SAC3147

GaAs MMIC Power Amplifier
6GHz~8GHz 39dBm

Rev 1.0

Features

- Frequency：6GHz~8GHz
- Small Signal Gain：20dB
- Output P_{-1}dB：39dBm CW
- PAE：30%@OP_{-1}dB，f=7GHz
- IM_3: -24dBc, 33dBm/Tone@7GHz
- Die Size：3.7mm×4.2mm×0.1mm
- Supply Voltage：+8V/-Vg
- Package：Bare Die

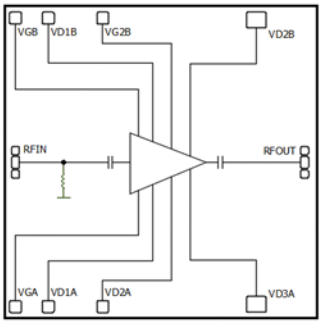
Typical Applications

- Wireless Communication

General Description

SAC3147 is a C-band GaAs MMIC power amplifier. SAC3147 provides 21 dB of gain,39dBm of output power for 1 dB compression and more than 30%PAE@OP_{-1}dB,7GHz from a +8V supply. The chip has surface passivation for protection and backside via holes and gold metallization to allow a conductive epoxy die attach process, It's ideal for Point-to-Point radio applications.

Functional Diagram



Electrical Performance

T_A=25℃, V_D=+8V, I_{DQ}=3.5A, Z_0=50Ω, CW

Parameter	Min.	Typ.	Max.	Units
Frequency Range	6	—	8	GHz
Small Signal Gain	17	21	—	dB
Gain Flatness	—	±1.5	—	dB
Reverse Isolation	—	-65	—	dB
VSWRi	—	1.7	2.5	:1
Power-Added Efficiency	—	30	—	%
Output P_{-1}dB	38.2	39	—	dBm
IM_3*	—	24	—	dBc
Drain Voltage (VD)	—	8	8.5	V
Gate Current	—	7	55	mA
Supply Current (ID)***	—	—	5.25	A
Thermal Resistance **	—	2.9	—	℃/W

* Pout/Tone=33dBm, fc=7GHz, Δf=4MHz

**Pout@OP_{-1}dB,f=7GHz

*** Adjust Vg between -1V to -0.6V to achieve I_{DQ}= 3.5A typical.

SuperApex, LLC
1580 S. Milwaukee Ave. Suite 405, Libertyville, IL 60048, USA
Tel: 1-847-505-8319, 1-847-573-9866
E-mail: sales@superapexco.com
Website: www.superapexco.com

Absolute Maximum Ratings

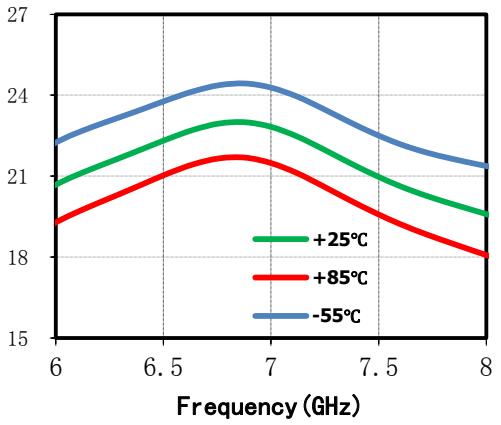
Maximum Input Power	+25dBm ， 10s	Operating Temperature (Backside)	-55℃~+85℃
Channel Temperature	165℃	Storage Temperature	-55℃~+150℃
Maximum VD Supply	+8.5V	VG Range	-1.5V(Pinch-off) ~-0.6V

Typical Performance Curve

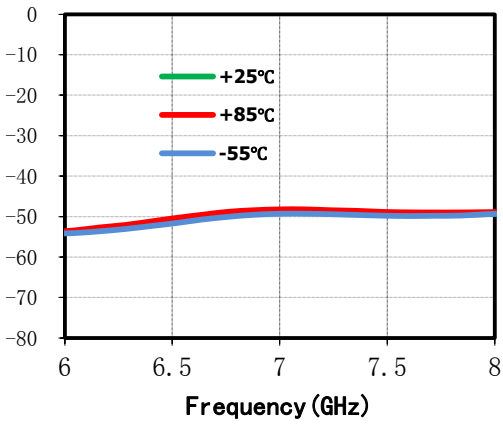
The following data are obtained from SAC3147 evaluation board

VD = + 8V, I_{DQ} = 3.5A, CW, T_A = + 25℃

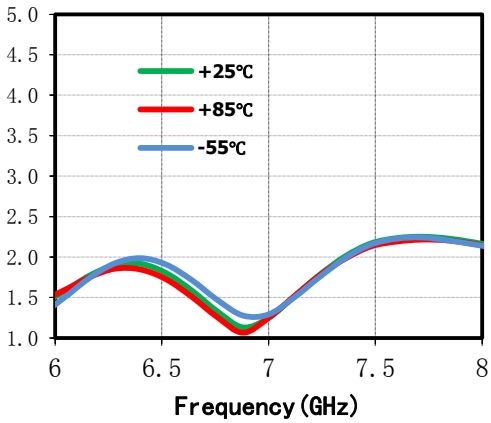
Small Signal Gain(dB) vs.Temperature



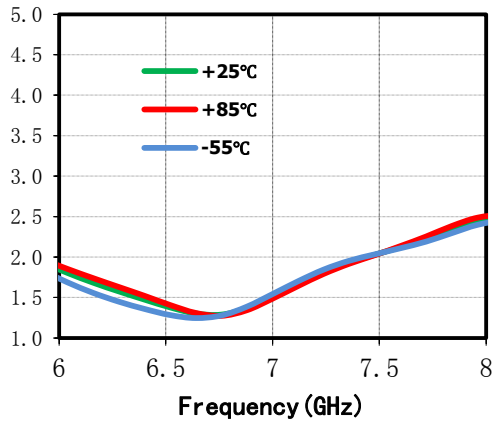
Isolation(dB) vs.Temperature



Input VSWR(:1) vs.Temperature

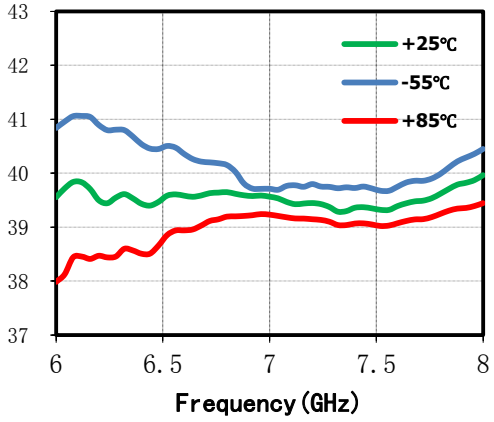


Output VSWR(:1) vs.Temperature

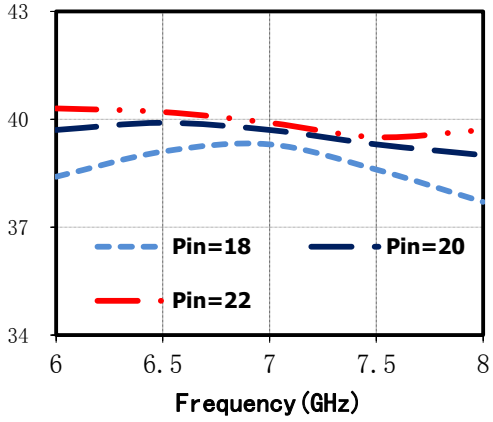


SuperApex, LLC
1580 S. Milwaukee Ave. Suite 405, Libertyville, IL 60048, USA
Tel: 1-847-505-8319, 1-847-573-9866
E-mail: sales@superapexco.com
Website: www.superapexco.com

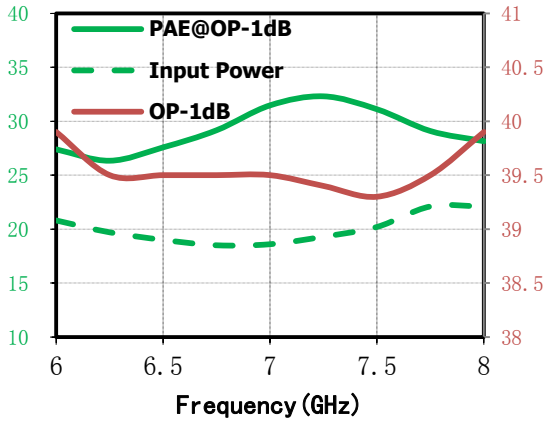
OP-1dB (dBm) vs. Temperature



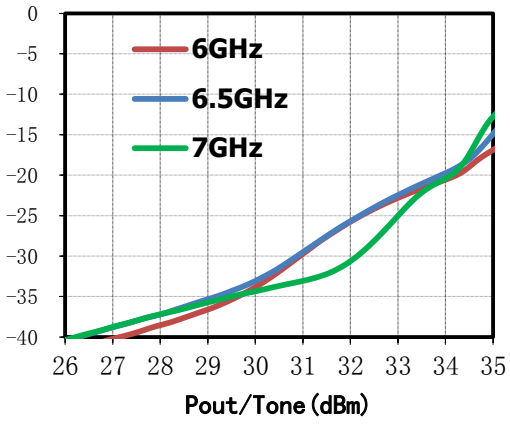
Pout (dBm) vs. Pin(dBm)



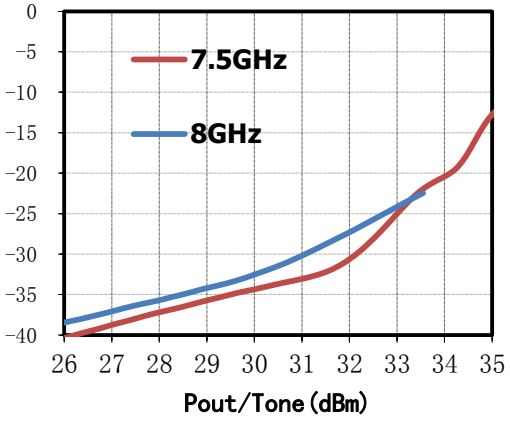
PAE (%), PWRin (dBm) @OP-1dBvs. Freq.



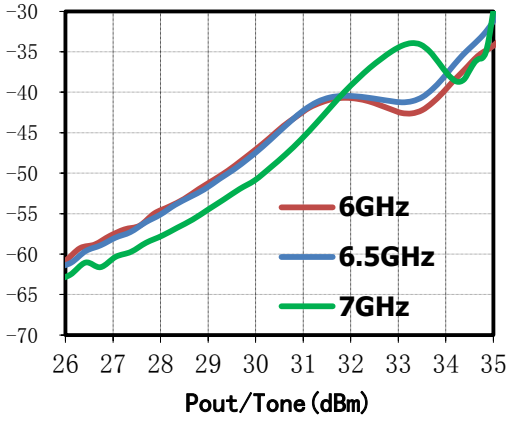
IM3 (dBc) vs. Pout/Tone



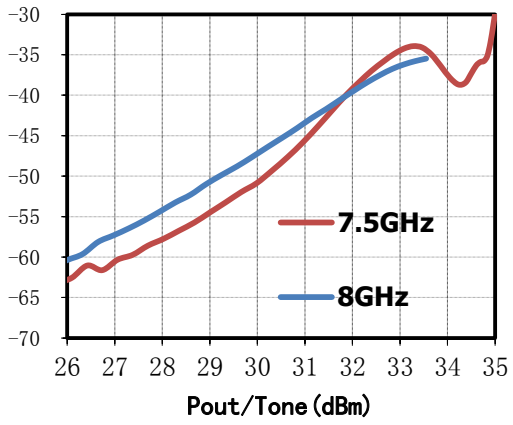
IM3 (dBc) vs. Pout/Tone



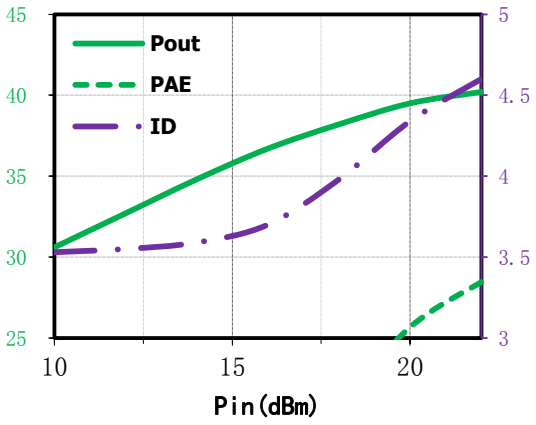
IM5 (dBc) vs. Pout/Tone



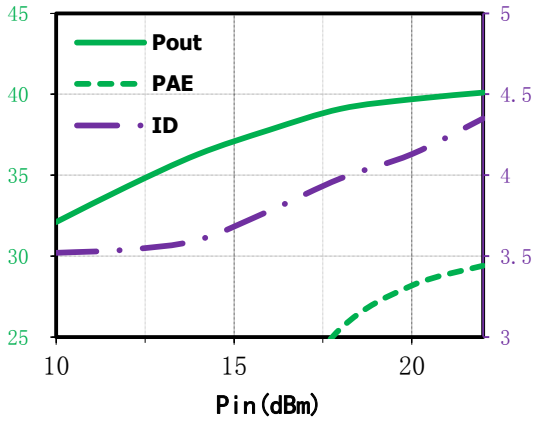
IM5 (dBc) vs. Pout/Tone



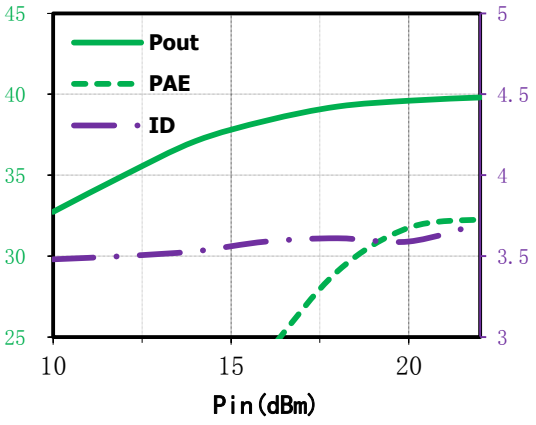
Pout (dBm)、PAE (%)、ID(A) vs. Pin,f=6GHz



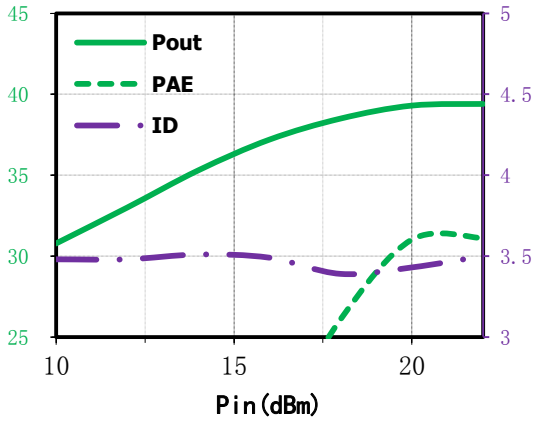
Pout (dBm)、PAE (%)、ID(A) vs. Pin,f=6.5GHz



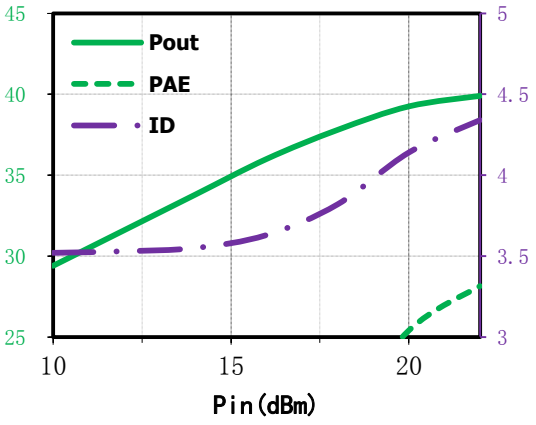
Pout (dBm)、PAE (%)、ID(A) vs. Pin,f=7GHz



Pout (dBm)、PAE (%)、ID(A) vs. Pin,f=7.5GHz

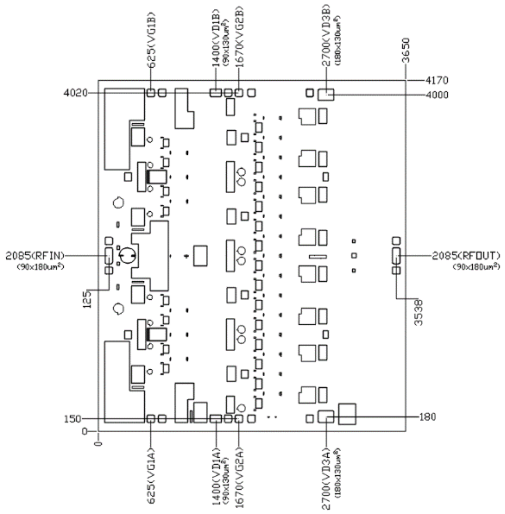


Pout (dBm)、PAE (%)、ID(A) vs. Pin,f=8GHz

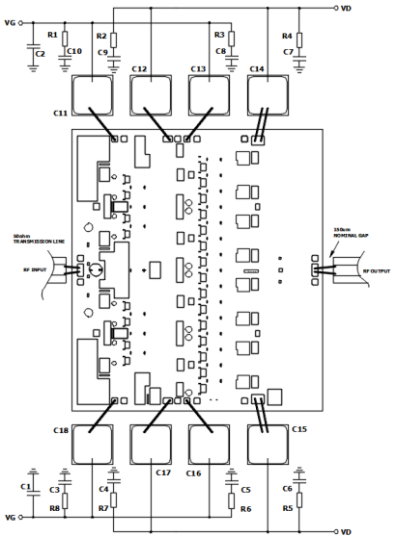


Die Outline

(All dimensions in μm)



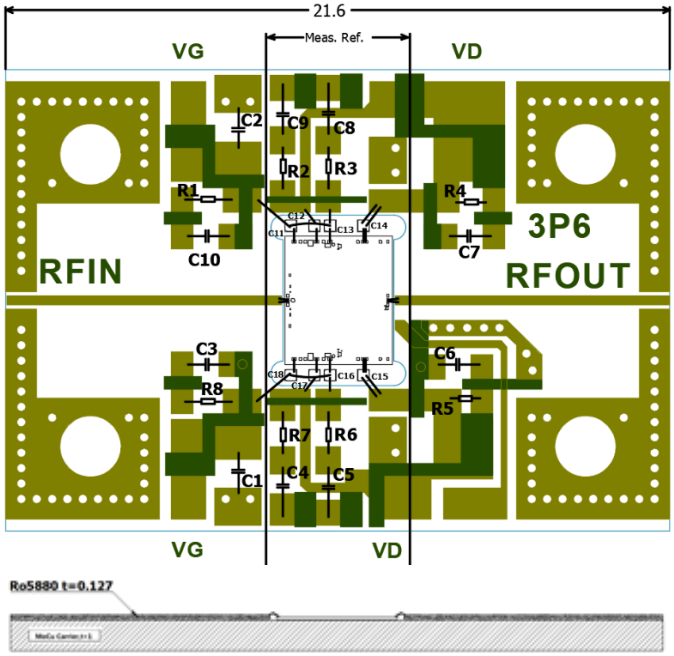
Assembly Diagram



BOM

Reference Des.	Value	Part Number	Manuf.	Size
C1、C14	22μF	—	—	0805
C6~C13、C19	470pF	—	ANY	SLC
C2~C5	0.47μF	—	—	0603
C15~C18	0.47μF	—	—	0603
R1~R8	1Ω	—	—	0603

SAC3147 Evaluation board



Notes

1. SAC3147 is biased with a positive drain supply and negative gate supply. The recommended gate voltage is set to -0.55 to -0.9V when the drain voltage is set to 8V;
2. The back of chip is RF ground;
3. RF connections should be made as short as possible to reduce the inductive effect of the bond wire. Use of a 1 mil thermosonic wedge bonding is highly recommended as the loop height will be minimized;
4. Bypass SLCs should be placed as close as possible to the chip;
5. GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test;
6. The maximum spike voltage at drains(VDxx) should not exceed 8.5v.

Revision History

Revision	Date	Comment
1.0	Aug 17, 2021	First Release

SuperApex, LLC
1580 S. Milwaukee Ave. Suite 405, Libertyville, IL 60048, USA
Tel: 1-847-505-8319, 1-847-573-9866
E-mail: sales@superapexco.com
Website: www.superapexco.com