SAC5002CR5

GaN MMIC Power Amplifier
5GHz~8GHz 46dBm

Rev 1.0

Features

- Frequency: 5GHz~8GHz
- Small Signal Gain: 33dB
- Output Power: 46dBm
- PAE: 30%
- Package: Metal-Ceramic-Package (CR5)
- Supply Voltage: +28V/-Vg

Typical Applications

- Point-to-Point Radios

General Description

SAC5002CR5 is a broadband power amplifier delivering 46dBm with 30% power added efficiency from 5GHz to 8GHz. No external matching is required to achieve full-band operation.

Electrical Performance

T_{BASE}=23℃, V_D=+28V, I_{DQ}=1.3A, Z_0=50Ω, Pulse Width=100μs, Duty Cycle=10%

Parameter	Min.	Typ.	Max.	Units
Frequency Range	5	—	8	GHz
Small Signal Gain	—	33	—	dB
Power Gain**	—	23	—	dB
Reverse Isolation	—	45	—	dB
RF Input Port Return Loss	—	12	—	dB
Output Power	—	46	—	dBm
Drain Voltage (V_D)	—	28	—	V
Gate Current	—	2	22	mA
Supply Current (I_D)*	—	—	6	A

*Adjust Vg between -2.5V to -1.5V to achieve I_{DQ}= 1.3A, and typical Vg voltage is -2.1V

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	310℃,50s		

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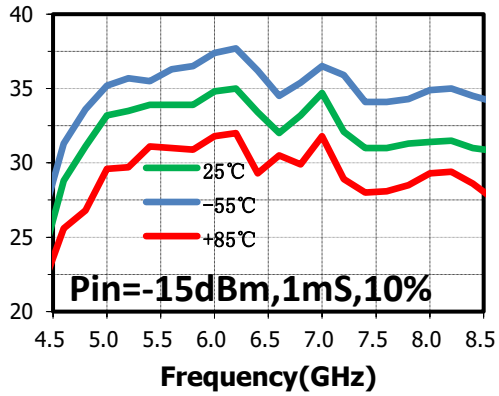
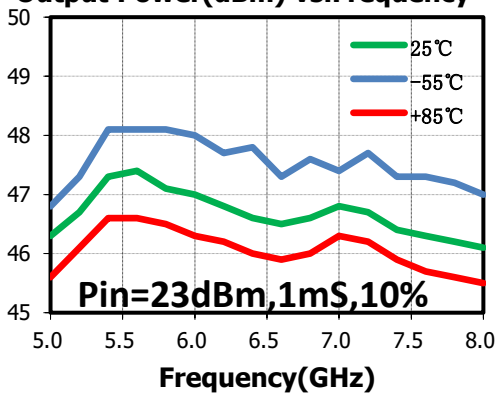
Typical Performance Curve

The following curves are taken from SAC5002CR5 evaluation board. De-embedding operation has been Implemented, VD = + 28V, I_{DQ} = 1.3A, T_{BASE} = + 23℃

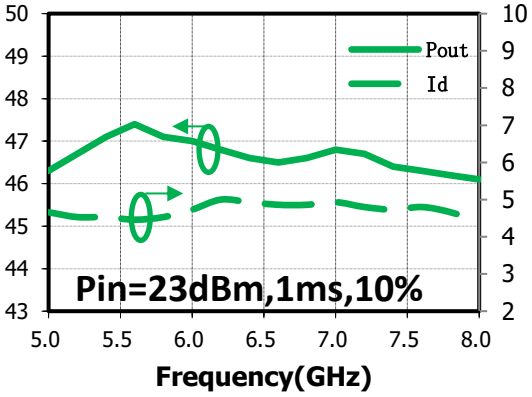
Small Signal Gain(dB) vs.Frequency



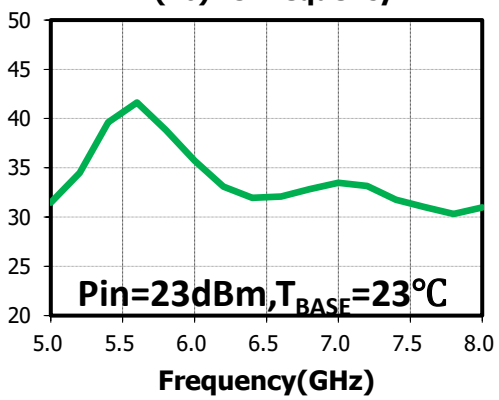
Output Power(dBm) vs.Frequency



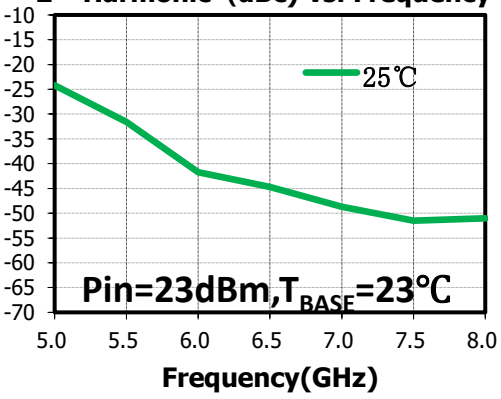
Output Power(dBm) vs.Frequency



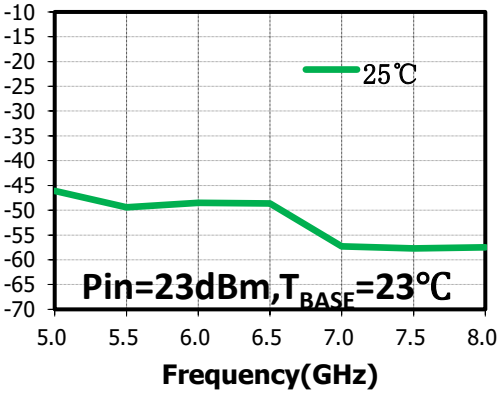
PAE(%) vs.Frequency

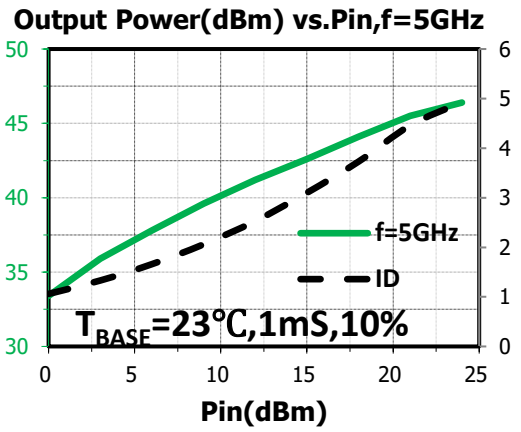


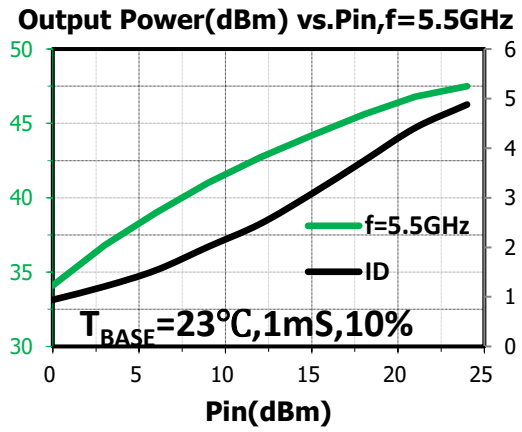
2nd Harmonic (dBc) vs. Frequency

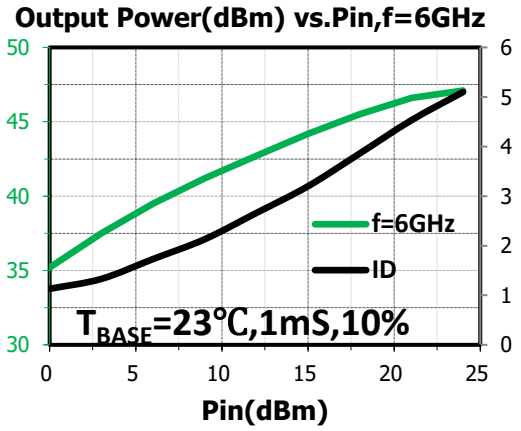


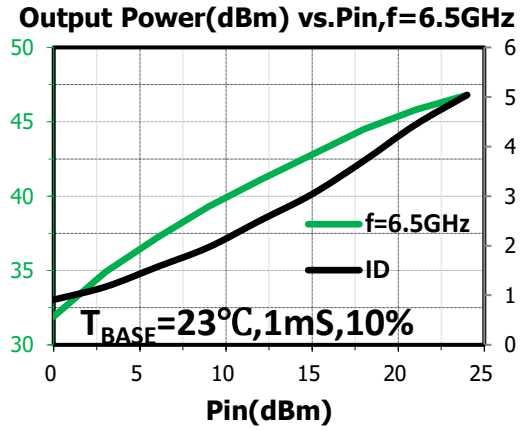
3rd Harmonic(dBc) vs. Frequency

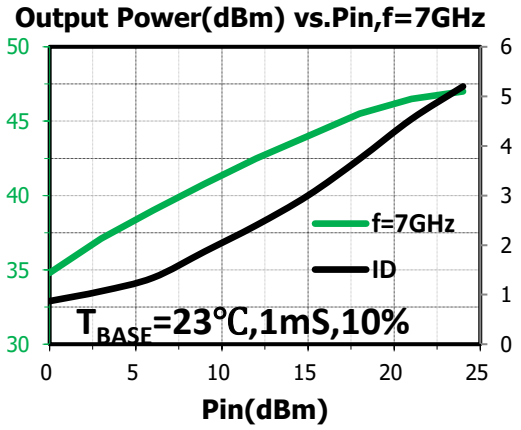


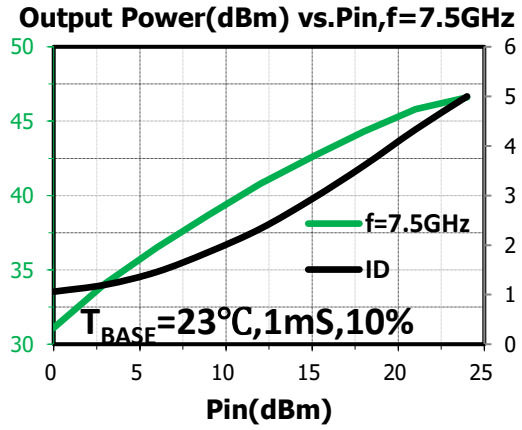

Output Power(dBm) vs.Pin,f=5GHz
f=5GHz
ID
TBASE=23℃,1mS,10%
Pin(dBm)

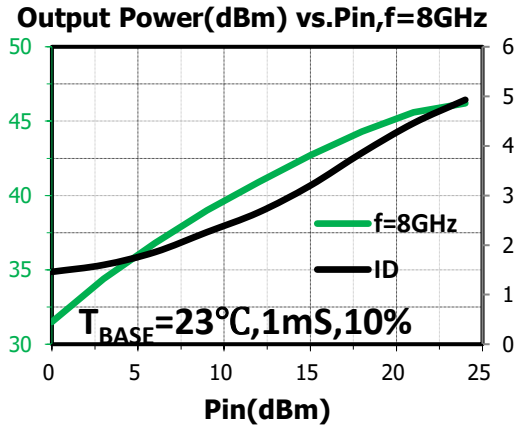

Output Power(dBm) vs.Pin,f=5.5GHz
f=5.5GHz
ID
TBASE=23℃,1mS,10%
Pin(dBm)


Output Power(dBm) vs.Pin,f=6GHz
f=6GHz
ID
TBASE=23℃,1mS,10%
Pin(dBm)


Output Power(dBm) vs.Pin,f=6.5GHz
f=6.5GHz
ID
TBASE=23℃,1mS,10%
Pin(dBm)


Output Power(dBm) vs.Pin,f=7GHz
f=7GHz
ID
TBASE=23℃,1mS,10%
Pin(dBm)


Output Power(dBm) vs.Pin,f=7.5GHz
f=7.5GHz
ID
TBASE=23℃,1mS,10%
Pin(dBm)

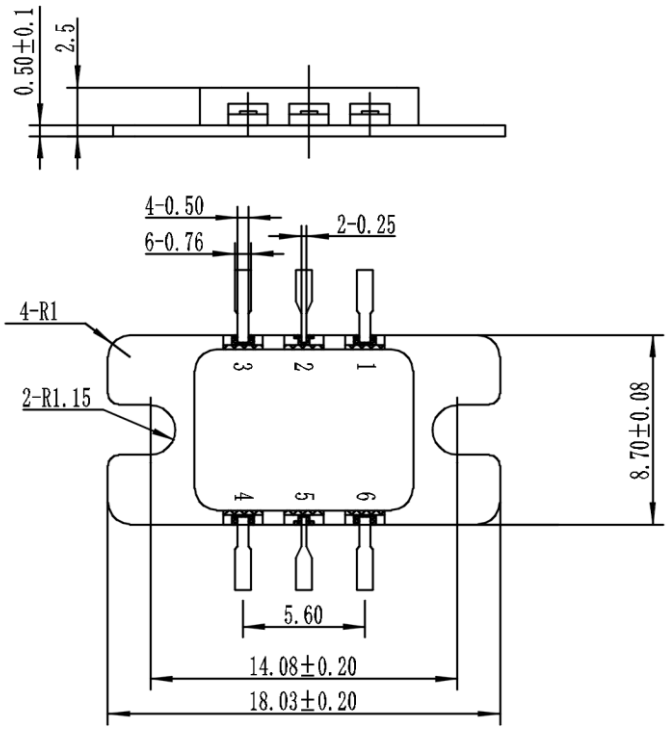


Thermal Resistance

Parameter	Conditions	Value	Unit
θ_{JC1}	VD=+28V， T_{BASE}=+70℃， Pin=+23dBm, CW, f=5.5GHz	1.44	℃/W
θ_{JC2}	VD=+28V， T_{BASE}=+70℃， Pin=+23dBm, CW, f=7.5GHz	1.64	℃/W

Die Outline

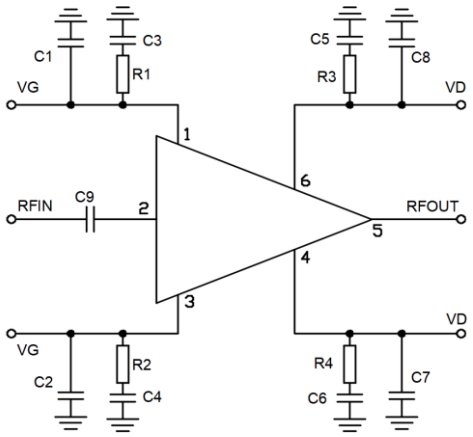
(All dimensions in mm)



Pin Descriptions

Pin No.	Function	Pin No.	Function
1	Gate	4	Drain
2	RF input, DC Coupled	5	RF Output, AC Coupled
3	Gate	6	Drain

Application Circuit



BOM

Reference Des.	Value	Part Number	Manuf.	Size
C1, C2	0.1μF	—	—	0805
C3~C6	0.022μF	—	—	0603
C7, C8	0.1μF	—	—	0603
R1~R8	2.2Ω	—	—	0603
C9	39pF	—	—	0603

Notes

1. SAC5002CR5 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. The flange of package may be attached using screws, recommended torque for screw mounting is 10N-cm；
3. The surface finish of the heat sink should be better than 0.8μm, and the surface flatness must be better than 10 μm;
4. Silicon based heat sink compounds should not be used for the thermal conductive grease. They cause poor grounding of the source flange. contamination and long-term degradation of thermal resistance between the FET package and heat sink;
5. The chip is an Electrostatic Sensitive Device;
6. The maximum soldering temperature for device pins is 400 ℃/3s.

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Revision History

Revision	Date	Comment
1.0	Jul. 3, 2024	First Release

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