SAC3163QP5

GaN Power Amplifier
9KHz~6GHz 35dBm

Rev 1.2

Features

- Frequency: 9KHz~6GHz
- Small Signal Gain: 14dB
- Output Power: 35dBm
- PAE: 38%@6GHz
- Package Size: 5mm×5mm×0.75mm
- Supply Voltage: +28V/-Vg

Typical Applications

- Point-to-Point Radios

General Description

SAC3163QP5 is a broadband power amplifier operates from 9KHz~6GHz and provides 35dBm of saturated output power with 14dB of large signal gain and greater than 40% power-added efficiency.

Electrical Performance

T_{BASE}=23℃, V_D=+28V, I_{DQ}=100mA, Z_0=50Ω, CW

Parameter	Min.	Typ.	Max.	Units
Frequency Range	0.000009	—	6	GHz
Small Signal Gain	8	15	—	dB
Power Gain	—	10	—	dB
Reverse Isolation	—	35	—	dB
VSWRi	—	2	3.5	:1
Output Power	34	35	—	dBm
Drain Voltage (V_D)	—	28	—	V
Gate Current	—	—	5	mA
Supply Current (I_D)*	—	—	1	A

*Adjust Vg between -2.8V to -1.5V to achieve I_{DQ}= 100mA, and typical Vg voltage is -2.4V

Absolute Maximum Ratings

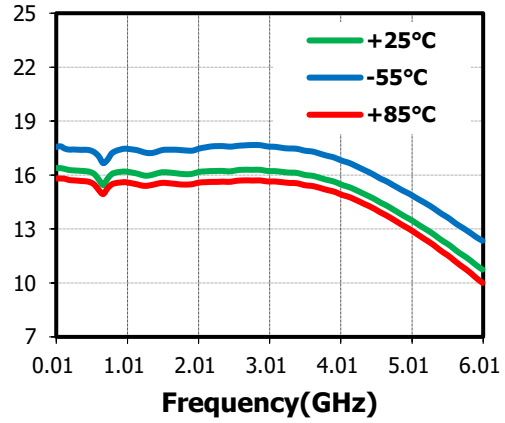
Maximum Input Power	+30dBm	Operating Temperature (T_{BASE})	-55℃~+85℃
Channel Temperature	230℃	Storage Temperature	-55℃~+180℃
Maximum V_D	+40V	V_G Range	-5V~-1.5V
Mounting Temperature	260℃,20s		

SuperApex, LLC
2801 Lakeside Drive, Suite 208, Bannockburn, IL 60015, USA
Tel: 1-847-505-8319, 1-847-573-9866
E-mail: sales@superapexco.com
Website: www.superapexco.com

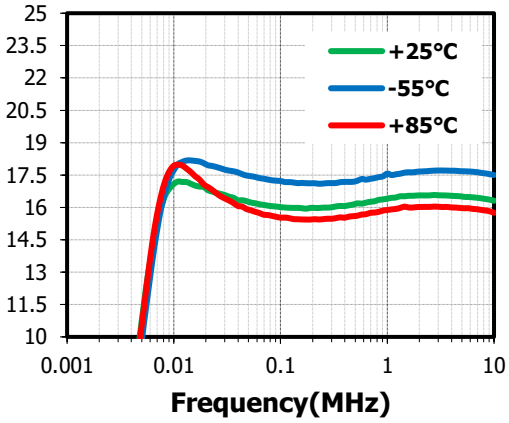
Typical Performance Curve

The following data was tested using the SAC3163QP5 evaluation board, V_D=+28V, I_{DQ}=100mA, T_{BASE}=+23℃, Application Circuit 1(9KHz~6GHz)

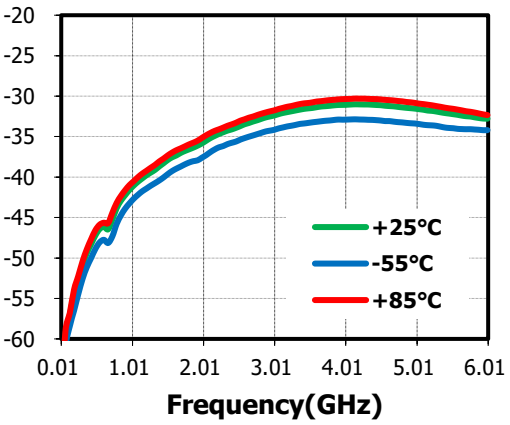
Small Signal Gain(dB) vs.Temperature



Small Signal Gain(dB) vs.Temperature



Reverse Isolation(dB) vs.Temperature



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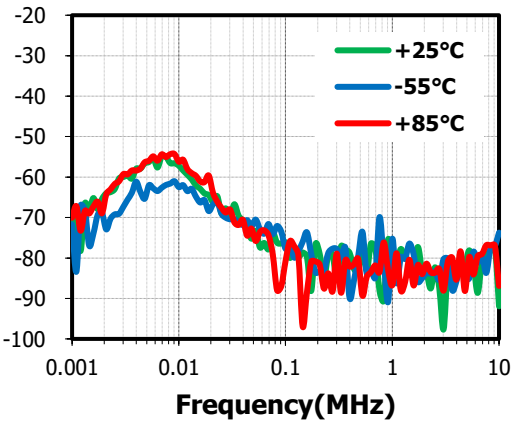
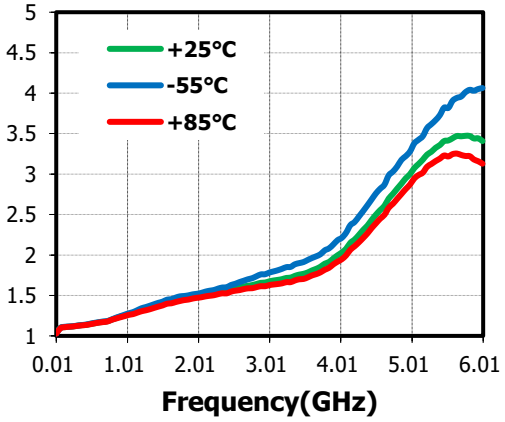


Input VSWR(:1) vs.Temperature



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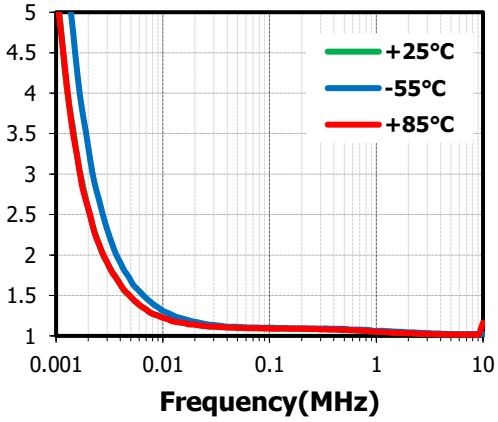
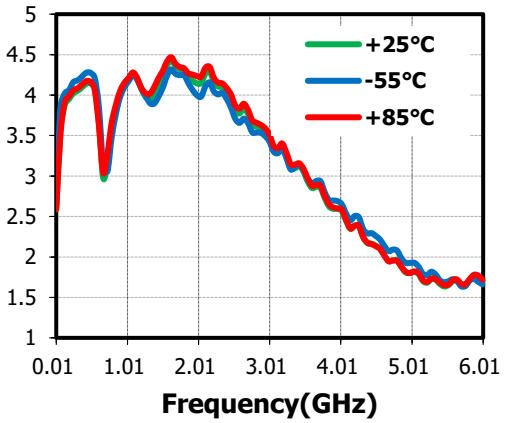
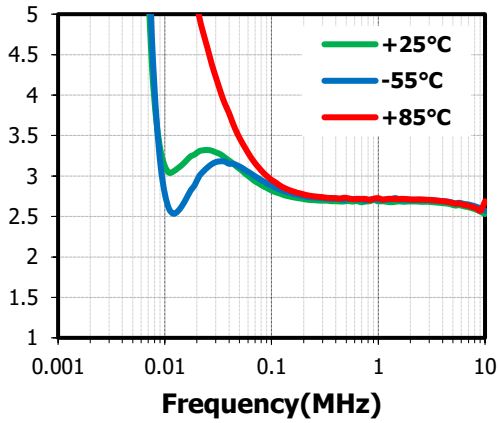


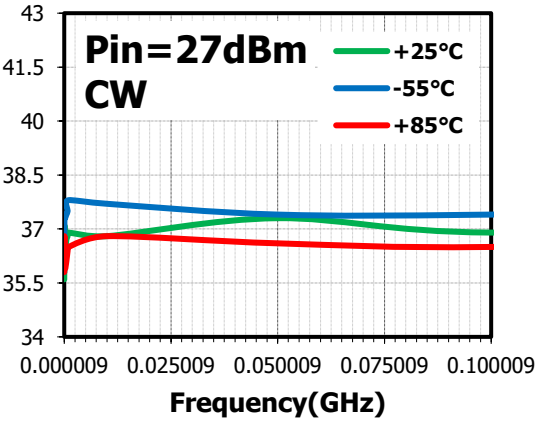
Output VSWR(:1) vs.Temperature



Output VSWR(:1) vs.Temperature



Output Power(dBm) vs.Temperature



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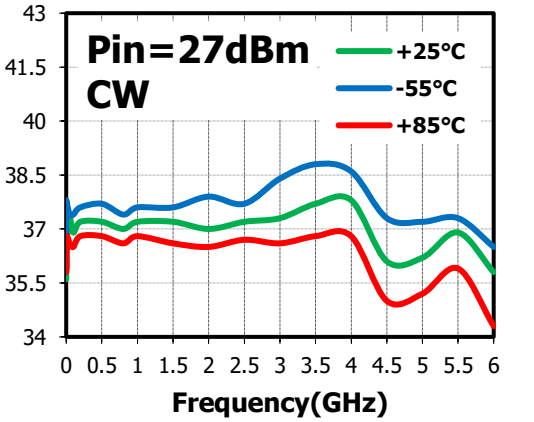
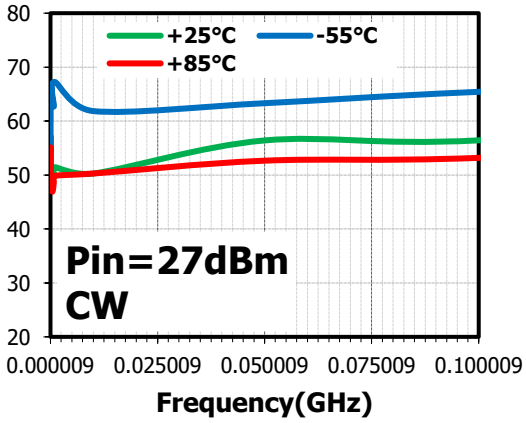


PAE(%) vs.Temperature



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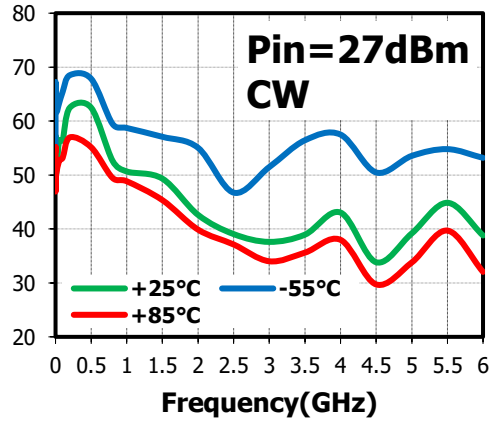

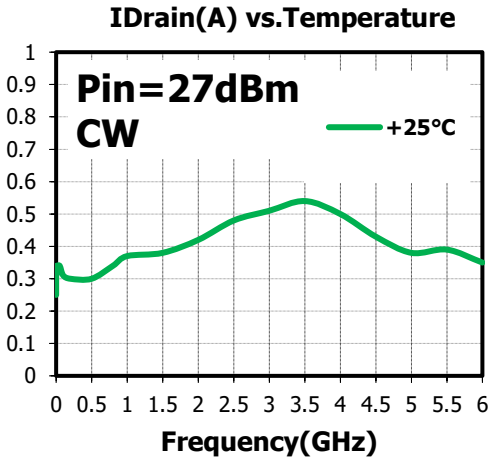

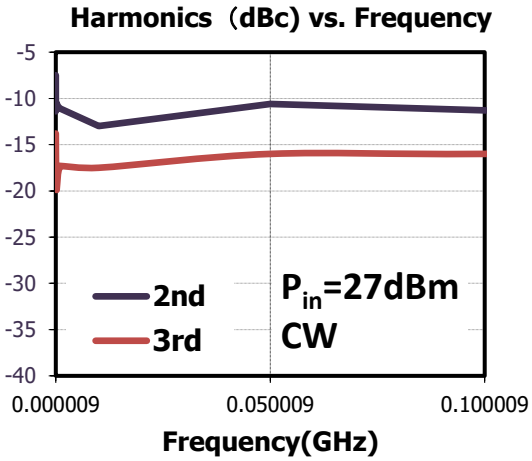

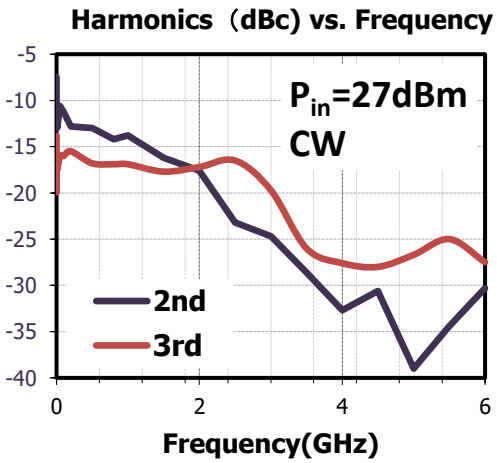

Thermal Resistance

Parameter	Conditions	Value	Unit
θ_{JC1}	V_D=+28V， T_{BASE}=+70℃， Pin=+27dBm, CW, f=1GHz	8.1	℃/W

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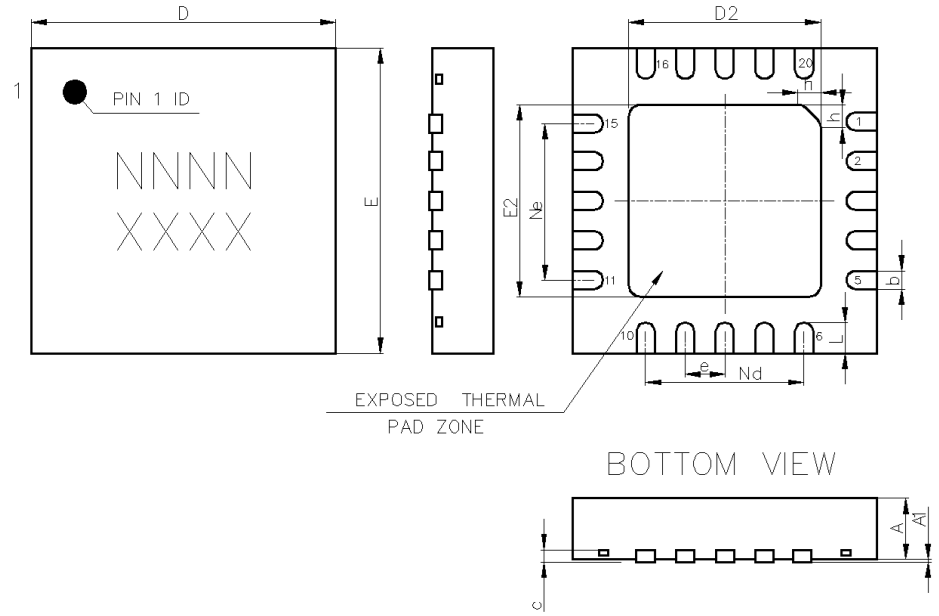
Outline Drawing



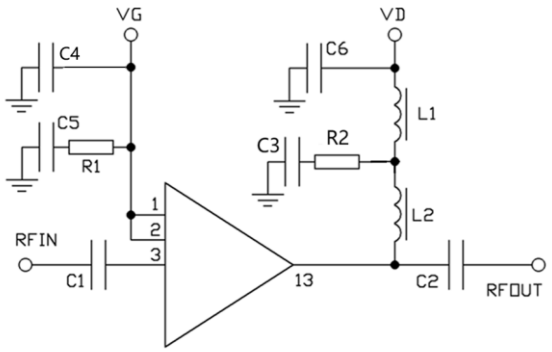
SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.8	1.4
A1	--	0.02	0.05
b	0.25	0.30	0.35
c		0.203REF	
D	4.90	5.00	5.10
D2	3.05	3.15	3.25
e		0.65BSC	
Ne		2.60BSC	
Nd		2.60BSC	
E	4.90	5.00	5.10
E2	3.05	3.15	3.25
L	0.45	0.50	0.55
h	0.25	0.30	0.35

Pin Function

Pin No.	Description	Pin No.	Description
1	Gate	15	GND
2	Gate	16	GND
3	RFIN (DC Coupled)	17	GND
4	GND	18	GND
5	GND	19	GND
6	GND	20	GND
7	GND		
8	GND		
9	GND		
10	GND		
11	GND		
12	GND		
13	RFOUT/Drain feed		
14	GND		

Application Circuit 1

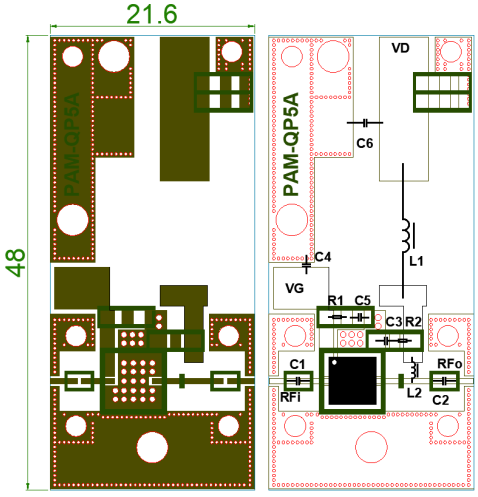
(9KHz~6GHz)



Components List

Reference Des.	Value	Part Number	Manuf.	Size
C1、C2	2.2μF	GRM188R61H225KE11D	Murata	0603
C5	22μF	—	—	0805
R1	3.9Ω	—	—	0805
R2	240 Ω	—	—	0805
L1	1mH	YPRH1508-102M	YJYCOIN	YPRH1508
L2	900nH	1008AF-901	Coilcraft	1008
C6	22μF	—	—	1812
C3	8200pF	—	—	0805
C4	47μF	—	—	1206

SAC3163QP5 Evaluation Board



The Evaluation board is a 2-layers board fabricated using Rogers 4350 t=0.254 and using best practices for

high frequency RF design. The RF input and RF output traces have a 50 Ω characteristic impedance.

The bottom center pad of SAC3163QP5 is used for RF grounding and heat dissipation. For best heat dissipation, copper-filled vias are highly recommended, SAC3163QP5 is high power dissipation surface mount components and require a well-designed thermal mount. All the heat generated by the device is expected to be removed through the bottom heat slug with a low thermal resistance path to the chassis. The use of multiple copper-filled vias or solder-filled vias under the package's heat slug while using an indium foil between the PCB and chassis provides a low thermal resistance mount, Insufficient number of vias or insufficient solder filling will significantly affect the heat dissipation process of the device, and then reduce the performance or even damage the device.

Notes

1. SAC3163QP5 requires a positive drain voltage (VDx) and a negative gate voltage (VGx) bias. Before applying the positive drain voltage, it is necessary to ensure that the negative gate voltage has been applied. When turning off, it is necessary to ensure that the positive drain voltage is turned off before the negative gate voltage.
2. When using packaged products, try to use thin RF boards and increase the number of groundings vias at the bottom of the device to reduce grounding inductance.
3. Remove the vacuum packaging and bake at 125+/-5 ℃ for 6 hours before soldering.

Revision History

Revision	Date	Comment
1.0	Nov 02, 2025	First Release
1.1	Nov 13, 2025	1.Change L2 model from 4310LC-132 to 1008AF-901; 2.Updated Application Circuit 1; 3.Updated Components List; 4.Updated SAC3163QP5 Evaluation Board layout
1.2	Dec 1,2025	1.Updated Application Circuit 1, Added R2, C3, C4

SuperApex, LLC
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