SAC5004

GaN MMIC Power Amplifier
5GHz~8GHz 46dBm

Rev 1.0

Features

- Frequency: 5GHz~8GHz
- Small Signal Gain: 32dB
- Output Power: 45dBm
- Package: Bare die
- Supply Voltage: +24V/-Vg

Typical Applications

- Point-to-Point Radios

General Description

SAC5004 is a broadband power amplifier delivering 45dBm with 32% power added efficiency from 5GHz to 8GHz. No external matching is required to achieve full-band operation.

Electrical Performance

T_{BASE}=23℃, V_D=+24V, I_{DQ}=0.85A, Z_0=50Ω, CW

Parameter	Min.	Typ.	Max.	Units
Frequency Range	5	—	8	GHz
Small Signal Gain	—	32	—	dB
Power Gain**	—	22	—	dB
Reverse Isolation	—	-45	—	dB
RF Input Port Return Loss	—	-12	—	dB
Output Power	—	45	—	dBm
Drain Voltage (V_D)	—	24	—	V
Gate Current	—	2	21	mA
Supply Current (I_D)*	—	—	6	A

*Adjust Vg between -2.5V to -1.5V to achieve I_{DQ1}= 1.3A, I_{DQ2}= 0.63A, I_{DQ1}= 0.12A
**Pin=23dBm

Absolute Maximum Ratings

Maximum Input Power	+28dBm	Operating Temperature (T_{BASE})	-55℃~+85℃
Channel Temperature	230℃	Storage Temperature	-55℃~+180℃
Maximum V_D	+32V	V_G Range	-5V~-1V
Mounting Temperature (30 seconds)	320℃		

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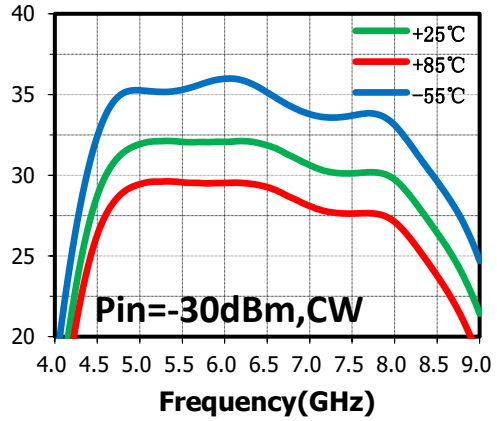
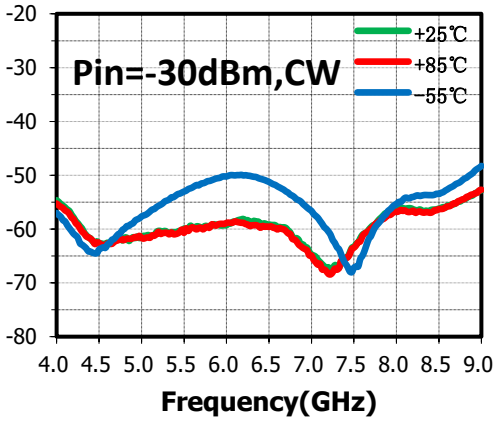
Typical Performance Curve

V_D = + 24V, I_{DQ} = 0.85A, T_{BASE} = + 23℃, CW

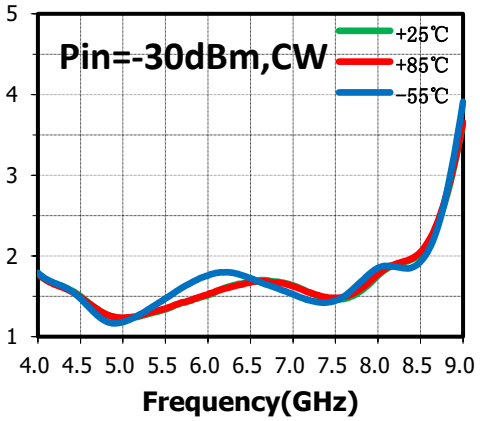
Small Signal Gain(dB) vs.Frequency



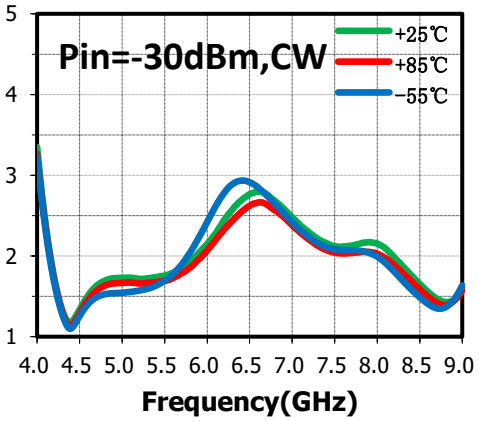
Isolation(dB) vs.Frequency



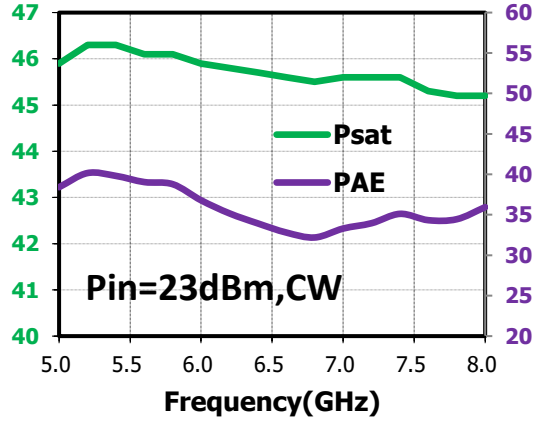
RF Input VSWR(:1) vs.Frequency



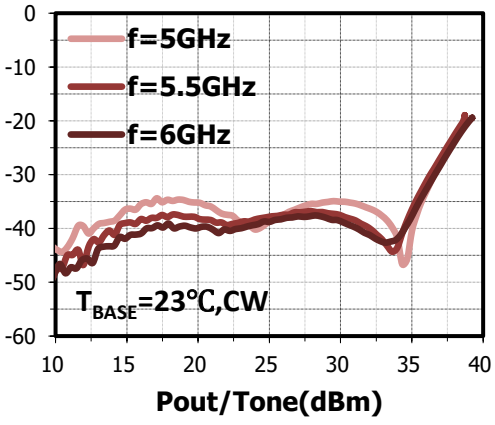
RF Output VSWR(:1) vs.Frequency

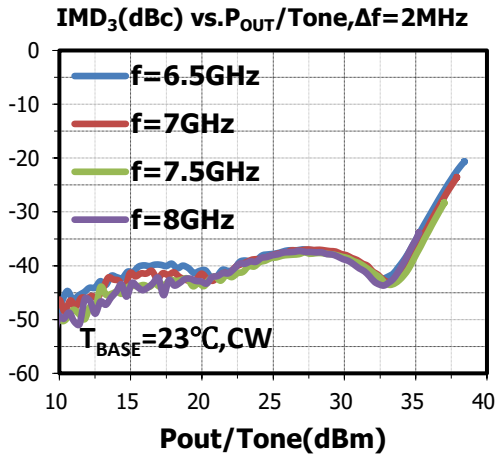


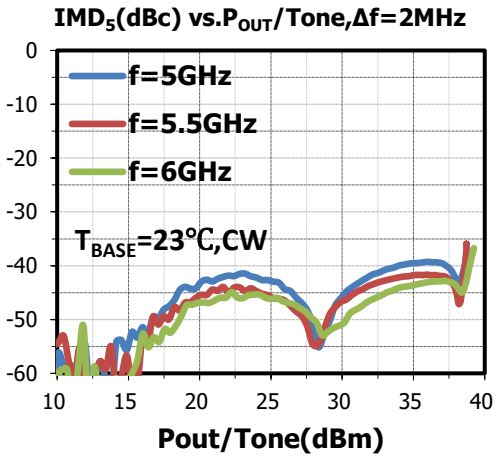
Output Power(dBm)、PAE(%) vs.Frequency

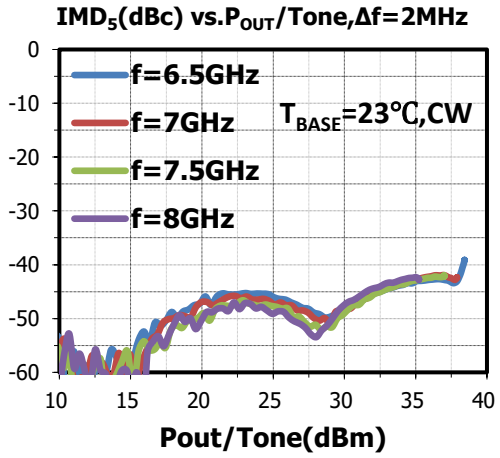


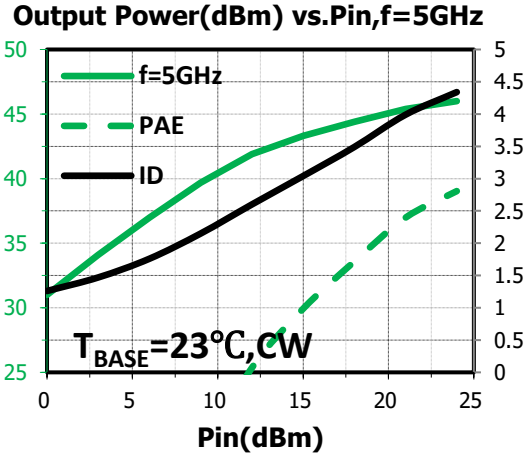
IMD_3(dBc) vs.P_{OUT}/Tone,Δf=2MHz

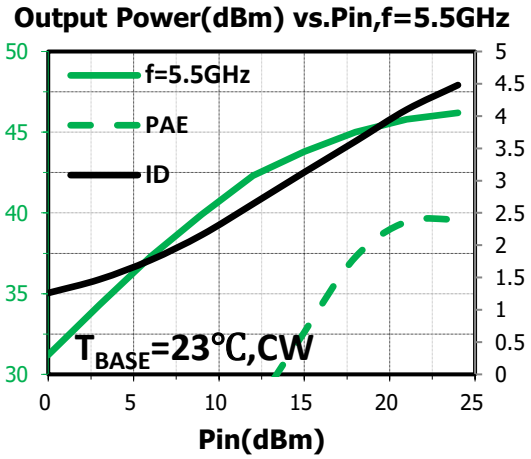


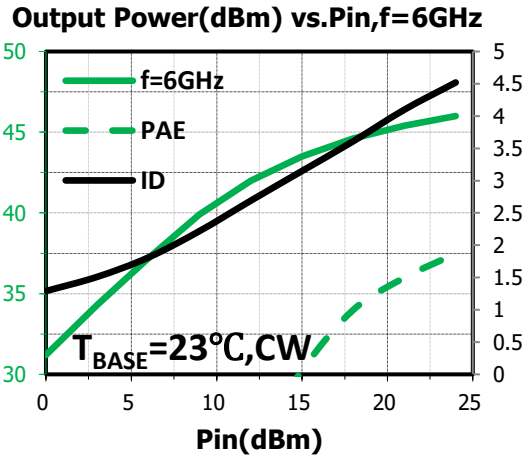

IMD3(dBc) vs.POUT/Tone,Δf=2MHz
f=6.5GHz
f=7GHz
f=7.5GHz
f=8GHz
TBASE=23℃,CW
Pout/Tone(dBm)


IMD5(dBc) vs.POUT/Tone,Δf=2MHz
f=5GHz
f=5.5GHz
f=6GHz
TBASE=23℃,CW
Pout/Tone(dBm)

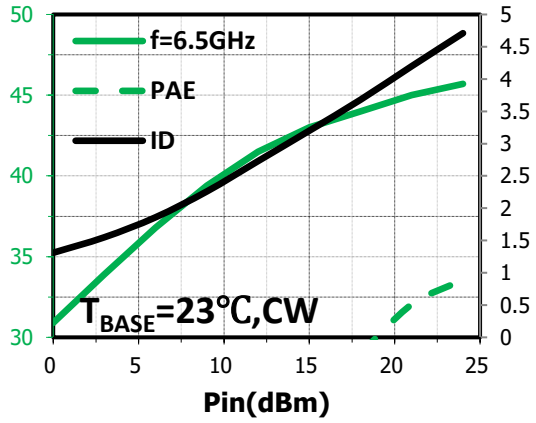

IMD5(dBc) vs.POUT/Tone,Δf=2MHz
f=6.5GHz
f=7GHz
f=7.5GHz
f=8GHz
TBASE=23℃,CW
Pout/Tone(dBm)


Output Power(dBm) vs.Pin,f=5GHz
f=5GHz
PAE
ID
TBASE=23℃,CW
Pin(dBm)

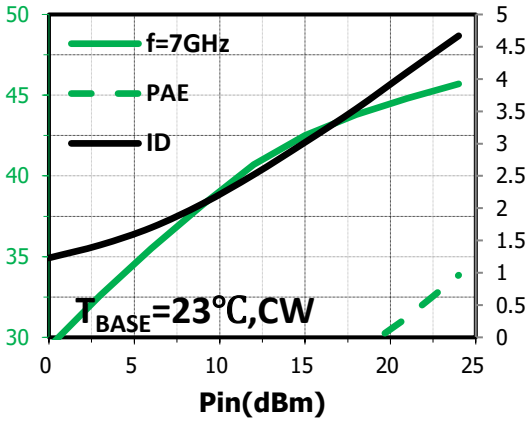

Output Power(dBm) vs.Pin,f=5.5GHz
f=5.5GHz
PAE
ID
TBASE=23℃,CW
Pin(dBm)


Output Power(dBm) vs.Pin,f=6GHz
f=6GHz
PAE
ID
TBASE=23℃,CW
Pin(dBm)

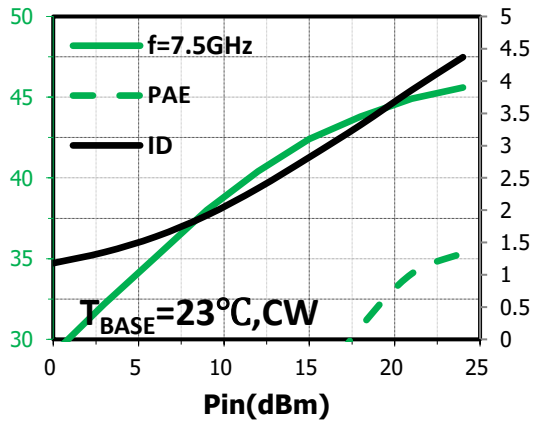
Output Power(dBm) vs.Pin,f=6.5GHz



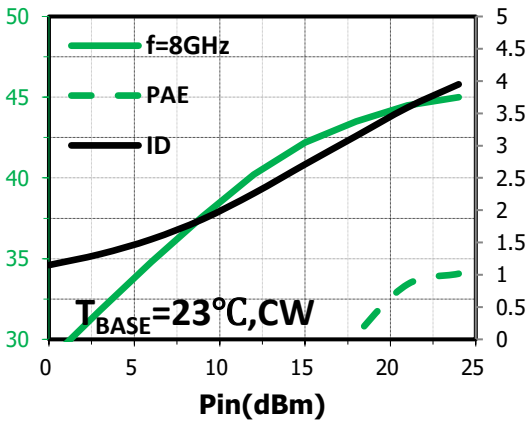
Output Power(dBm) vs.Pin,f=7GHz



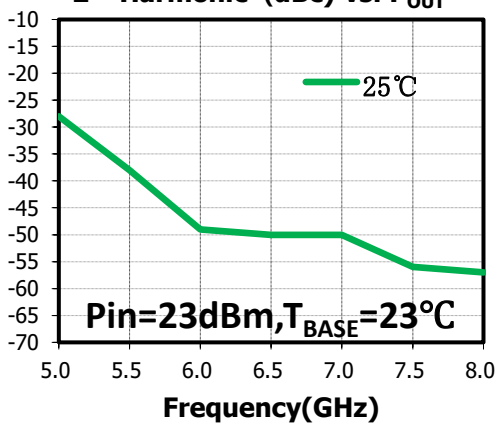
Output Power(dBm) vs.Pin,f=7.5GHz



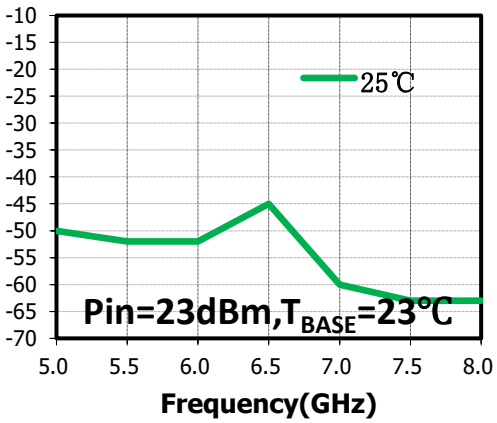
Output Power(dBm) vs.Pin,f=8GHz



2nd Harmonic (dBc) vs. P_{OUT}



3rd Harmonic(dBc) vs. P_{OUT}



Thermal Resistance

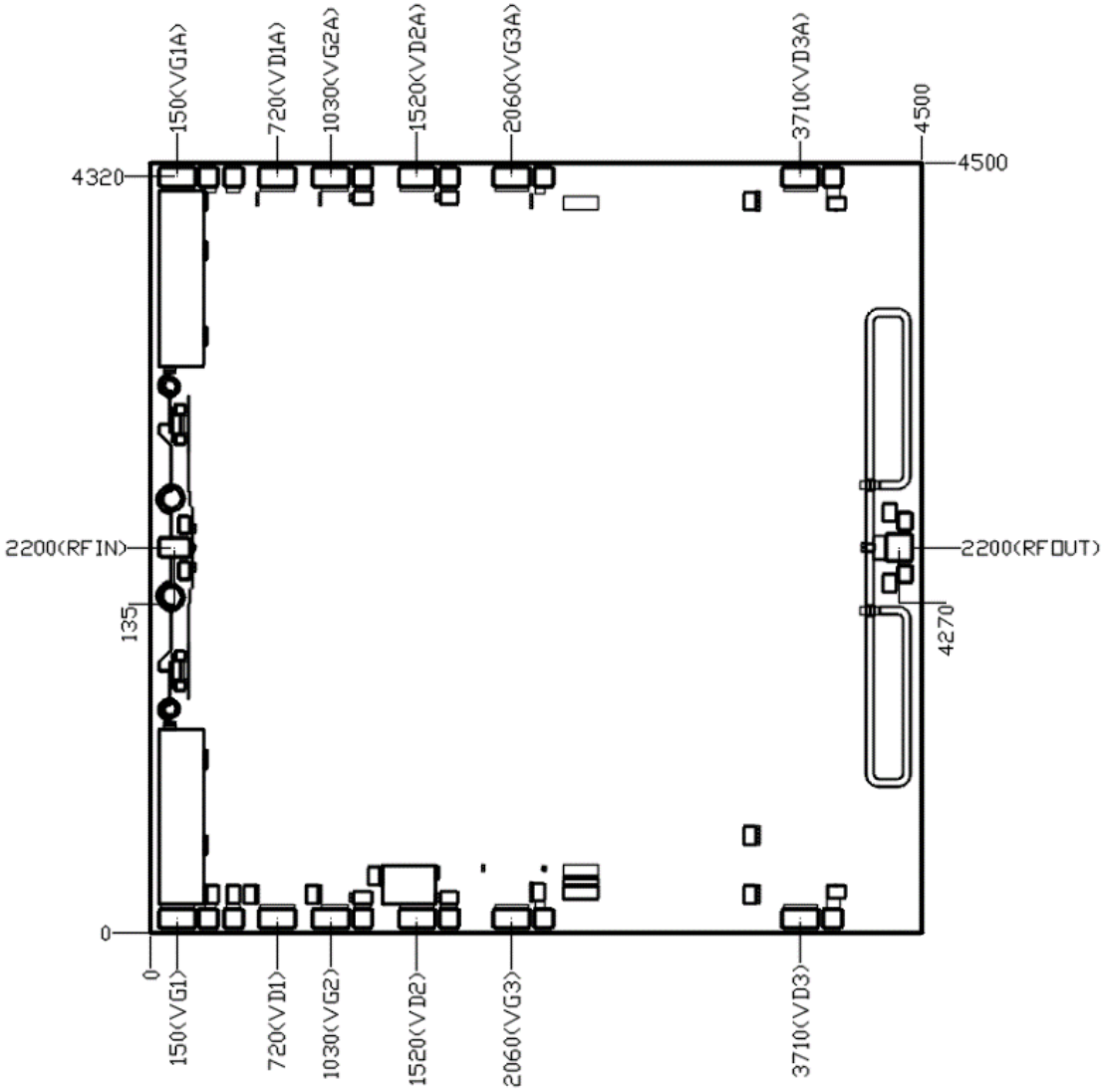
Parameter	Conditions	Value	Unit
θ_{JC1}	VD=+28V， T_{BASE}=+70℃， Pin=+23dBm, CW, f=6GHz	0.81	℃/W

Electrostatic Discharge (ESD) Ratings

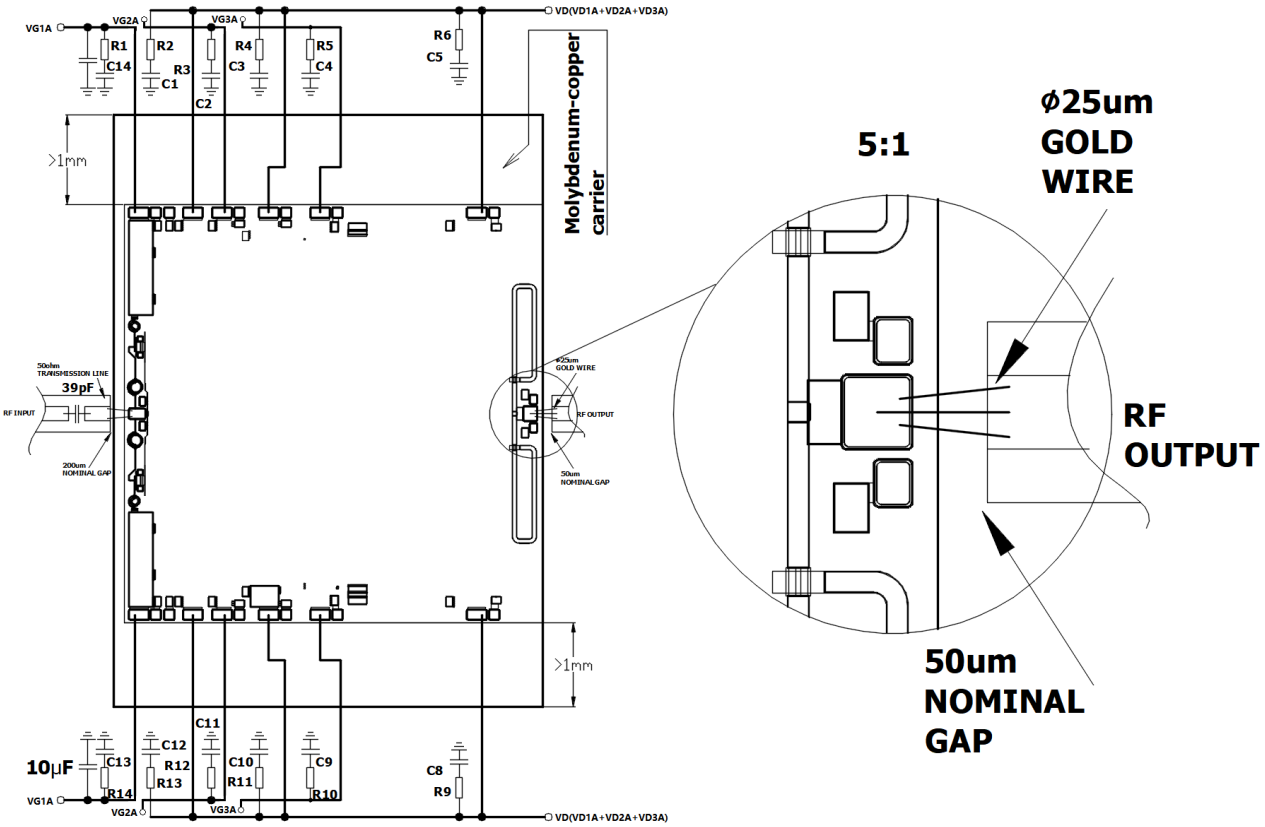
ESD Model	Conditions	Withstand Threshold (V)	Class
HBM	Human body model (HBM) per ANSI/ESDA/JEDEC JS-001	500	1B

Bare Die Outline

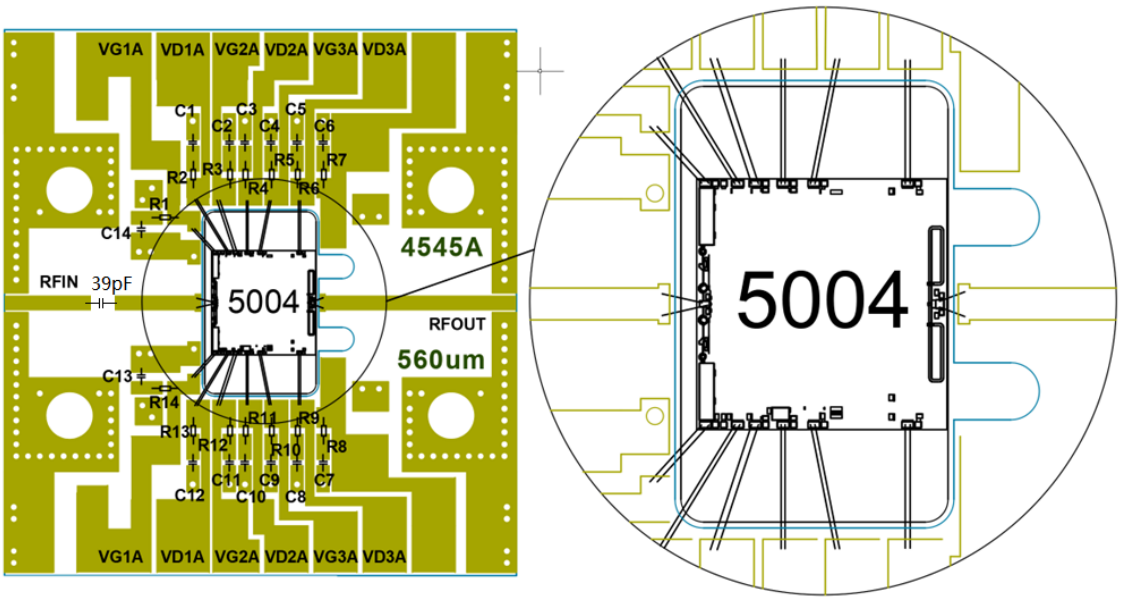
(μm)



Application Circuit



SAC5004 EVB



C6, R7 and C7, R8 are adjust elements

BOM

Reference Des.	Value	Part Number	Manuf.	Size
R1~R14	1Ω	—	—	0402
R1~R14	0.01μF	—	—	0402
PCB, Ro4350b, t=0.254				

Notes

1. **SAC5004 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. **Suggest molybdenum-copper thinness is 0.2mm.**
3. **Microelectronic devices are susceptible to damage from Electrostatic Discharge. Proper precautions.**
4. **should be observed during handling, assembly, and test.**

Revision History

Revision	Date	Comment
1.0	Mar. 18, 2024	First Release