SAC3127AQP6

GaAs MMIC Power Amplifier
27.5GHz~30GHz 35.5dBm

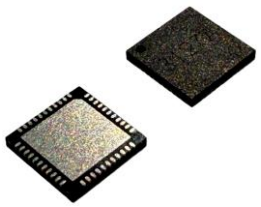
Rev1.1

Features

- Frequency: 27.5GHz~30GHz
- Gain: 25dB
- Output P_{-1}dB: 35.5dBm
- Supply Voltage: +5~6.5V/-VG
- Power-Added Efficiency: 25%@P_{-1}dB
- IM3 Level: -25dBc @ P_{OUT} 25 dBm/tone
  -20dBc @ P_{OUT} 29 dBm/tone
- Package: Over molding QFN6x6

Typical Applications

- Microwave radio
- SatCom
- VSAT



General Description

SAC3127AQP6 is a Ka-band GaAs power amplifier. SAC3127AQP6 provides 25 dB of gain, and 35.5 dBm of output power for 1 dB compression from a +6V supply.

SAC3127AQP6 is housed inside a low-cost RoHS compliant QFN6x6 industry standard over molding package.

Electrical Performance

T_A=25℃, V_D=+6V, I_D=2.5A, Z_0=50Ω, CW

Parameter	Min.	Typ.	Max.	Units
Frequency Range		27.5~30		GHz
Small Signal Gain	23	25	—	dB
Small Signal Gain Flatness	—	±1	±2	dB
Reverse Isolation	—	-47	—	dB
Input VSWR	—	2	3.5	:1
Power-Added Efficiency	—	25	—	%
Output Power for 1 dB Compression (OP_{-1}dB)	35.5	36	—	dBm
Drain Voltage (V_D)	5	—	6.5	V
Gate Current (I_G)	—	5	28	mA
Supply Current (I_D)	—	3	3.7	A
Thermal Resistance	—	3.8	—	℃/W

Absolute Maximum Ratings

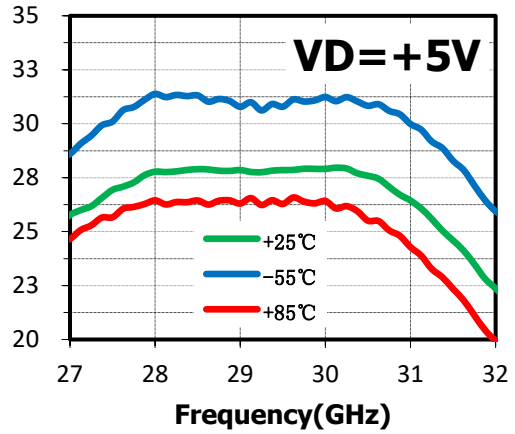
Maximum Input Power	+24dBm	Operating Temperature	-55℃~+85℃
Channel Temperature	+150℃	Storage Temperature	-65℃~+150℃
Maximum V_D	+7V	Maximum V_G	-3V(Pinch-off)

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

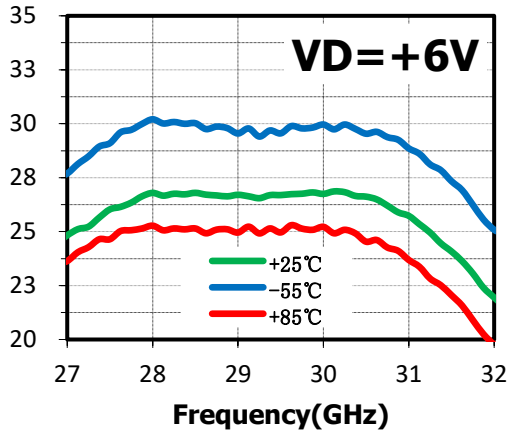
Typical Performance Curve

V_D=+6V I_D=2.5A CW

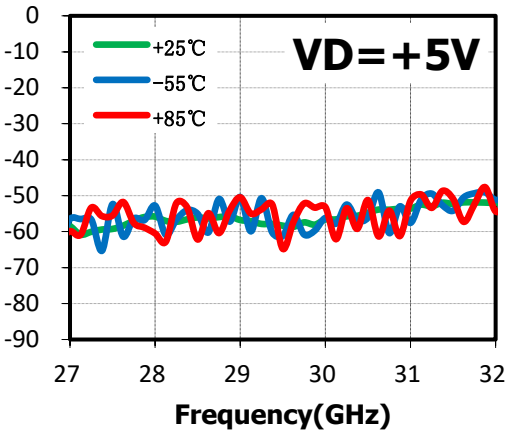
Small Signal Gain(dB)vs.Temperature



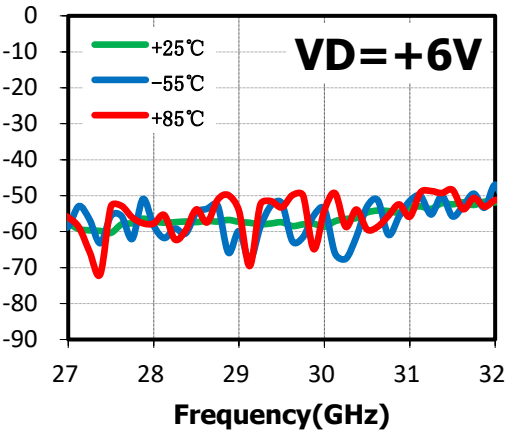
Small Signal Gain(dB)vs.Temperature



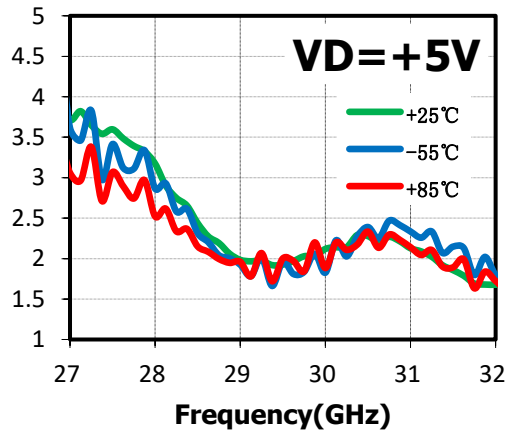
Isolation(dB)vs.Temperature



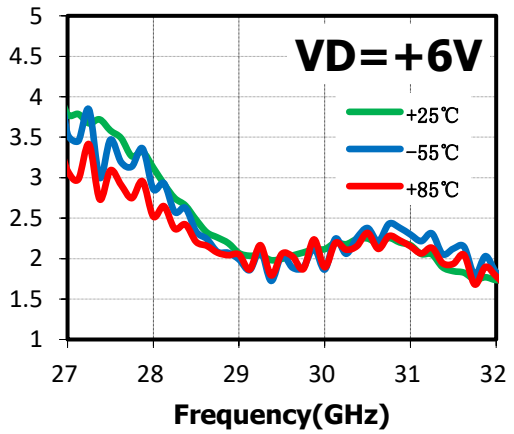
Isolation(dB)vs.Temperature



VSWRi(:1)

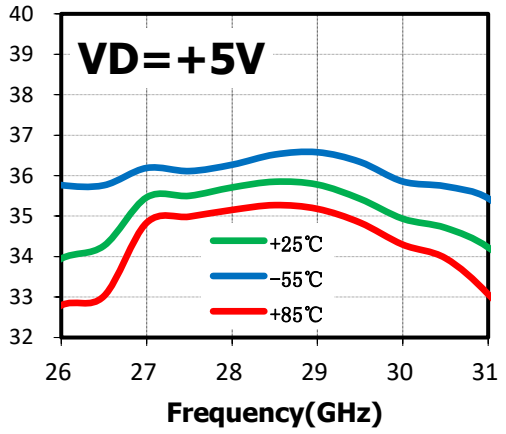


VSWRi(:1)

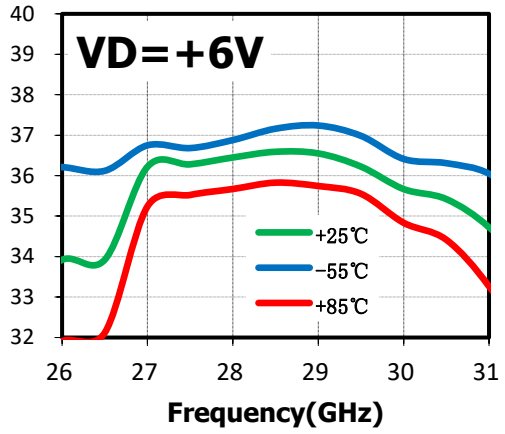


SuperApex, LLC
2801 Lakeside Drive, Suite 208, Bannockburn, IL 60015, USA
Tel: 1-847-505-8319, 1-847-573-9866
E-mail: sales@superapexco.com
Website: www.superapexco.com

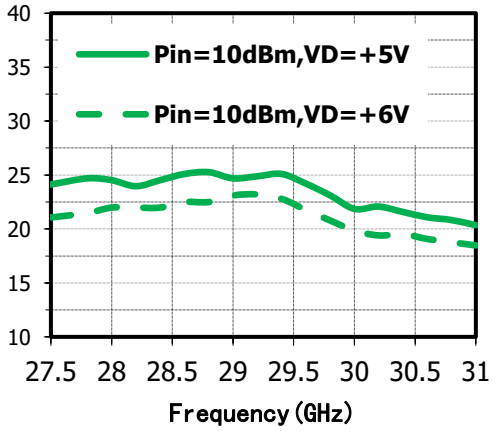
Output P-1dB(dBm)vs.Temperature



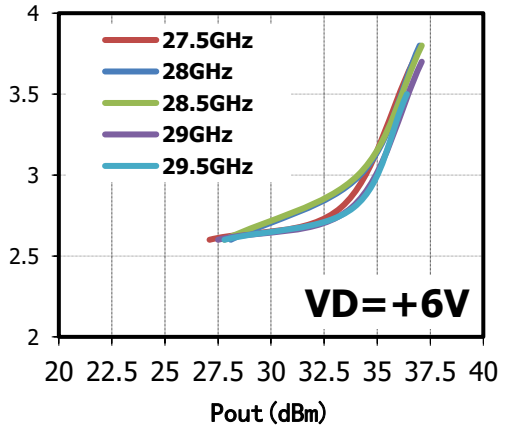
Output P-1dB(dBm)vs.Temperature



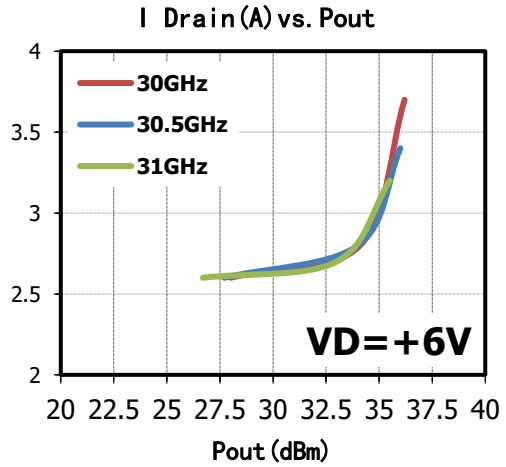
PAE (%) vs. Frequency



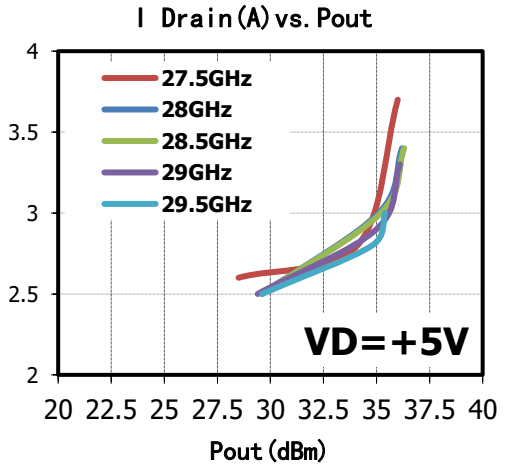
I Drain (A) vs. Pout

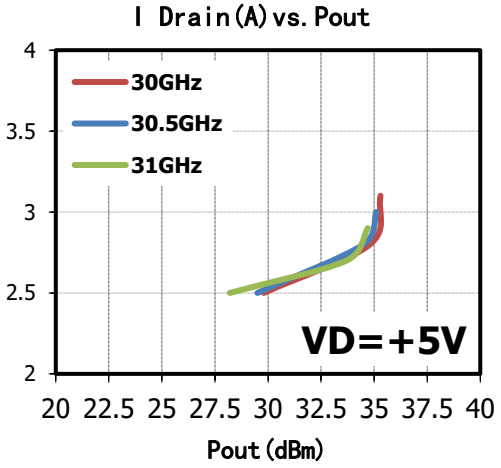


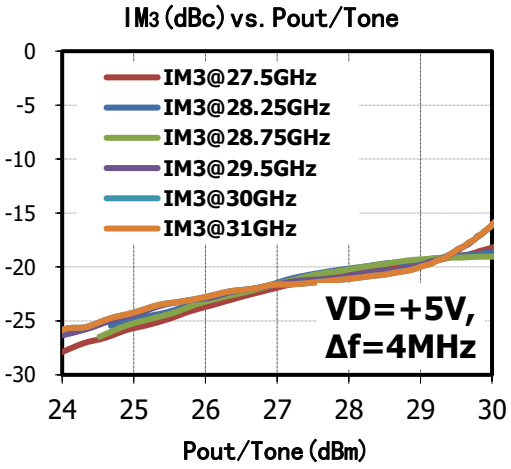
I Drain (A) vs. Pout

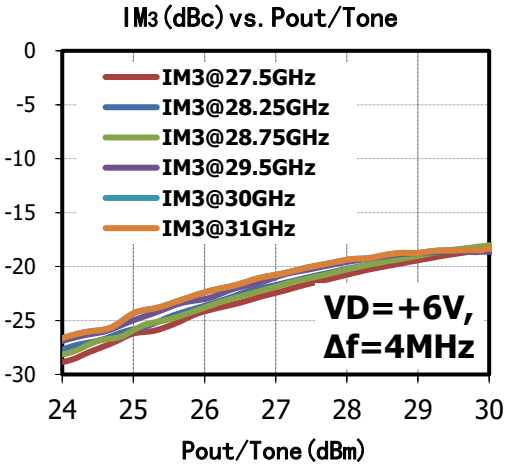


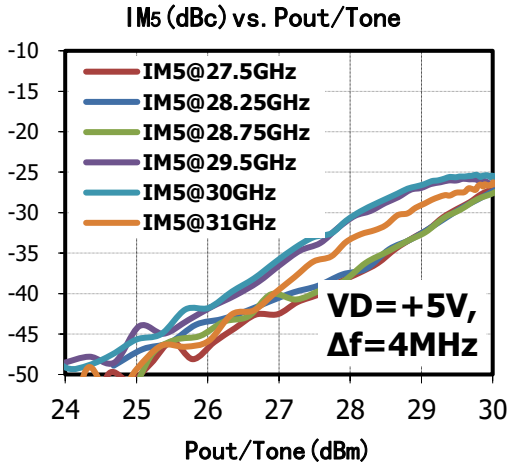
I Drain (A) vs. Pout

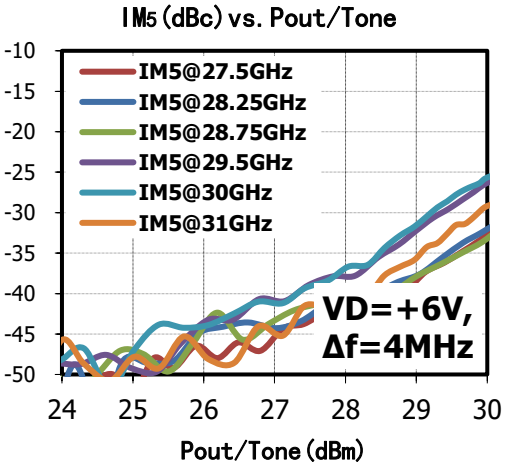



I Drain(A) vs. Pout
30GHz
30.5GHz
31GHz
VD=+5V
Pout (dBm)

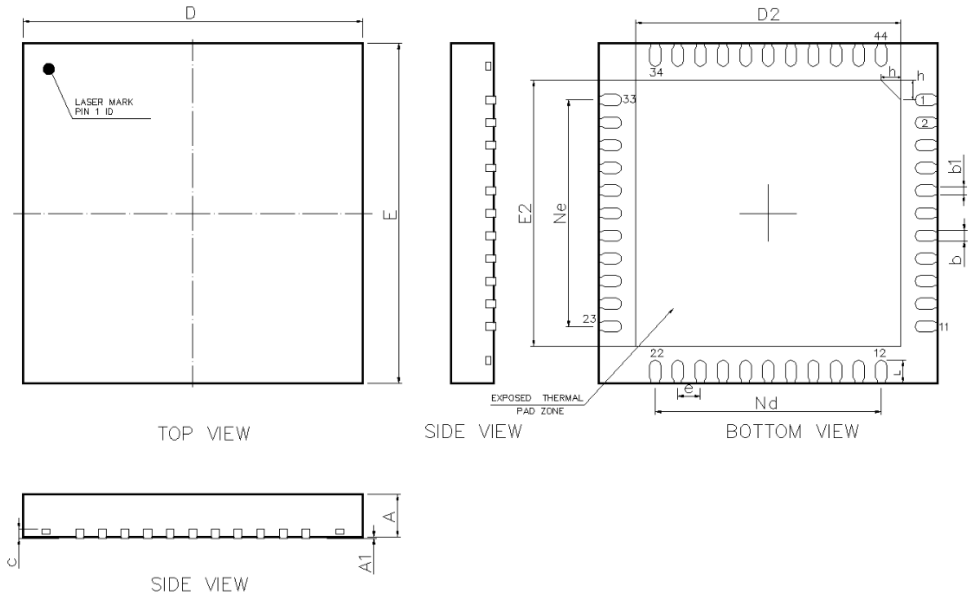

IM3 (dBc) vs. Pout/Tone
IM3@27.5GHz
IM3@28.25GHz
IM3@28.75GHz
IM3@29.5GHz
IM3@30GHz
IM3@31GHz
VD=+5V,
Δf=4MHz
Pout/Tone (dBm)


IM3 (dBc) vs. Pout/Tone
IM3@27.5GHz
IM3@28.25GHz
IM3@28.75GHz
IM3@29.5GHz
IM3@30GHz
IM3@31GHz
VD=+6V,
Δf=4MHz
Pout/Tone (dBm)


IM5 (dBc) vs. Pout/Tone
IM5@27.5GHz
IM5@28.25GHz
IM5@28.75GHz
IM5@29.5GHz
IM5@30GHz
IM5@31GHz
VD=+5V,
Δf=4MHz
Pout/Tone (dBm)

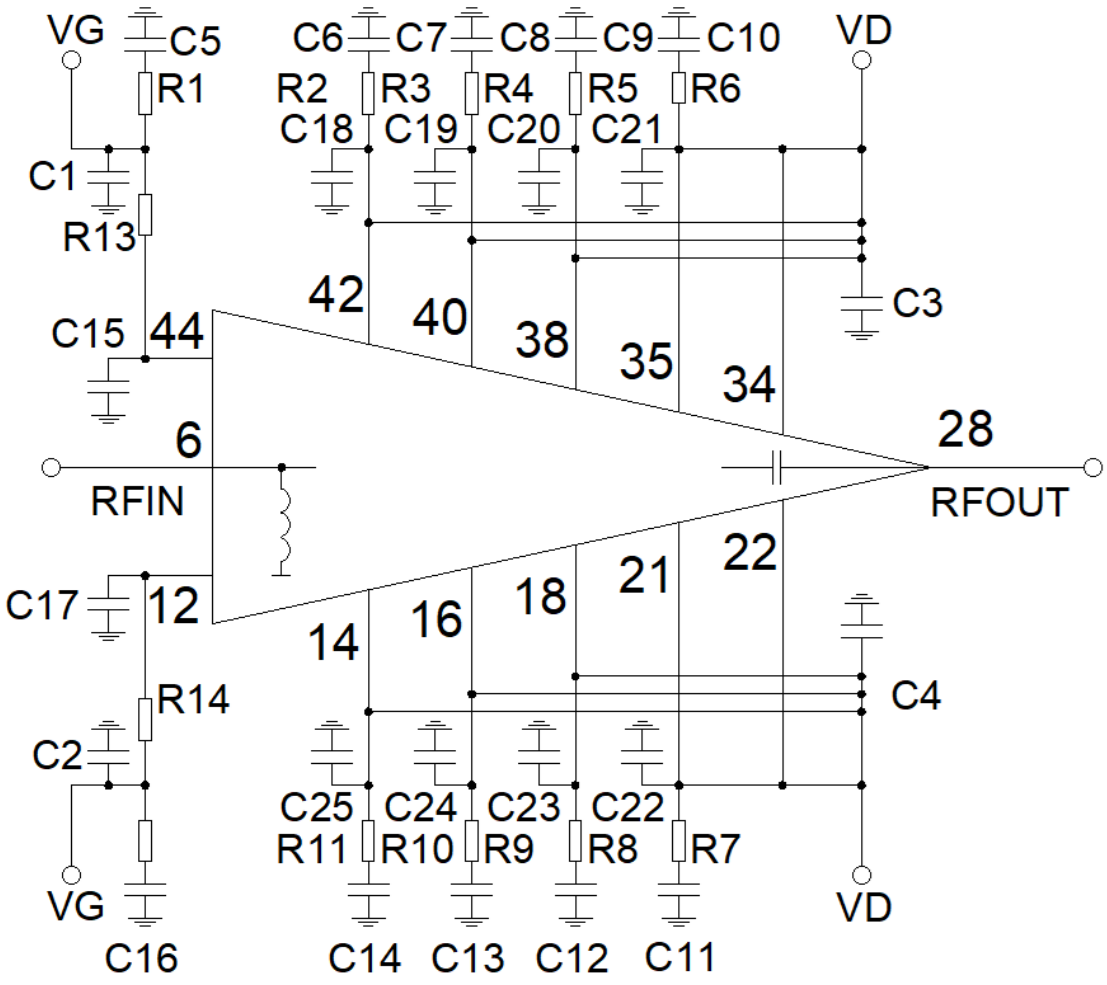

IM5 (dBc) vs. Pout/Tone
IM5@27.5GHz
IM5@28.25GHz
IM5@28.75GHz
IM5@29.5GHz
IM5@30GHz
IM5@31GHz
VD=+6V,
Δf=4MHz
Pout/Tone (dBm)

Outline Dimension (mm)



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	--	0.02	0.05
b	0.15	0.20	0.25
b1		0.14REF	
c		0.203REF	
D	5.90	6.00	6.10
D2	4.60	4.70	4.80
e		0.40BSC	
Ne		4.00BSC	
Nd		4.00BSC	
E	5.90	6.00	6.10
E2	4.60	4.70	4.80
L	0.35	0.40	0.45
h	0.30	0.35	0.40

Application Circuit



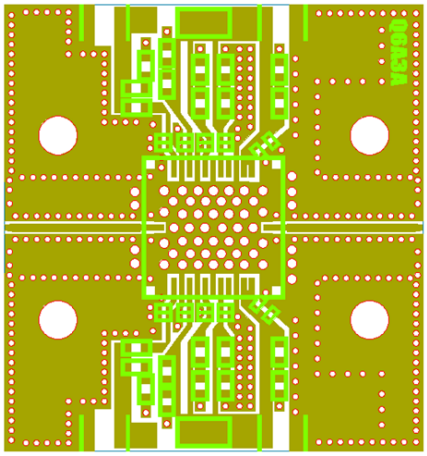
Pin Descriptions

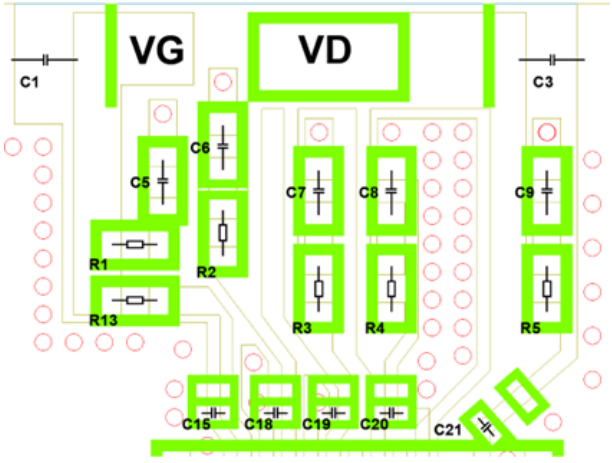
Pin No.	Function	Pin No.	Function	Pin No.	Function	Pin No.	Function	Pin No.	Function
1	GND	15	GND	29	GND	43	GND		
2	GND	16	VD2	30	GND	44	VG		
3	GND	17	GND	31	GND				
4	GND	18	VD3	32	GND				
5	GND	19	NC	33	GND				
6	RF INPUT	20	GND	34	VD4				
7	GND	21	VD4	35	VD4				
8	GND	22	VD4	36	GND				
9	GND	23	GND	37	NC				
10	GND	24	GND	38	VD3				
11	GND	25	GND	39	GND				
12	VG	26	GND	40	VD2				
13	GND	27	GND	41	GND				
14	VD1	28	RFOUT	42	VD1				

Components List

Reference Des.	Value	Part Number	Manuf.	Size
C1、C2	22μF	—	—	0805
C3、C4	10μF	—	—	0805
C5~C14、C16	0.47μF	—	—	0201
C15、C17~ C25	0.01μF			0201
R1~R10	10Ω	—	—	0201
R12、R13	1Ω	—	—	0201

Evaluation Board





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

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

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

The bottom center pad of SAC3127AQP6 is used for RF grounding and heat dissipation. For best heat dissipation, copper-filled vias are highly recommended, SAC3127AQP6 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 a 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. SAC3127AQP6 requires VDx and VGx bias.
   Turn-on: Apply VGx, Apply VDx, Apply RFIN signal.
   Turn-off: Remove RFIN signal, Decrease VG to -3 V(pinch-off), Decrease VD to 0 V
2. The moisture resistant grade of products is 2a, the storage environment ≤30°C/60% RH， the surrounding workshop life is 4 weeks;
3. After un-packing, it is necessary to bake the parts for 6 hours in 125+/-5℃environment before soldering;
4. GaAs MMIC 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	Oct. 1, 2025	First Release
1.1	Nov. 17, 2025	Updated Evaluation Board, Updated test data, Updated Application Circuit

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