

SAC3127

GaAs MMIC Power Amplifier
28.5GHz~32GHz 35.5dBm

Rev1.2

Features

- Frequency: 28.5GHz~32GHz
- Gain: 25dB
- Output P₁dB: 35.5dBm
- Supply Voltage: +5~6V
- Power-Added Efficiency: 23%@P₁dB
- IM3 Level: -23dBc @ POUT 29 dBm/tone
-20dBc @ POUT 30 dBm/tone
- Die Size: 3.55mm×3.8mm×0.1mm
- Packaged: Bare Die

Typical Applications

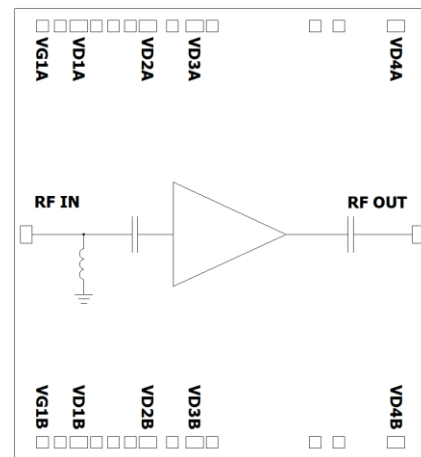
- Microwave radio
- Telecommunication
- Test instrumentation
- SatCom
- VSAT
- Military and Aerospace

General Description

The SAC3127 is a Ka-band GaAs MMIC power amplifier. The SAC3127 provides 25 dB of gain, and 35.5dBm of output power for 1 dB compression and 23%PAE from a +6V supply.

The chip has surface passivation for protection and backside via holes and gold metallization to allow a conductive epoxy die attach process. This device is well suited for communications, Point to Point radio and radar applications.

Functional Diagram



Electrical Performance

T_A=25°C, V_D=+6V, I_D=2.5A, Z₀=50Ω, CW

Parameter	Min.	Typ.	Max.	Units
Frequency Range	28.5~32			GHz
Small Signal Gain	21	25	—	dB
Small Signal Gain Flatness	—	±2	—	dB
Reverse Isolation	—	-55	—	dB
Input Return Loss	—	-8	—	dB
Power-Added Efficiency	—	23	—	%
Output Power for 1 dB Compression (OP ₁ dB)	35	35.5	—	dBm
Output Third Order Intercept(OIP ₃)*	—	40.5	—	dBm
IM3 Level*	—	-20	—	dBc
Drain Voltage(V _D)	5	—	6	V
Gate Current(I _G)	—	5	28	mA
Supply Current(I _D)	—	3	3.7	A
Thermal Resistance	—	4.1	—	°C/W

* Measurement taken at Pout / Tone = 30 dBm, fc= 30GHz, Δf=1MHz

Absolute Maximum Ratings

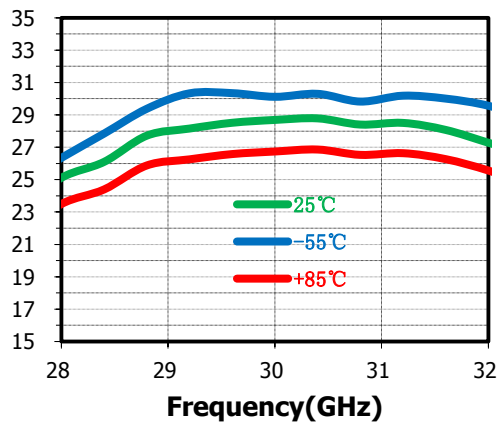
Maximum Input Power	+14dBm	Operating Temperature	-40°C ~+70°C
Channel Temperature	+150°C	Storage Temperature	-65°C ~+150°C
Maximum V _D	+6.5V	Maximum V _G	-1.2V

Typical Performance Curve

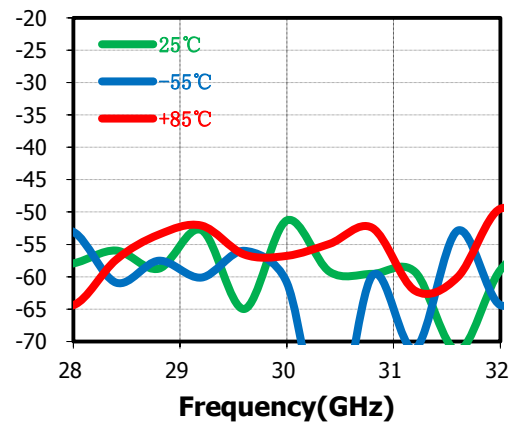
The results captured in the test-jig environment within connector plan

VD=+6v ID=2.5A CW

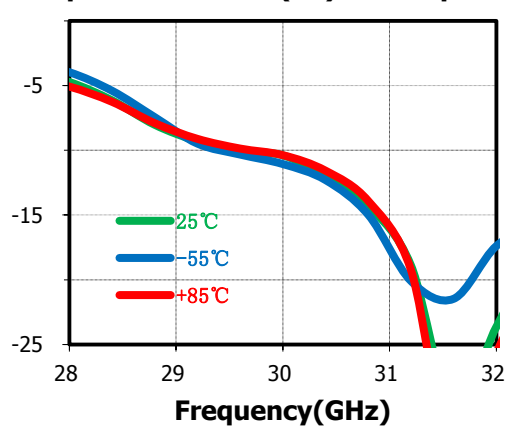
Small Signal Gain(dB) vs.Temperature



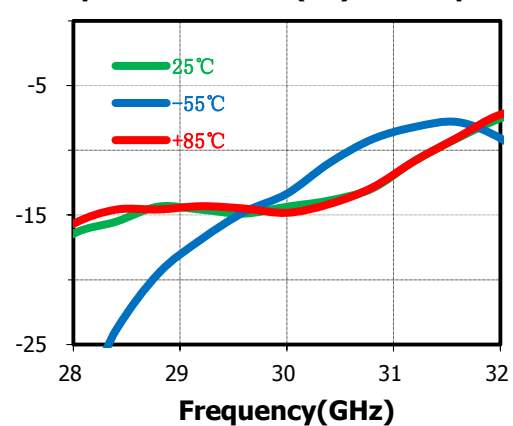
Reverse Isolation(dB) vs.Temperature



Input Return Loss(dB) vs.Temperature



Output Return Loss(dB) vs.Temperature



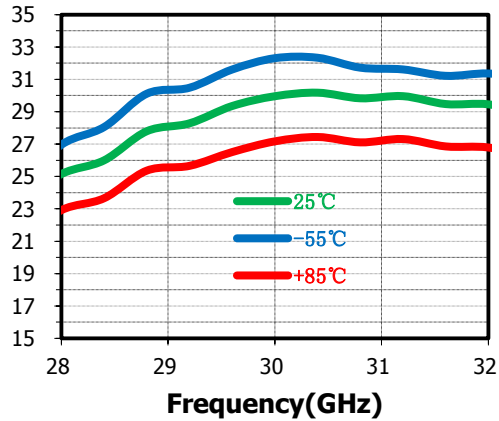
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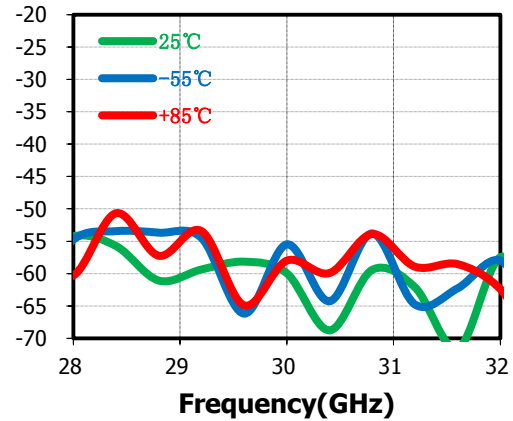
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VD=+5v ID=2.5A CW

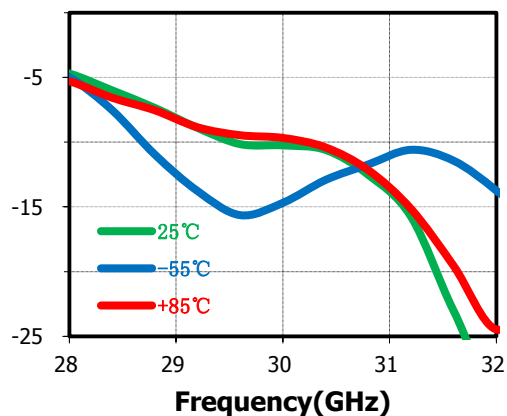
Small Signal Gain(dB) vs.Temperature



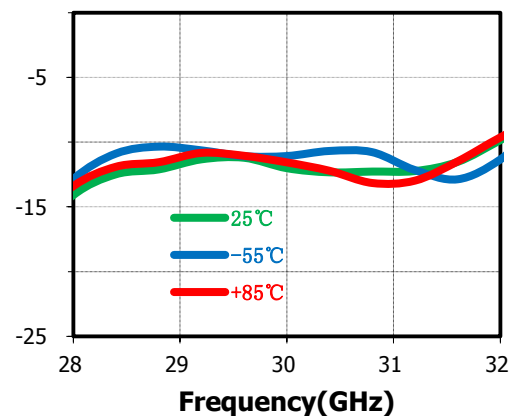
Reverse Isolation(dB) vs.Temperature



Input Return Loss(dB) vs.Temperature



Output Return Loss(dB) vs.Temperature



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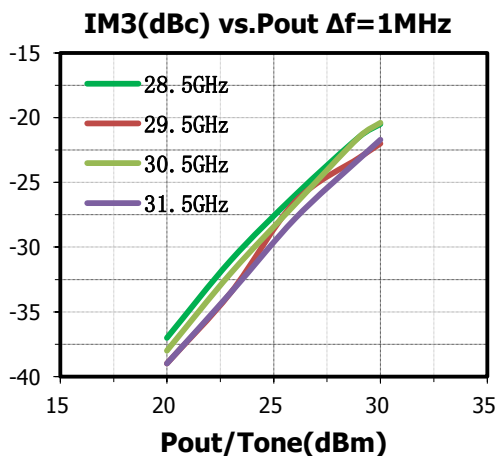
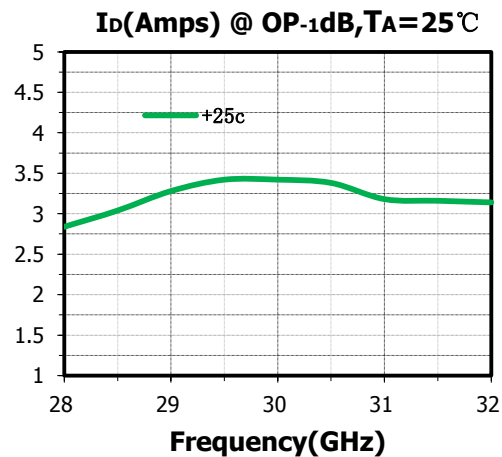
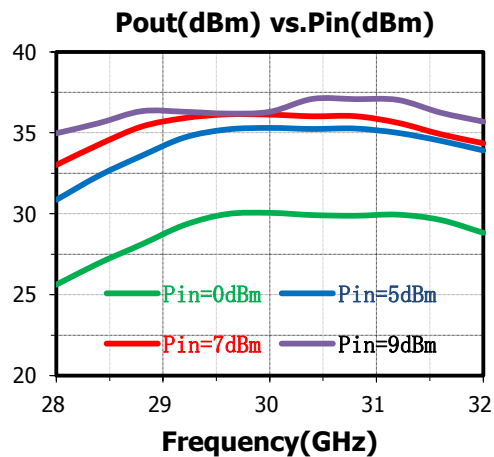
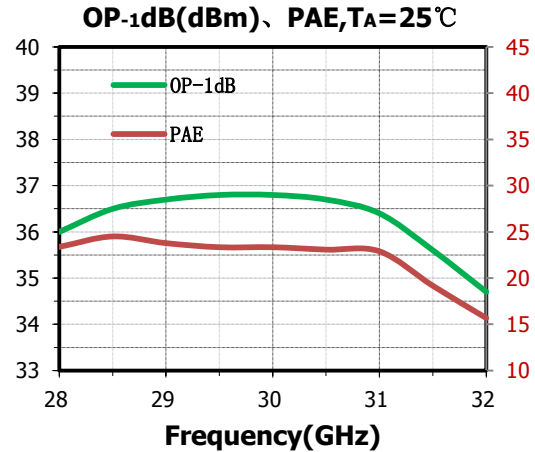
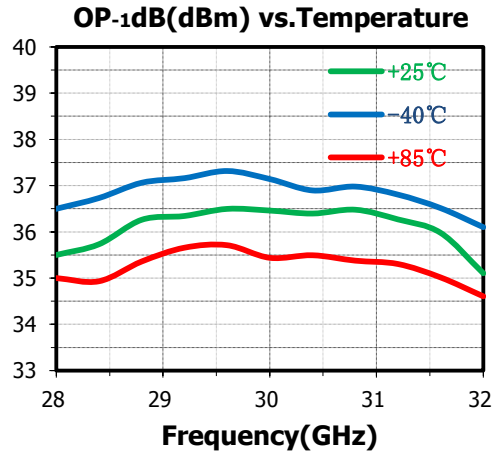
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Power and PAE Performance Curve

The results captured in the test-jig environment within connector plan, then de-embedded the housing and come back in the die plan

VD=6V IDQ=2.5A



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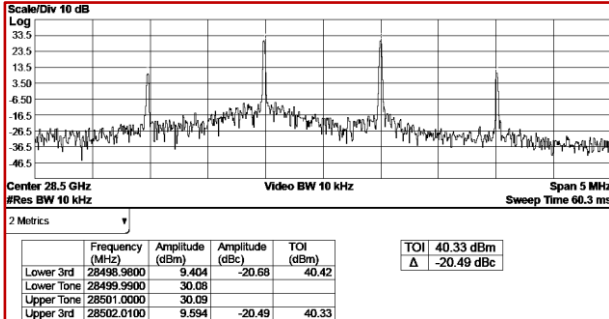
Address: 111 Barclay Boulevard, Ste. 211, Lincolnshire, IL 60069, USA
Tel: 1-847-573-9866, 1-847-505-8319
E-mail: sales@superapexco.com
Website: www.superapexco.com

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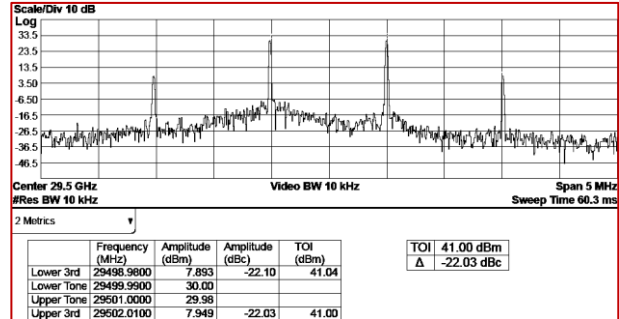
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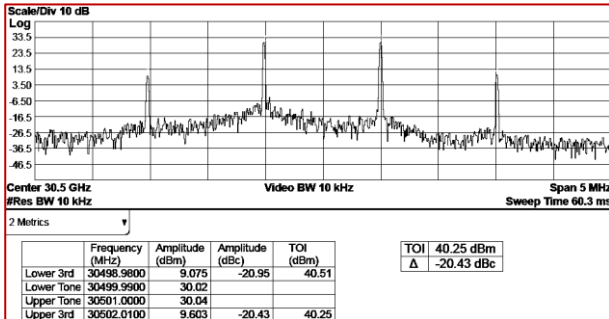
Pout/tone=30dBm Freq=28.5GHz $\Delta f=1\text{MHz}$



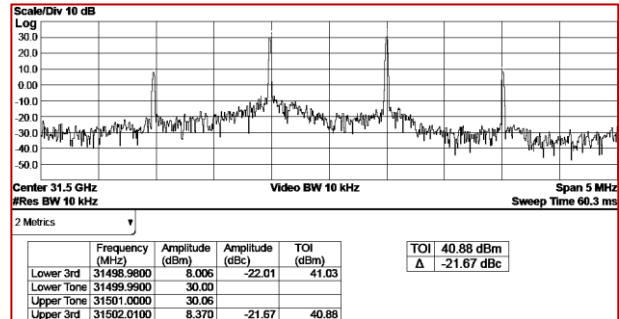
Pout/tone=30dBm Freq=29.5GHz $\Delta f=1\text{MHz}$



Pout/tone=30dBm Freq=30.5GHz $\Delta f=1\text{MHz}$

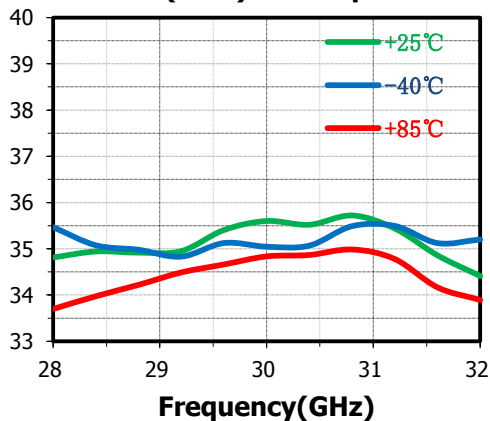


Pout/tone=30dBm Freq=31.5GHz $\Delta f=1\text{MHz}$

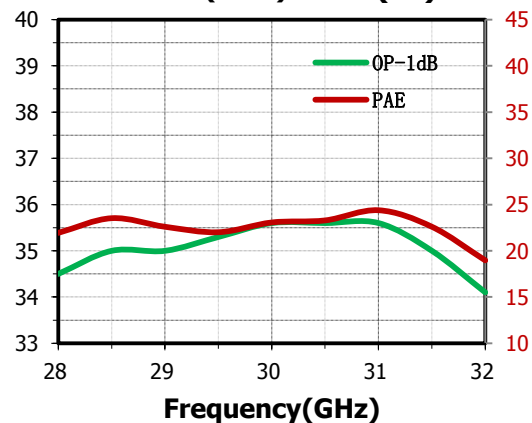


VD=5V IDQ=2.5A

OP-1dB(dBm) vs. Temperature



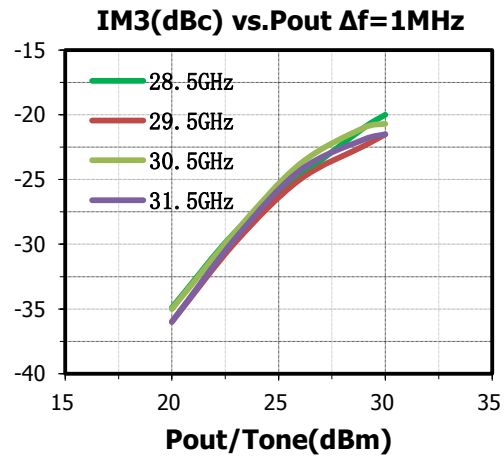
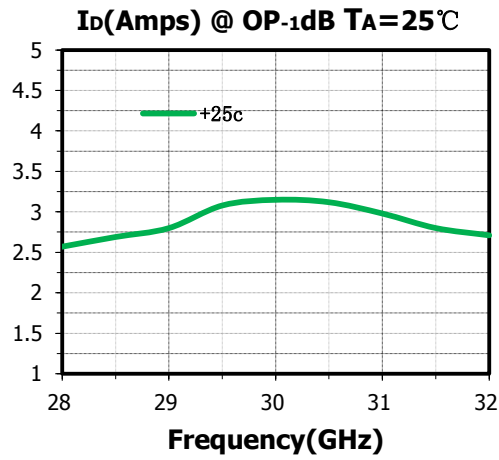
OP-1dB(dBm)、PAE(%)



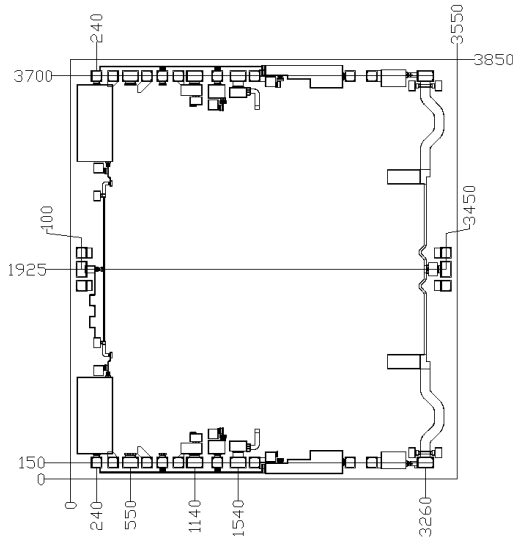
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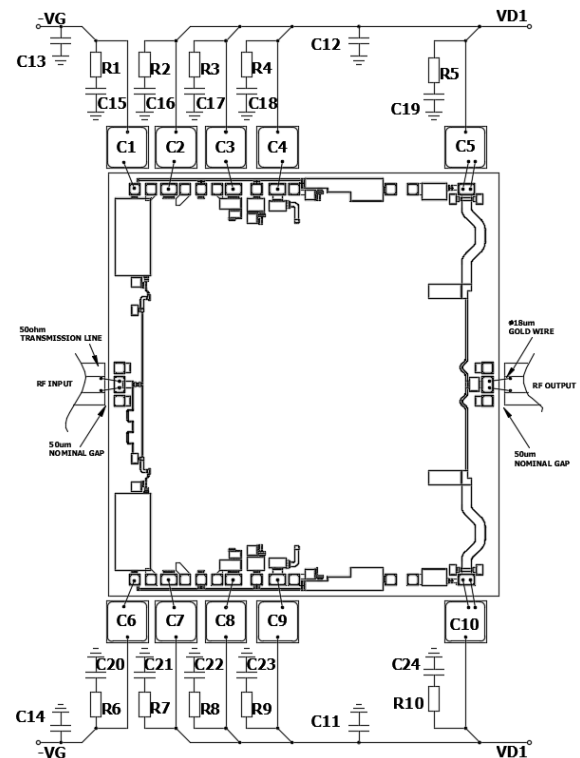
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Die Outline
(all dimensions in μm)



Assembly Diagram



Bonding pad size:

150x100um VD1A ~ VD4A, VD1B ~ VD4B, RF IN, RFOUT pads
100x100um VG1A, VG1B pads

Components List

Reference Des.	Value	Part Number	Manuf.	Size
C1~C10	39pF	—	ANY	SLC
C15~C24	0.1uF	—	ANY	0603
C11~C14	10uF	—	ANY	0805
R1~R10	10Ω	—	ANY	0603

Notes

1. The SAC3127 is biased with a positive drain supply and negative gate supply. The recommended gate voltage is set to -0.6~-0.9 V.
2. RF connections should be made as short as possible to reduce the inductive effect of the bond wire. Use of a 0.8 mil thermosonic wedge bonding is highly recommended as the loop height will be minimized. The RF input and output require a double bond wire as shown.
3. The backside of the SAC3127 is RF ground. Eutectic mounting is preferred, If using conductive epoxy, recommended epoxies is UNIMEC H9890-6A cured per the manufacturer's cure schedule. Epoxy should be applied in accordance with the manufacturers specifications and should avoid contact with the top surface of the die. An epoxy fillet should be visible around the total die periphery.
4. Bypass caps C11~C14 should be placed no farther than 5mm from the amplifier.