

SAC5003Q7



GaN MMIC Power Amplifier
8GHz~12GHz 45dBm

Rev 1.0

Features

- Frequency: 8GHz~12GHz
- Small Signal Gain: 28dB
- Output Power: 45dBm
- Power Gain: 20dB
- Package size: 7mmx7mmx1.3mm
- Supply Voltage: +28V/-Vg

Typical Applications

- Point-to-Point Radios

General Description

SAC5003Q7 is a X-band power amplifier delivering 45dBm with 25% power added efficiency from 8GHz to 12GHz.

Electrical Performance

$T_{BASE}=23^{\circ}C$, $V_D=+28V$, $I_{DQ}=2.3A$, $Z_0=50\Omega$, Pulse Width=100 μ s, Duty Cycle=10%

Parameter	Min.	Typ.	Max.	Units
Frequency Range	8	—	12	GHz
Small Signal Gain	—	28	—	dB
Power Gain**	—	20	—	dB
Reverse Isolation	—	-50	—	dB
RF Input Port Return Loss	—	-12	—	dB
Output Power	—	45	—	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 $I_{DQ}=2.3A$, and typical Vg voltage is -2V

**Pin=25dBm

Absolute Maximum Ratings

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

SuperApex, LLC

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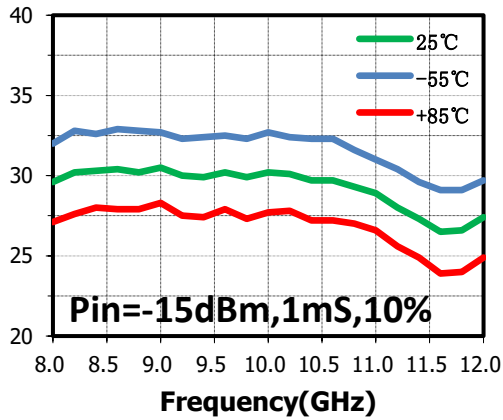
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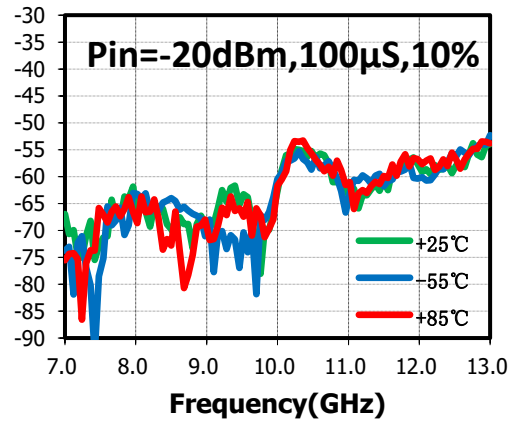
Typical Performance Curve

$V_D = +28V, I_{DQ} = 2.3A, T_{BASE} = +23^\circ C$

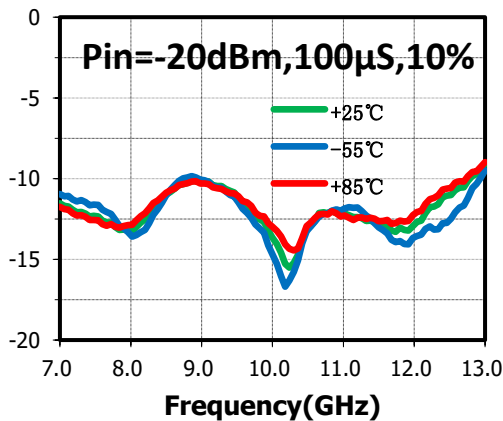
Small Signal Gain(dB) vs.Frequency



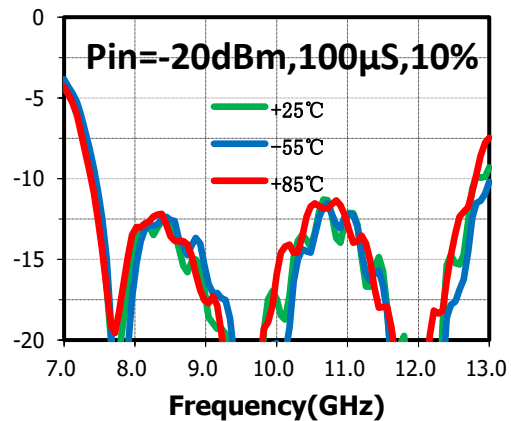
Isolation(dB) vs.Frequency



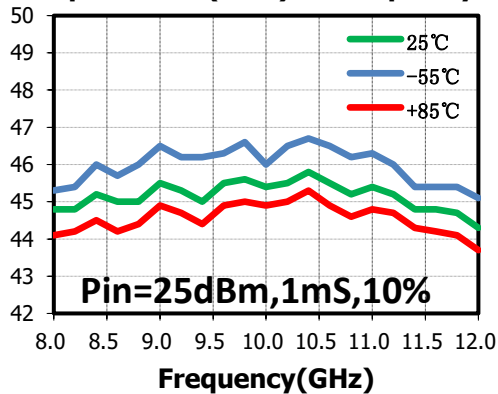
RF Input Return Loss(dB) vs.Frequency



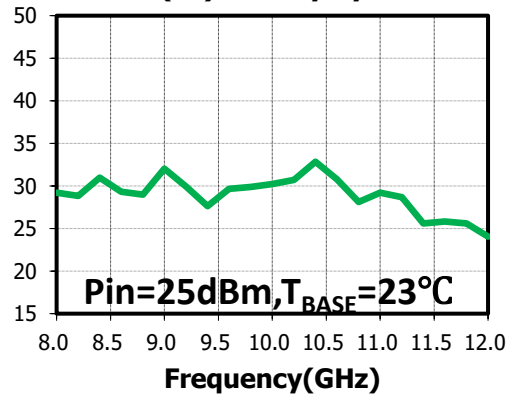
RF Output Return Loss(dB) vs.Frequency



Output Power(dBm) vs.Frequency



PAE(%) vs.Duty Cycle



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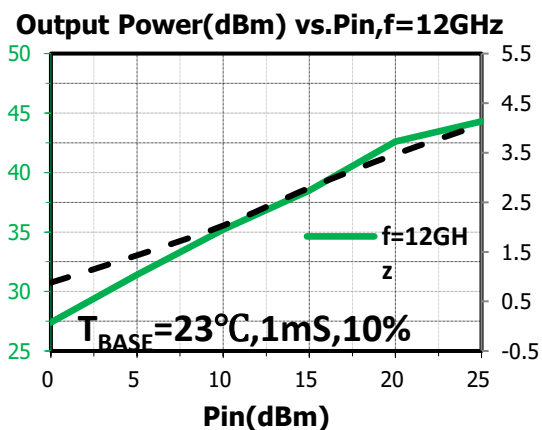
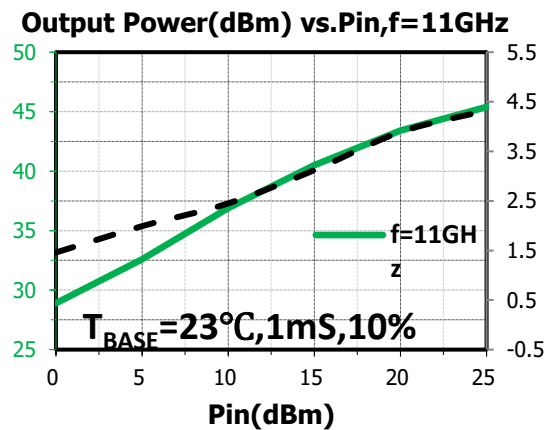
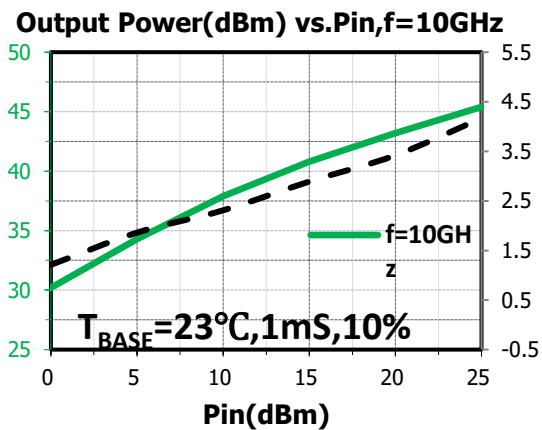
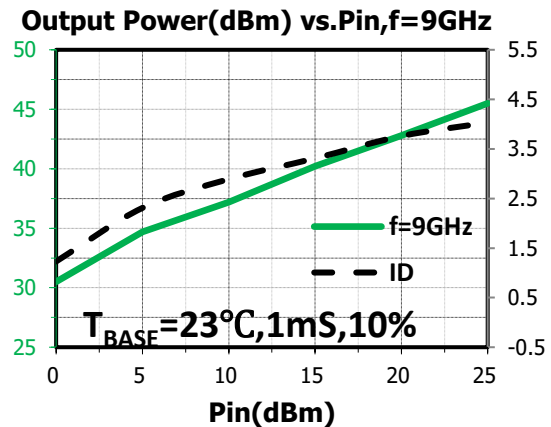
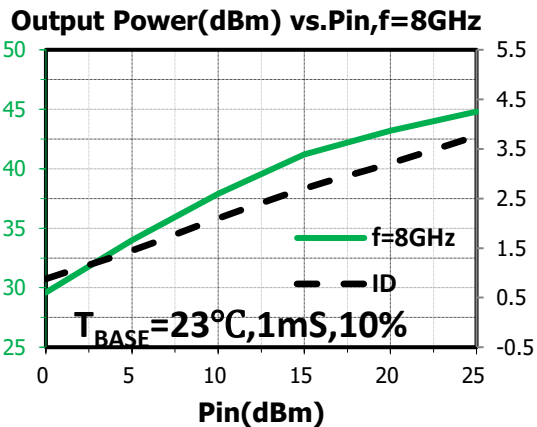
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Thermal Resistance

Parameter	Conditions	Value	Unit
θ_{JC1}	VD=+28V, $T_{BASE}=+70^{\circ}C$, Pin=+25dBm, CW, f=10GHz	1.82	$^{\circ}C/W$

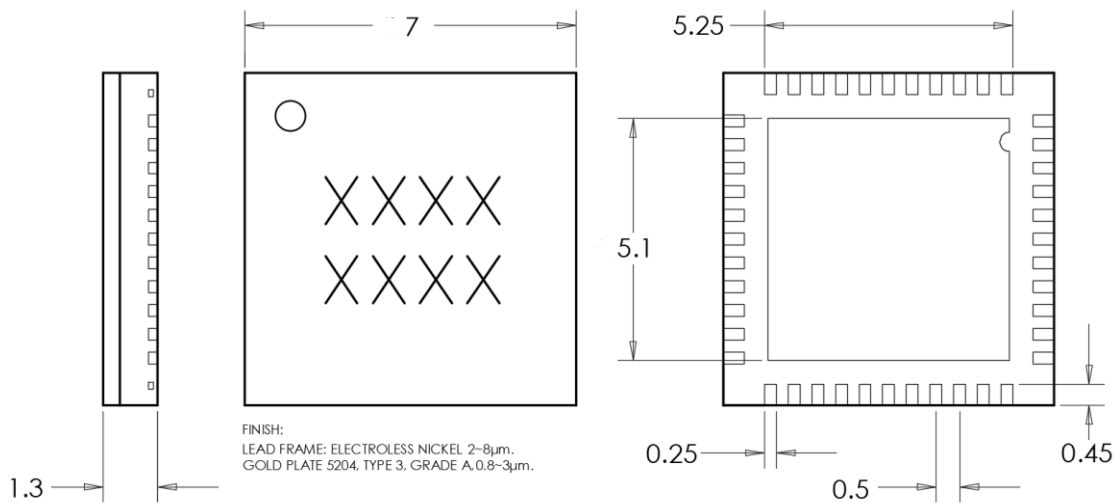
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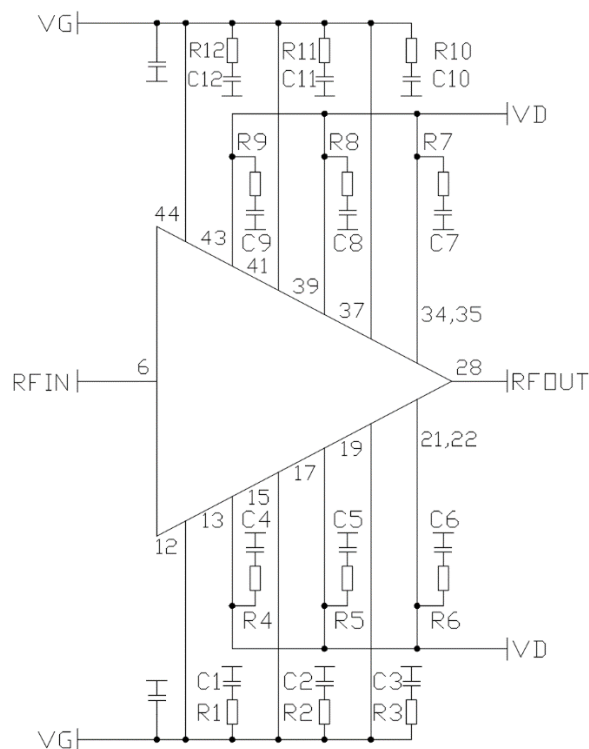
Electrostatic Discharge (ESD) Ratings

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

Outline Dimension (mm)



Application Circuit



Pin Descriptions

Pin No.	Function	Pin No.	Function	Pin No.	Function	Pin No.	Function	Pin No.	Function
1	GND	15	VG2A	29	GND	43	VD1B		
2	GND	16	GND	30	GND	44	VG1B		
3	GND	17	VD2A	31	GND				
4	GND	18	GND	32	GND				
5	GND	19	VG3A	33	GND				
6	RFIN	20	GND	34	VD3B				
7	GND	21	VD3A	35	VD3B				
8	GND	22	VD3A	36	GND				
9	RFIN	23	GND	37	VG3B				
10	GND	24	GND	38	GND				
11	GND	25	GND	39	VD2B				
12	VG1A	26	GND	40	GND				
13	VD1A	27	GND	41	VG2B				
14	GND	28	RFOUT	42	GND				

Notes

1. SAC5003Q7 requires VDx and VGx bias.

Turn-on: Apply VGx, Apply VDx, Apply RFIN signal.

Turn-off: Remove RFIN signal, Decrease VG to -1.5 V (pinch-off), Decrease VD to 0 V

- The moisture resistant grade of products is 2a, the storage environment $\leq 30^{\circ}\text{C}/60\% \text{RH}$, the surrounding workshop life is 4 weeks;
- After un-packing, it is necessary to bake the parts for 6 hours in $125\pm 5^{\circ}\text{C}$ environment before soldering;
- GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test;
- Ultrasonic cleaning is prohibited.

Revision History

Revision	Date	Comment
1.0	Jul. 18, 2024	First Release