SAC5009CR6

GaN MMIC Power Amplifier
8GHz~12GHz 48dBm

Rev 1.0

Features

- Frequency: 8GHz~12GHz
- Small Signal Gain: 29dB
- Output Power: 48dBm
- PAE：27%
- Package Size: 25mm×13mm×5mm
- Supply Voltage: +28V/-Vg
- Package: Metal-Ceramic-Package (CR6)

Typical Applications

- Point-to-Point Radios

General Description

SAC5009CR6 is a X-band power amplifier delivering 48dBm with 27% power added efficiency from 8GHz to 12GHz. No external matching is required to achieve full X-band operation.

Electrical Performance

T_{BASE}=23℃, V_D=+28V, I_{DQ}=4.5A, Z_0=50Ω, T=1mS, Duty Cycle=10%

Parameter	Min.	Typ.	Max.	Units
Frequency Range	8	—	12	GHz
Small Signal Gain	—	29	—	dB
Power Gain	—	20	—	dB
Reverse Isolation	—	45	—	dB
RF Input Port Return Loss	—	1.8	—	：1
Output Power	—	48	—	dBm
Drain Voltage (V_D)	—	28	—	V
2nd harmonic suppression**	—	32	—	dBc
3rd harmonic suppression**	—	35	—	dBc
Gate Current	—	2	27	mA
Supply Current (I_D)*	—	—	13	A

*Adjust Vg between-2.5~-1.5V to achieve I_{DQ}= 4.5A，, and typical Vg voltage is -2V
**P_{OUT}=48dBm

Absolute Maximum Ratings

Maximum Input Power	+34dBm	Operating Temperature (T_{BASE})	-55℃~+85℃
Channel Temperature	230℃	Storage Temperature	-55℃~+165℃
Maximum V_D	+32V	V_G Range	-7V~-1.5V
ESD Tolerance Level	Class 1B，HBM		

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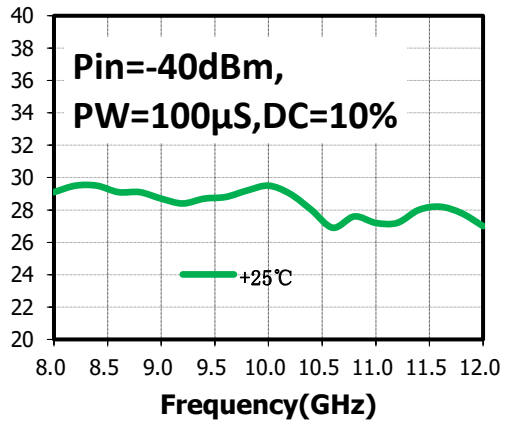
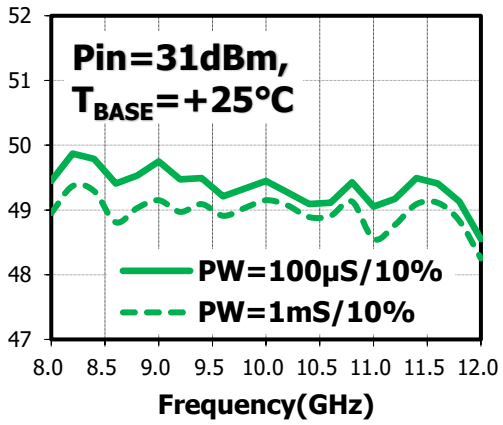
Typical Performance Curve

The following curves are taken from SAC5009CR6 evaluation board. De-embedding operation has been Implemented. VD=+28V, I_{DQ}=4.5A, T_{BASE}=+23℃

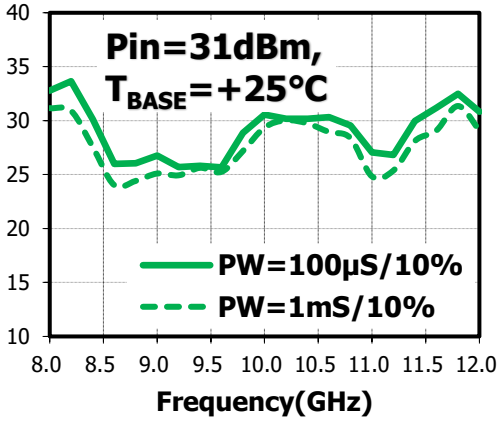
Small Signal Gain(dB) vs.Frequency



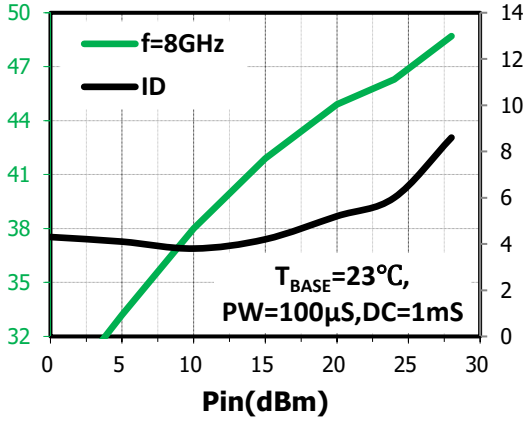
Output Power(dBm) vs.Frequency



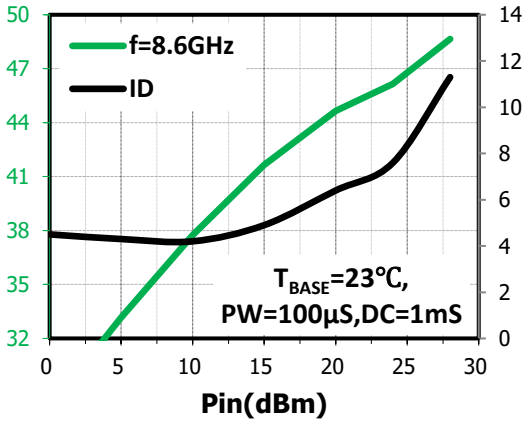
PAE(%) vs.Frequency



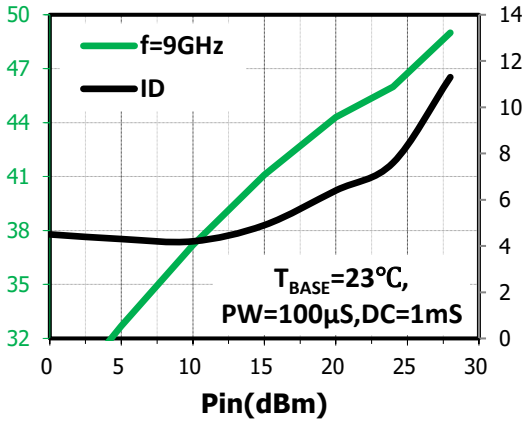
Output Power(dBm) vs.Pin,f=8GHz



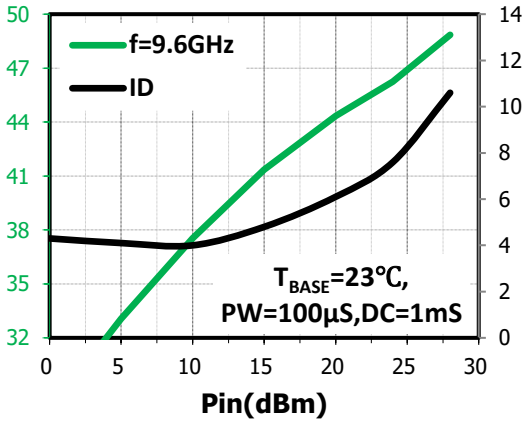
Output Power(dBm) vs.Pin,f=8.6GHz



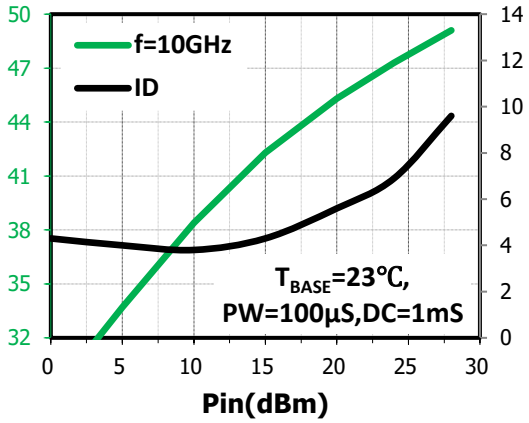
Output Power(dBm) vs.Pin,f=9GHz



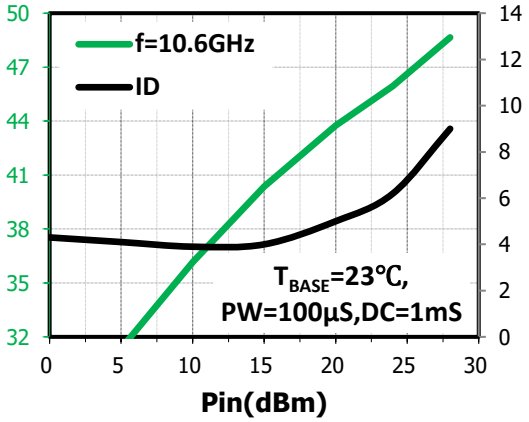
Output Power(dBm) vs.Pin,f=9.6GHz



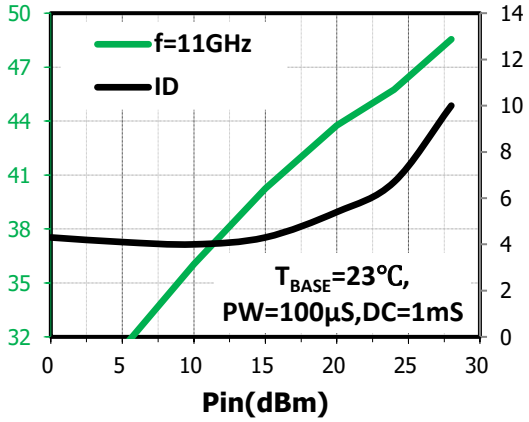
Output Power(dBm) vs.Pin,f=10GHz



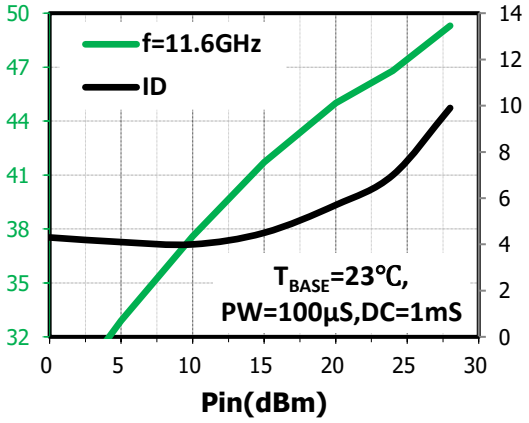
Output Power(dBm) vs.Pin,f=10.6GHz



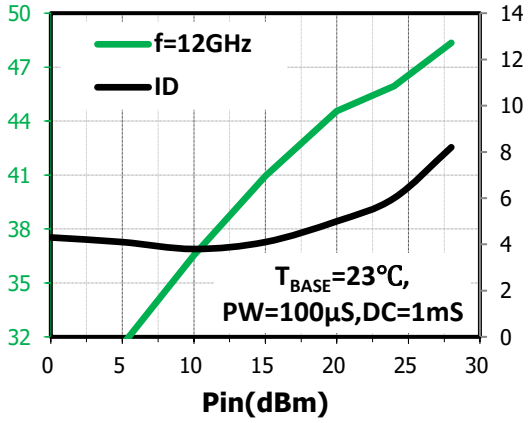
Output Power(dBm) vs.Pin,f=11GHz



Output Power(dBm) vs.Pin,f=11.6GHz



Output Power(dBm) vs.Pin,f=12GHz

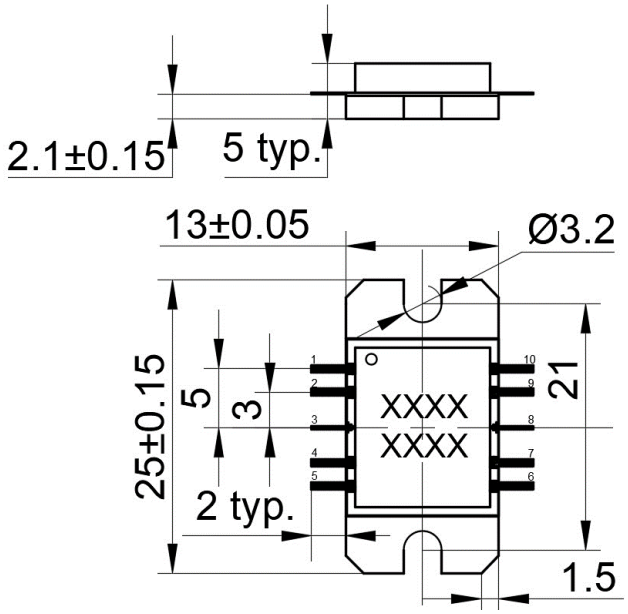


Thermal Resistance

Parameter	Conditions	Value	Unit
θ_{JC1}	VD=+28V，T_{BASE}=+70℃，Pin=+31dBm, PW=1mS, DC=10%, f=10.6GHz	1.72	℃/W

Outline Drawing

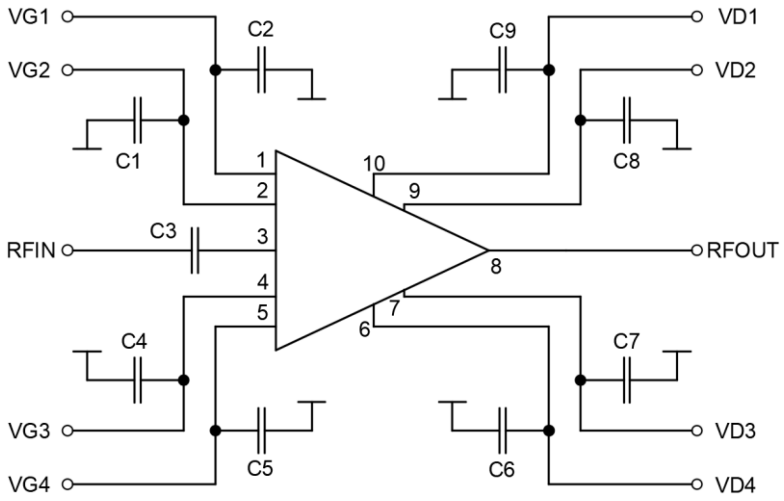
(All dimensions in mm)



Pin Descriptions

Pin No.	Function	Pin No.	Function
1	VG1	6	VD4
2	VG2	7	VD3
3	RFIN	8	RFOUT
4	VG3	9	VD2
5	VG4	10	VD1

Application Circuit



BOM

Reference Des.	Value	Part Number	Manuf.	Size
C1、C2、C4、C5	0.68μF	—	—	0603
C6、C7、C8、C9	0.022μF	—	—	0603
C3	10pF	—	—	0603

Notes

1. SAC5009CR6 requires a bias of drain positive voltage (VDx) and gate negative voltage (VGx). Before applying drain positive voltage, it is necessary to ensure that the gate negative voltage has been applied. When turning off, the drain positive voltage should be turned off first and then the gate negative voltage should be turned off;
2. For best RF performance we recommend using 0.05mm indium shim between MMIC package and heatsink, the surface finish of the heat sink should be better than 0.8μm, and the surface flatness must be better than 10μm;
3. The flange of package may be attached using screws. Torque conditions are 15N-cm for M3 screw;
4. Because of high DC power dissipation, good heat sinking is required;
5. This chip is an electrostatic sensitive device;
6. The maximum soldering temperature for device pins is 400 ℃/3s, the leads should be soldered in a staggered or star pattern from side to side, and never solder two adjacent leads. This allows the heat to dissipate on each lead, and not cause the adjacent leads to become de-soldered and damaged or displaced.

Revision History

Revision	Date	Comment
1.0	September 2, 2024	First Release