SAC5022

GaN MMIC Power Amplifier
2GHz~8GHz 44dBm

Rev 1.0

Features

- Frequency: 2GHz~8GHz
- Small Signal Gain: 33dB
- Output Power: 44dBm CW
- Package: Bare die
- Supply Voltage: +28V/-Vg

Typical Applications

- Point-to-Point Radios

General Description

SAC5022 is a 2GHz to 8GHz wideband power amplifier with a saturated output power (P_{OUT}) of 44dBm, power added efficiency (PAE) of 30%, and a power gain of 25dB typical from 2GHz to 8GHz at input power (P_{IN}) of 25dBm. The RF input and RF output are internally matched.

Electrical Performance

T_{BASE}=23℃, V_D=+28V, I_{DQ}=1.4A, Z_0=50Ω, CW

Parameter	Min.	Typ.	Max.	Units
Frequency Range	2	—	8	GHz
Small Signal Gain	—	33	—	dB
Power Gain	—	25	—	dB
Reverse Isolation	—	50	—	dB
RF Input Port Return Loss	—	9	—	dB
Output Power	43	44	—	dBm
Drain Voltage (V_D)	—	28	—	V
Gate Current	—	—	21	mA
Supply Current (I_D)*	—	—	5	A

*Adjust Vg between -2.5V to -1.7V to achieve I_{DQ1}=1.4A

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	-10V~-1.5V
Mounting Temperature (30 seconds)	320℃		

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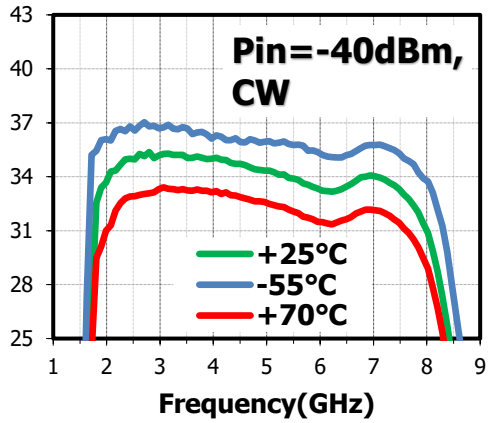
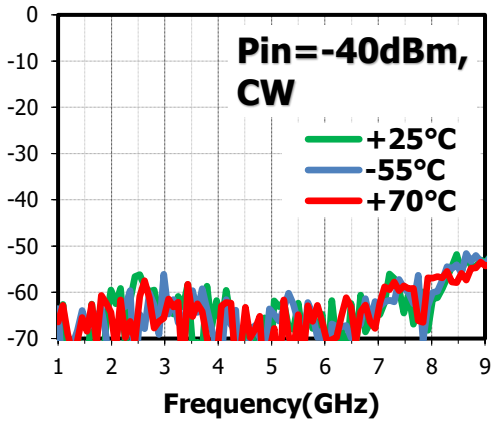
Typical Performance Curve

V_D = + 28V, I_{DQ} = 1.4A, T_{BASE} = + 23℃, CW

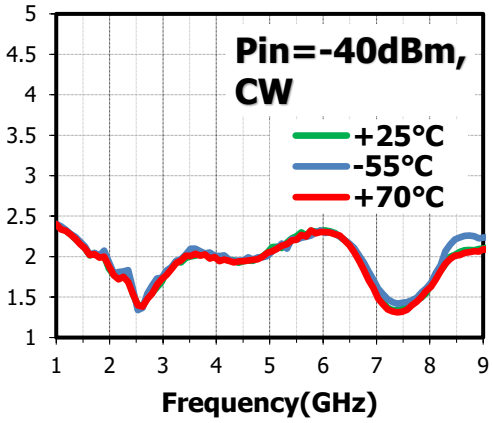
Small Signal Gain(dB) vs.Temperature



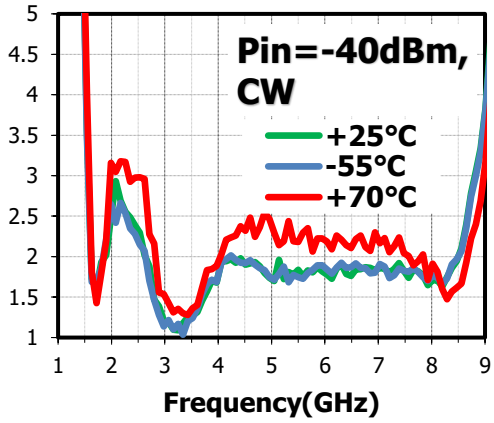
Isolation(dB) vs.Temperature



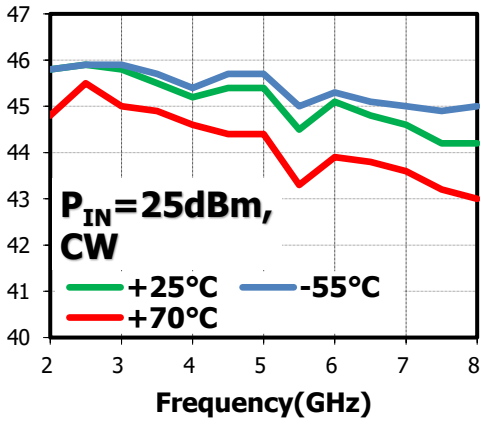
Input VSWR(:1) vs.Temperature



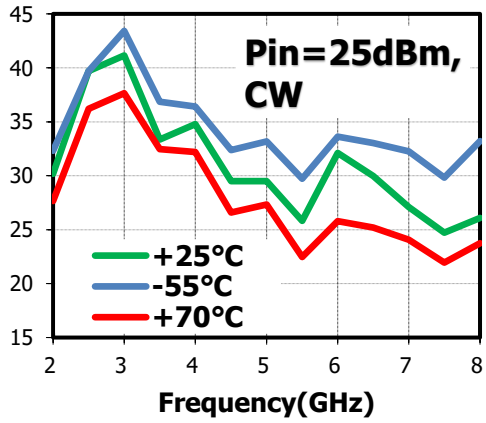
Output VSWR(:1) vs.Temperature

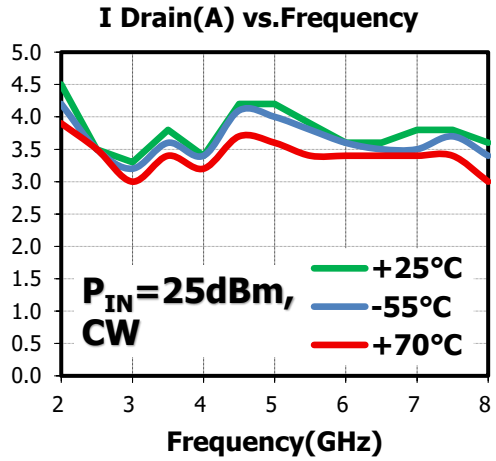


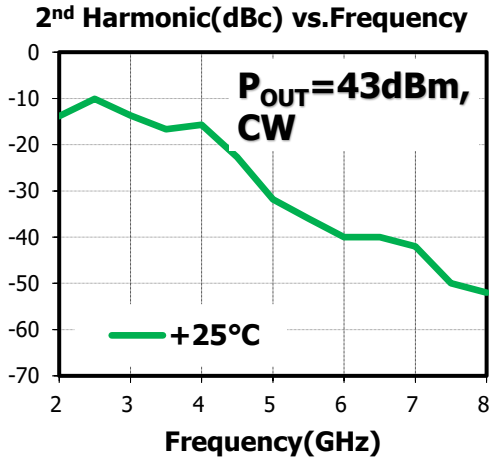
Output Power(dBm) vs.Frequency

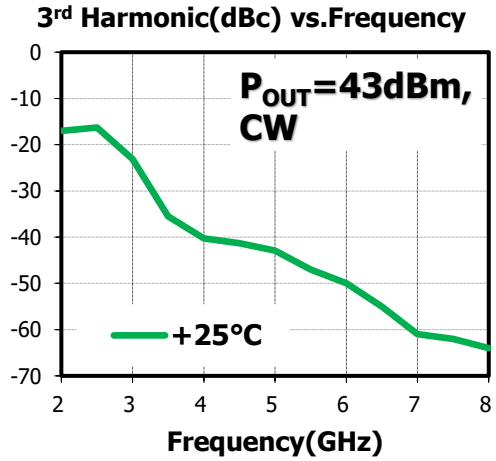


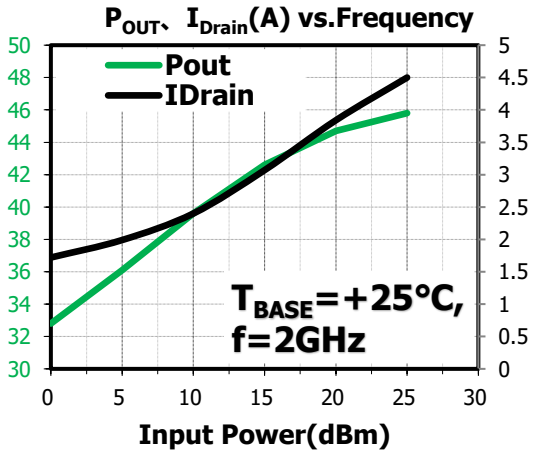
PAE(%) vs.Frequency

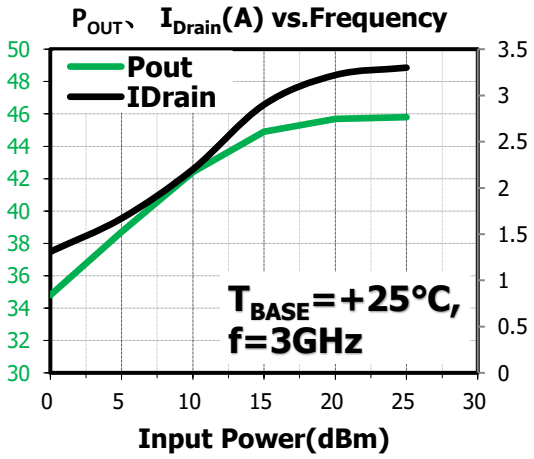


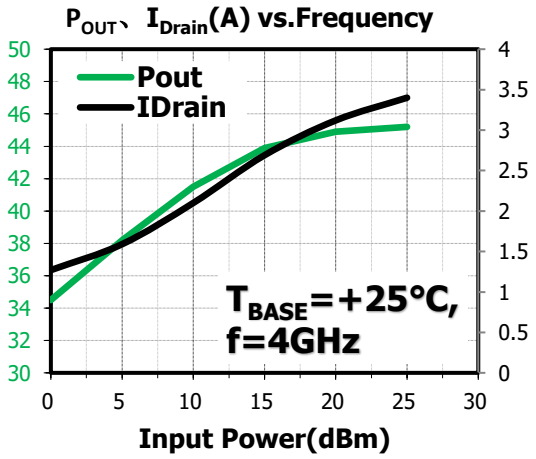

I Drain(A) vs.Frequency
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
2
3
4
5
6
7
8
Frequency(GHz)
P_IN=25dBm,
CW
+25°C
-55°C
+70°C

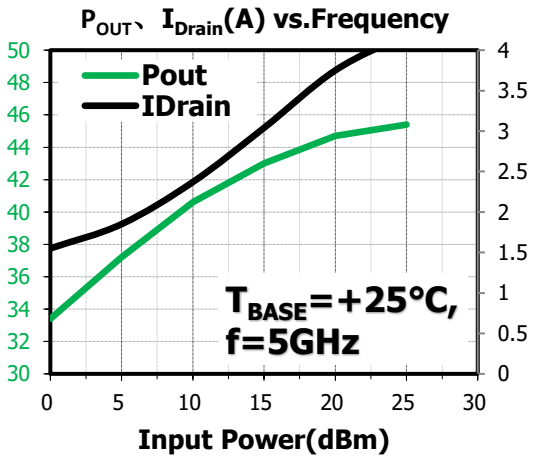

2nd Harmonic(dBc) vs.Frequency
0
-10
-20
-30
-40
-50
-60
-70
2
3
4
5
6
7
8
Frequency(GHz)
P_OUT=43dBm,
CW
+25°C

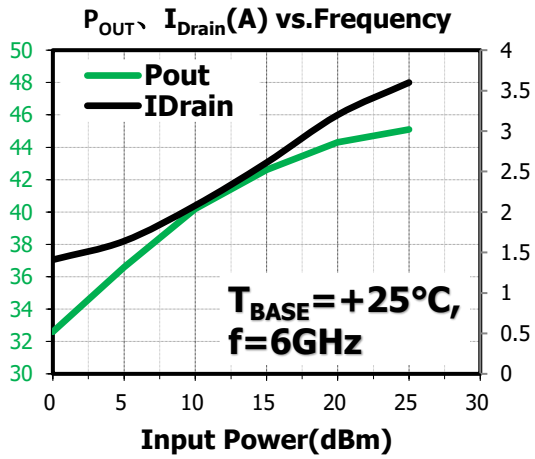

3rd Harmonic(dBc) vs.Frequency
0
-10
-20
-30
-40
-50
-60
-70
2
3
4
5
6
7
8
Frequency(GHz)
P_OUT=43dBm,
CW
+25°C

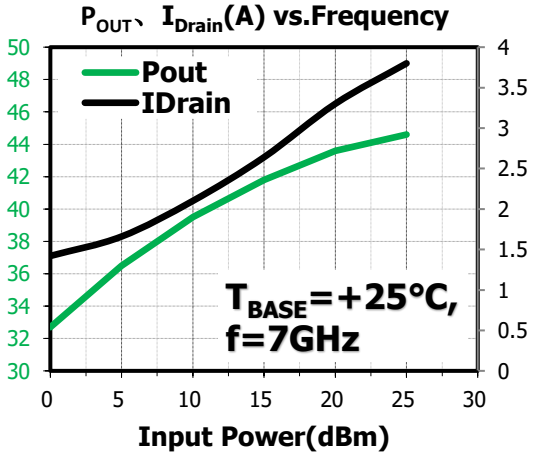

P_OUT、I_Drain(A) vs.Frequency
50
48
46
44
42
40
38
36
34
32
30
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0
5
10
15
20
25
30
Input Power(dBm)
Pout
IDrain
T_BASE=+25°C,
f=2GHz

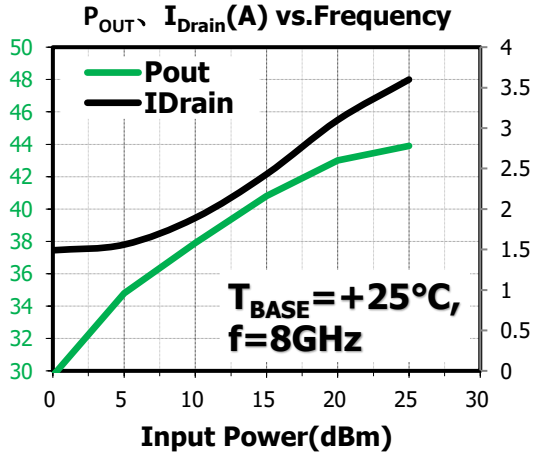

P_OUT、I_Drain(A) vs.Frequency
50
48
46
44
42
40
38
36
34
32
30
3.5
3
2.5
2
1.5
1
0.5
0
0
5
10
15
20
25
30
Input Power(dBm)
Pout
IDrain
T_BASE=+25°C,
f=3GHz


P_OUT、I_Drain(A) vs.Frequency
50
48
46
44
42
40
38
36
34
32
30
4
3.5
3
2.5
2
1.5
1
0.5
0
0
5
10
15
20
25
30
Input Power(dBm)
Pout
IDrain
T_BASE=+25°C,
f=4GHz









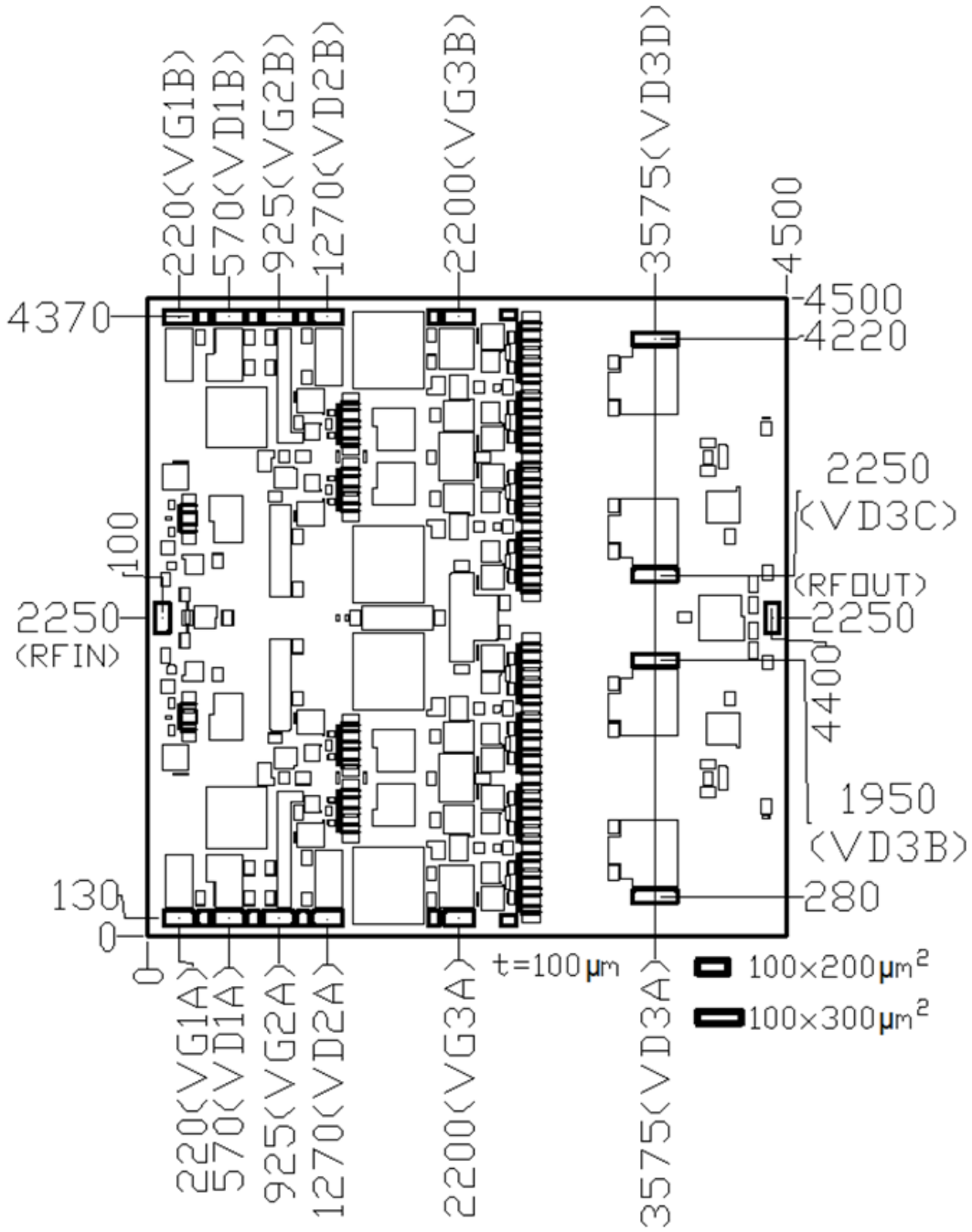
Thermal Resistance

Parameter	Conditions	Value	Unit
θ_{JC1}	VD=+28V， T_{BASE}=+70℃， Pin=+25dBm, CW, f=6GHz	0.88	℃/W

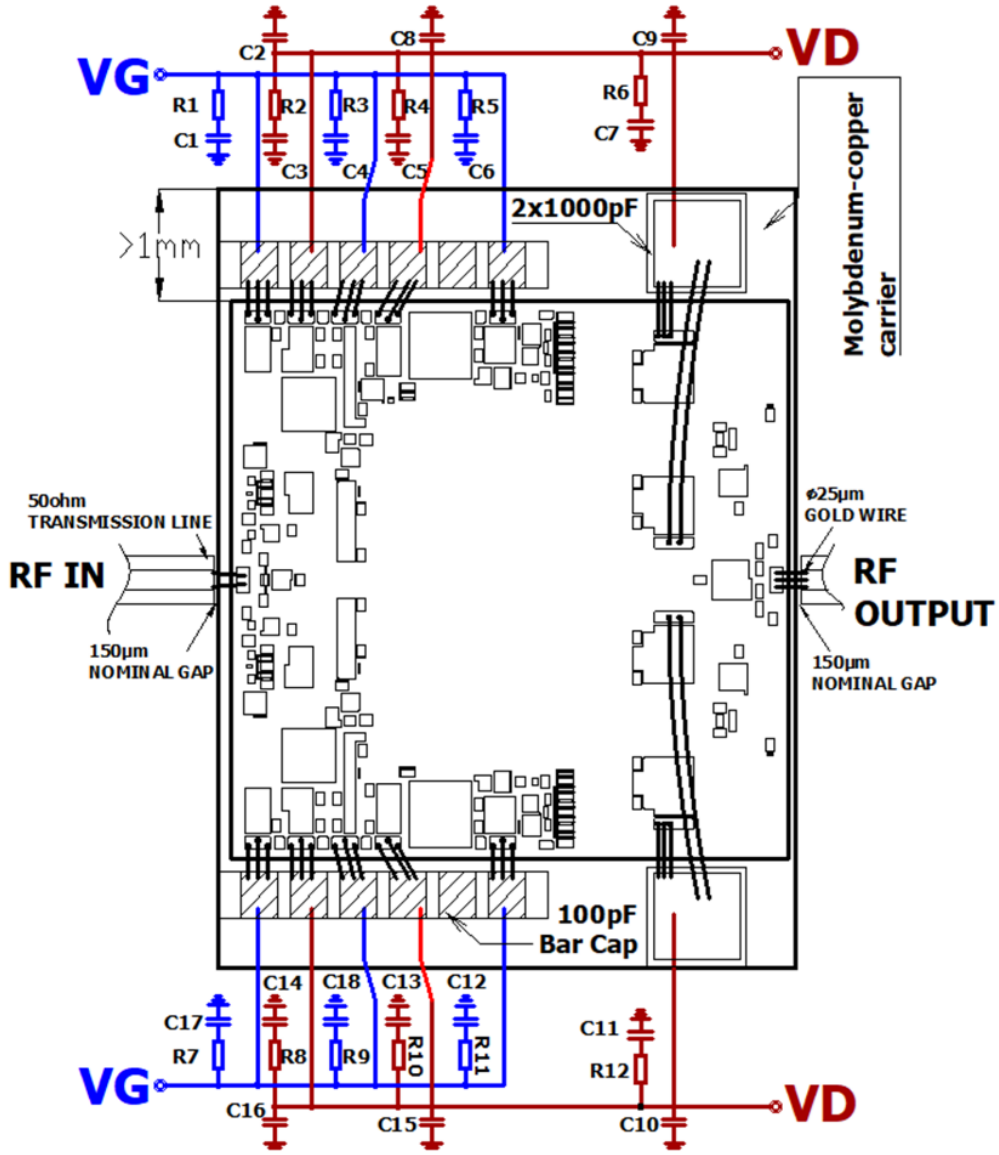
Electrostatic Discharge (ESD) Ratings

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

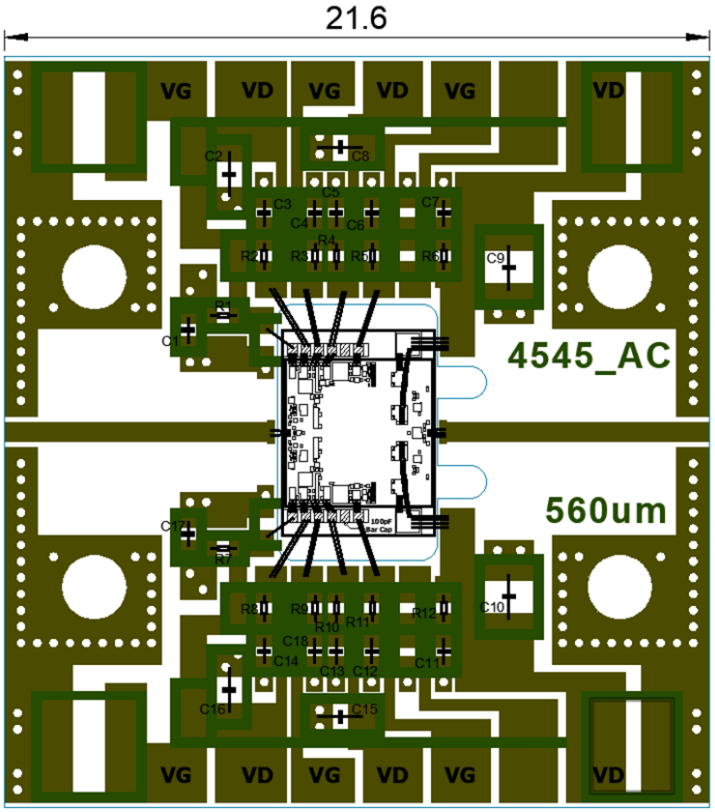
Bare Die Outline
(μm)



Application Circuit



SAC5022 EVB



BOM

Reference Des.	Part Number	Value	Size
R1~R12	-	2.2Ω	0402
C1、C3~C7、C11~C14、C17、C18	-	0.047μF	0402
C2、C8、C15、C16	-	4.7μF	0603
C9、C10	-	10μF	0805
-	PCB	Ro4350b, t=0.254	
-	MoCu Heatsink	Mo70，4.6x6.6x0.2	

Notes

1. SAC5022 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 heatsink thinness is 0.2mm;
3. Microelectronic devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly, and test;
4. Each VD and Vg pin (VD1x,2x,3x and VG1x,2x,3x) needs to have bypass capacitors (bar cap) mounted as close to the MMIC as possible;
5. The loop height of the VD and VG bonds should be minimized.

Revision History

Revision	Date	Comment
1.0	Jul. 8, 2025	First Release

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