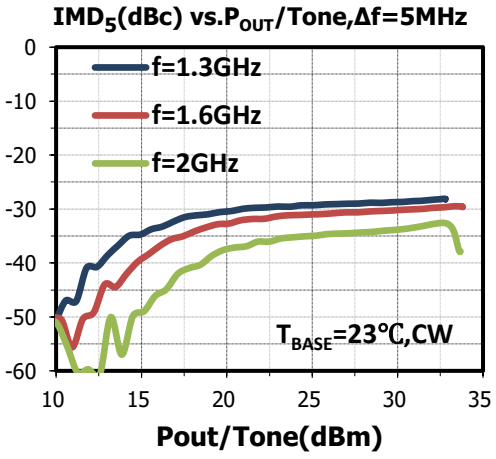

PAE(%) vs.POUT
f=0.03GHz
f=0.1GHz
f=0.5GHz
TBASE=23°C,CW
Pout(dBm)

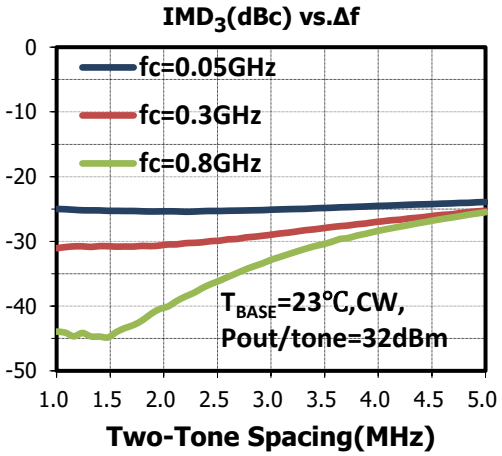

PAE(%) vs.POUT
f=1.2GHz
f=1.5GHz
f=1.8GHz
f=2GHz
TBASE=23°C,CW
Pout(dBm)

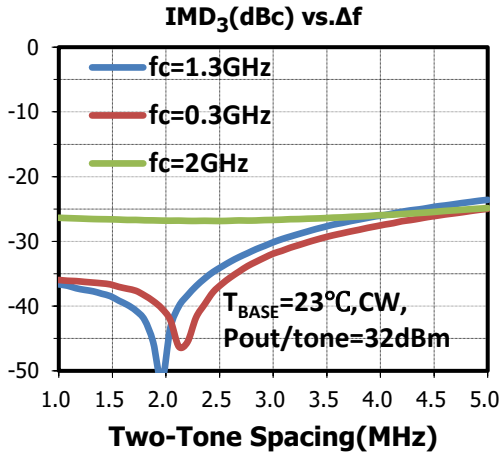

IMD3(dBc) vs.POUT/Tone,Δf=5MHz
f=0.05GHz
f=0.3GHz
f=0.8GHz
TBASE=23°C,CW
Pout/Tone(dBm)

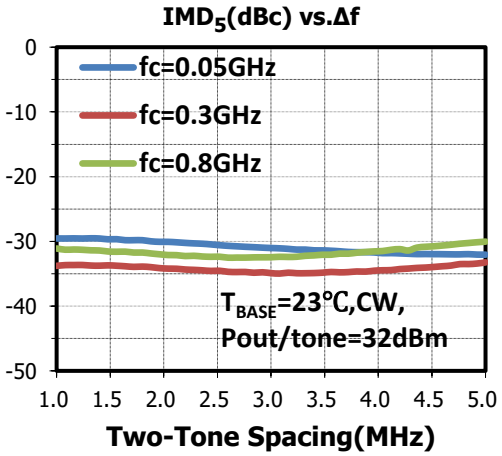

IMD3(dBc) vs.POUT/Tone,Δf=5MHz
f=1.3GHz
f=1.6GHz
f=2GHz
TBASE=23°C,CW
Pout/Tone(dBm)

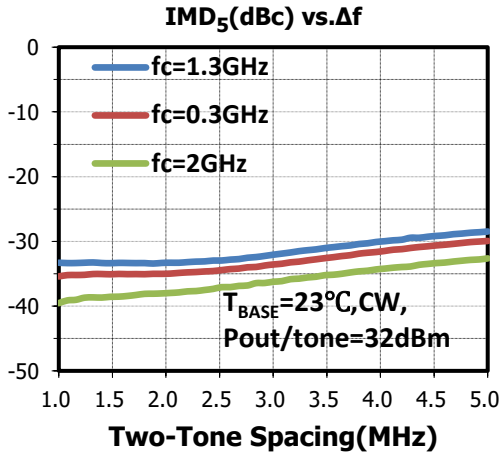

IMD5(dBc) vs.POUT/Tone,Δf=5MHz
f=0.05GHz
f=0.3GHz
f=0.8GHz
TBASE=23°C,CW
Pout/Tone(dBm)


IMD5(dBc) vs.POUT/Tone,Δf=5MHz
f=1.3GHz
f=1.6GHz
f=2GHz
TBASE=23°C,CW
Pout/Tone(dBm)







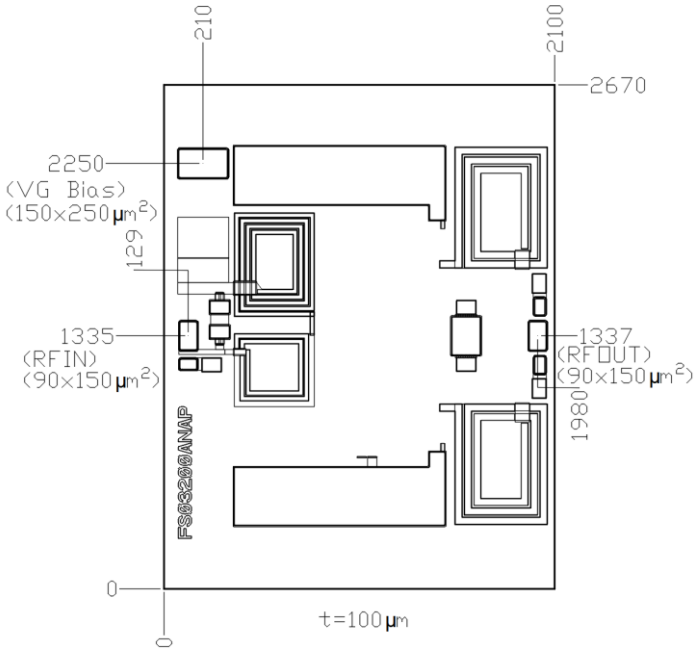


Thermal Resistance

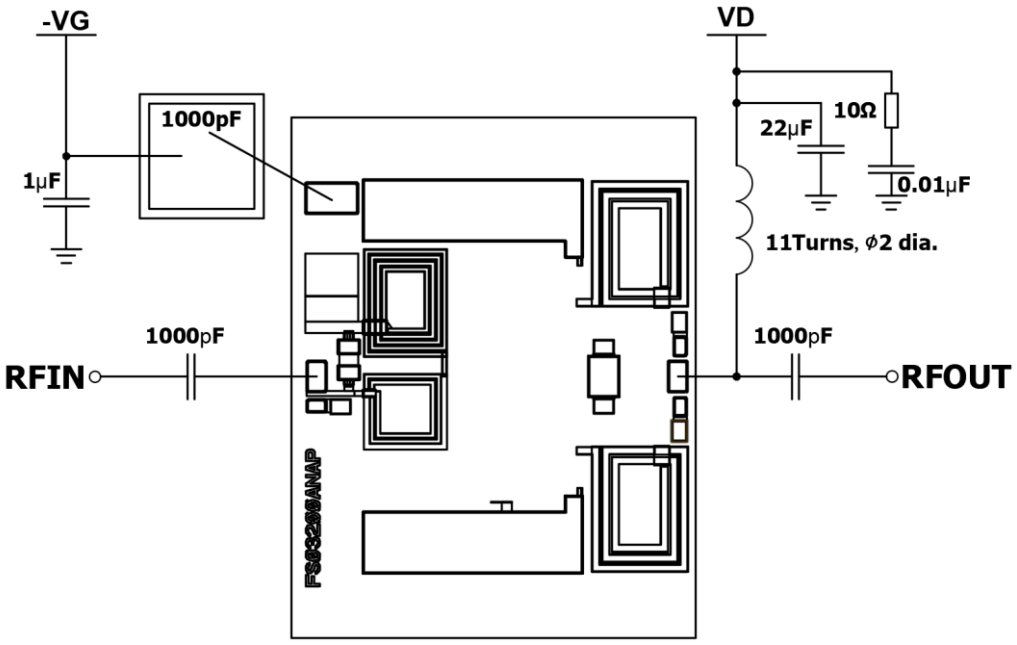
Parameter	Conditions	Value	Unit
θ_{JC1}	V_D=+24V， T_{BASE}=+70℃， Pin=+28dBm, CW, f=1GHz	9.6	℃/W

Bare Die Outline

(μm)



Assembly Diagram



Notes

1. **SAC5001 requires VDx and VGx bias.**
   Turn-on: Apply VGx,Apply VDx,Apply RFIN signal.
   Turn-off: Remove RFIN signal, Decrease VG to -5V(pinch-off), Decrease VD to 0 V
2. **Microelectronic devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly, and test.**

Revision History

Revision	Date	Comment
1.0	May 11, 2024	First Release

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