SAC5003

GaN MMIC Power Amplifier
8GHz~12GHz 46dBm

Rev 1.1

Features

- Frequency: 8GHz~12GHz
- Small Signal Gain: 30dB
- Output Power: 46.5dBm
- Power Gain:22dB
- Package: Bare die
- Supply Voltage: +28V/-Vg

Typical Applications

- Point-to-Point Radios

General Description

SAC5003 is a X-band power amplifier delivering 46.5dBm with 40% power added efficiency from 8GHz to 12GHz. No external matching is required to achieve full-band operation.

Electrical Performance

T_{BASE}=23℃, V_D=+28V, I_{DQ}=2.3A, Z_0=50Ω, Pulse Width=100μs, Duty Cycle=10%

Parameter	Min.	Typ.	Max.	Units
Frequency Range	8	—	12	GHz
Small Signal Gain	—	30	—	dB
Power Gain**	—	22	—	dB
Reverse Isolation	—	-50	—	dB
RF Input Port Return Loss	—	-12	—	dB
Output Power	—	46	—	dBm
Drain Voltage (V_D)	—	28	—	V
Gate Current	—	2	16	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
**Pin=25dBm

Absolute Maximum Ratings

Maximum Input Power	+30dBm	Operating Temperature (T_{BASE})	-55℃~+85℃
Channel Temperature	250℃	Storage Temperature	-55℃~+180℃
Maximum V_D	+32V	V_G Range	-5V~-1V
Mounting Temperature (30 seconds)	320℃		

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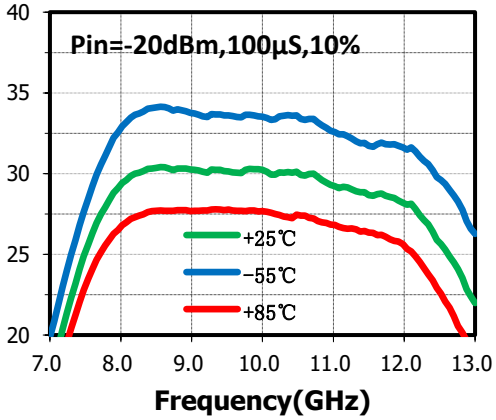
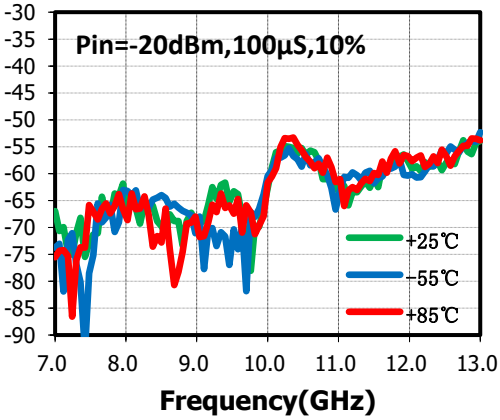
Typical Performance Curve

V_D = + 28V, I_{DQ} = 2.3A, T_{BASE} = + 23℃

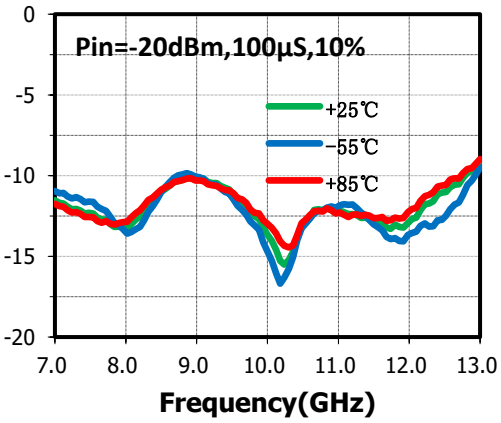
Small Signal Gain(dB) vs.Frequency



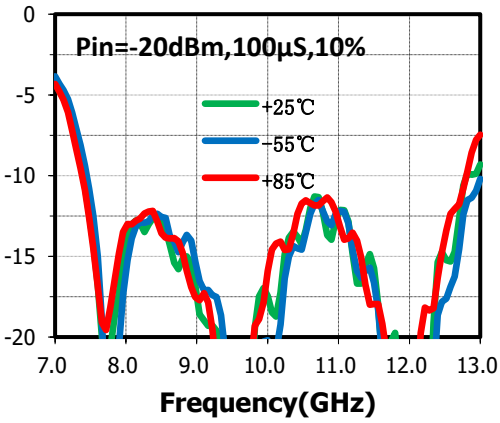
Isolation(dB) vs.Frequency



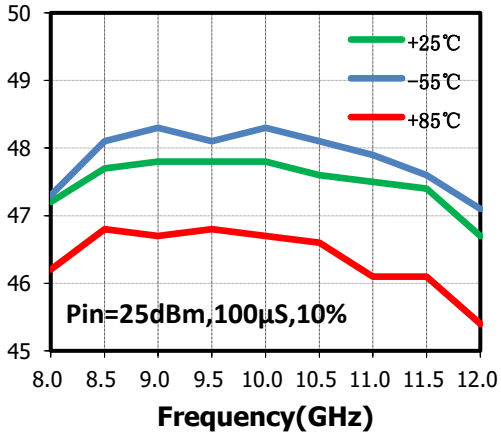
RF Input Return Loss(dB) vs.Frequency



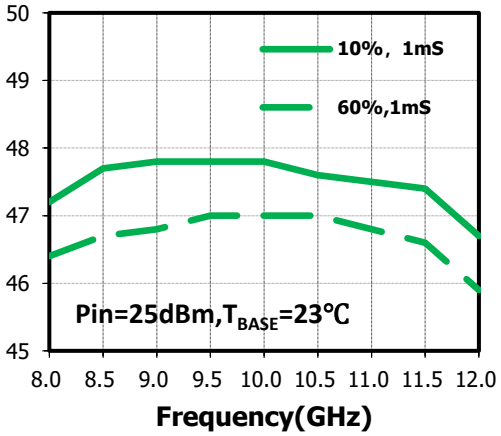
RF Output Return Loss(dB) vs.Frequency



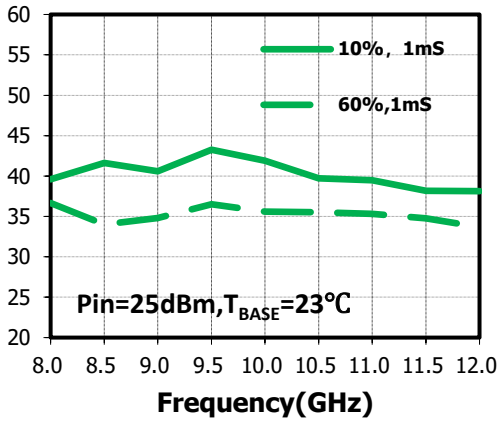
Output Power(dBm) vs.Frequency



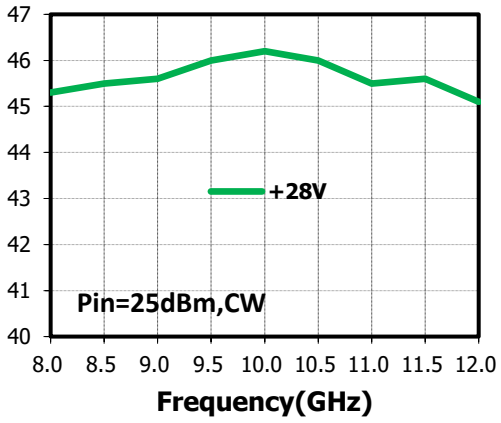
Output Power(dBm) vs.Duty Cycle



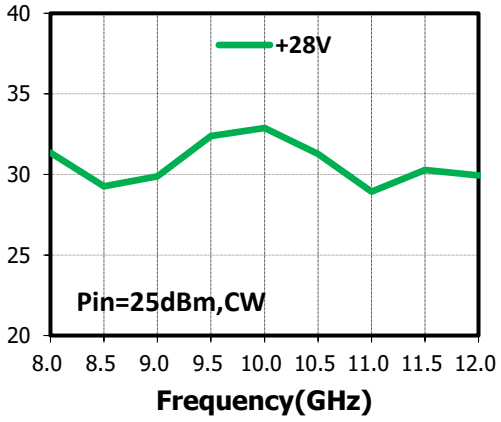
PAE(%) vs.Duty Cycle



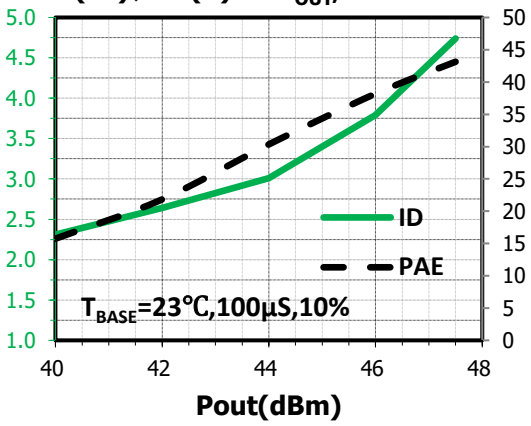
Output Power(dBm) vs.Frequency



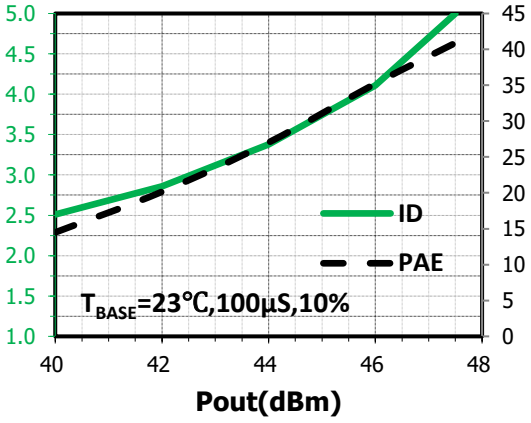
PAE(%) vs.Frequency



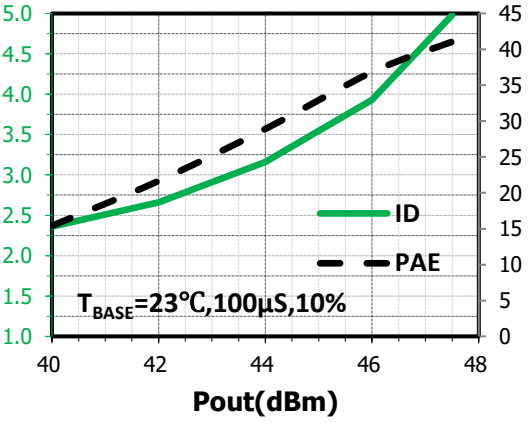
PAE(%)、ID(A) vs.P_{OUT},f=8GHz

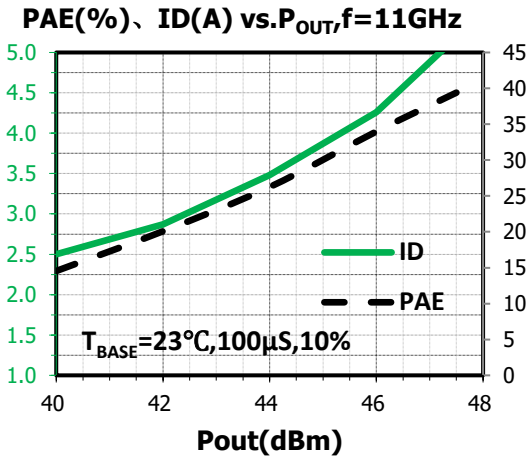


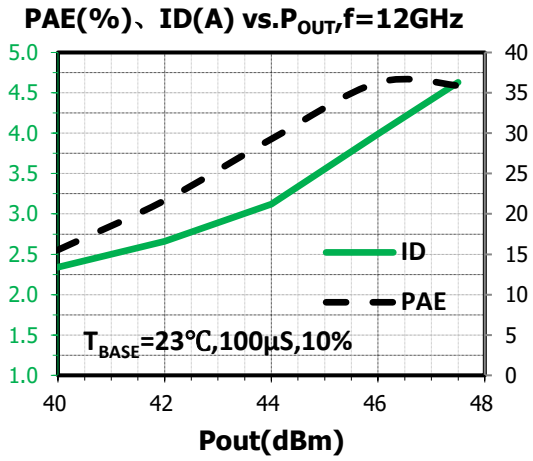
PAE(%)、ID(A) vs.P_{OUT},f=9GHz



PAE(%)、ID(A) vs.P_{OUT},f=10GHz







Thermal Resistance

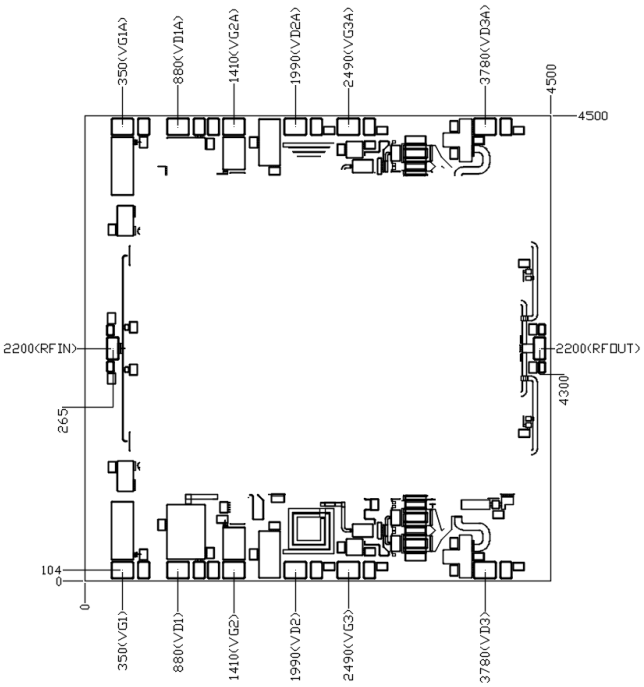
Parameter	Conditions	Value	Unit
θ_{JC1}	VD=+28V， T_{BASE}=+70℃， Pin=+25dBm, CW, f=10GHz	1.52	℃/W

Electrostatic Discharge (ESD) Ratings

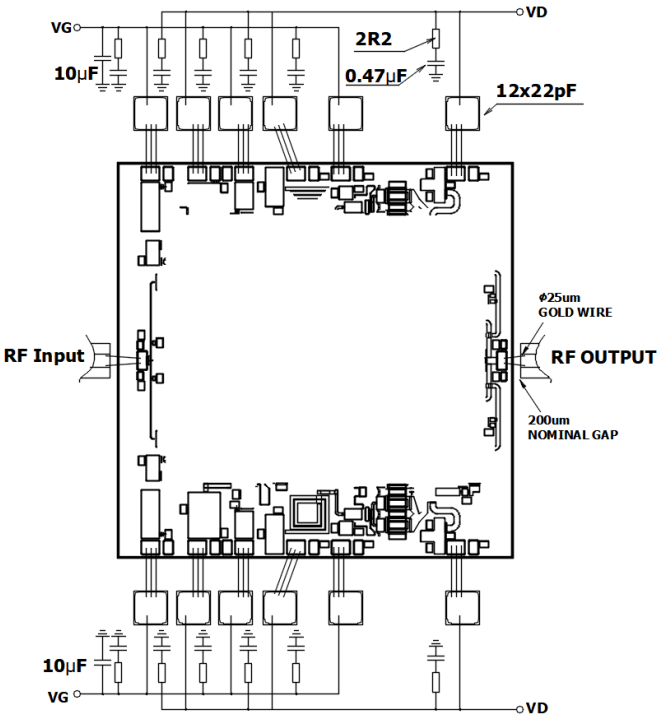
ESD Model	Conditions	Withstand Threshold (V)	Class
HBM	Human body model (HBM) per ANSI/ESDA/JEDEC JS-001	500	1B

Bare Die Outline

(μm)



Application Circuit



Notes

1. SAC5003 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	Mar. 30, 2024	First Release
1.1	Apr.17,2024	After modifying the evaluation plate heat sink structure and retesting the duty cycle of 60%/1mS working conditions and CW working conditions, the corresponding curve was updated and CW working condition test data was added; Corrected thermal resistance data.