

Features

- Frequency: 8GHz~10.5GHz
- Small Signal Gain: 23dB
- Output P-1dB: 37dBm CW
- PAE: 35%@OP-1dB, f=9.35GHz
- IM3: -24dBc, 29dBm/Tone@9.35GHz
- Bare die Size: 3.82mm×2.04mm×0.1mm
- Supply Voltage: +8V/-Vg
- Package: Bare die

Typical Applications

- X-band multifunction radar
- Point-to-Point Radio

General Description

SAC3149 is a X-band GaAs MMIC power amplifier. SAC3149 provides 23 dB of gain, and 37 dBm of output power for 1 dB compression and more than 30% PAE 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 and multifunction radar applications.

Electrical Performance

$T_A=25^{\circ}\text{C}$, $V_D=+8\text{V}$, $I_{DQ}=1.6\text{A}$, $Z_0=50\Omega$, CW

Parameter	Min.	Typ.	Max.	Units
Frequency Range	8	—	10.5	GHz
Small Signal Gain	20	23	—	dB
Gain Flatness	—	±1	—	dB
Reverse Isolation	—	-65	—	dB
RF Input VSWR	—	2	—	:1
Power-Added Efficiency	—	30	—	%
Output P-1dB	—	37	—	dBm
IM ₃ *	—	24	—	dBc
Drain Voltage (V _D)	—	8	—	V
Gate Current	—	4	—	mA
Supply Current (I _D)**	—	—	4	A
Thermal Resistance	—	3.2	—	°C/W

* Pout/Tone=29dBm, fc=9.35GHz, Δf=1MHz

**Adjust Vg voltage (- 1.1~-0.65V) to make I_{DQ} about 1.6A, and typical Vg voltage is -0.85V

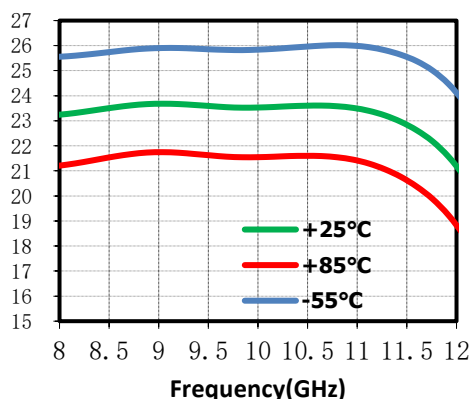
Absolute Maximum Ratings

Maximum Input Power	+22dBm	Operating Temperature (Backside)	-55°C~+85°C
Channel Temperature	150°C	Storage Temperature	-55°C~+150°C
Maximum V _D Supply	+8.5V	V _G Range	-1.5V(Pinch-off)~-0.3V

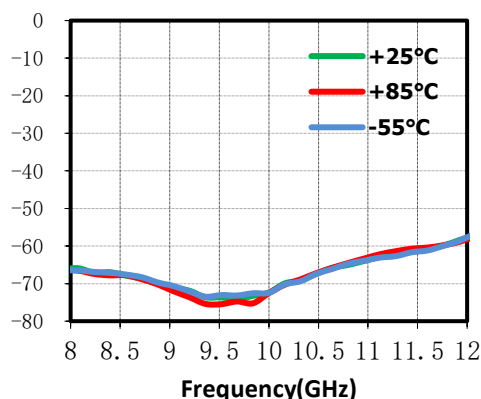
Typical Performance Curve

$V_D = +8V, I_{DQ} = 1.6A, CW, T_A = +25^\circ C$

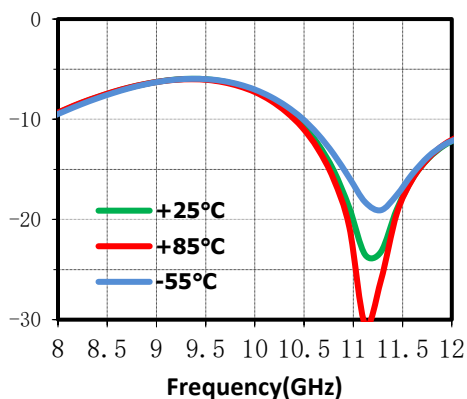
Small Signal Gain(dB) vs. Temperature



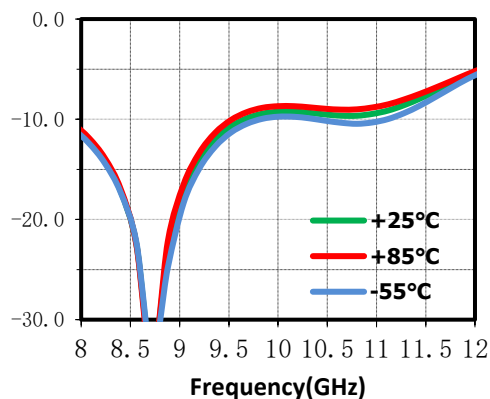
Isolation(dB) vs. Temperature



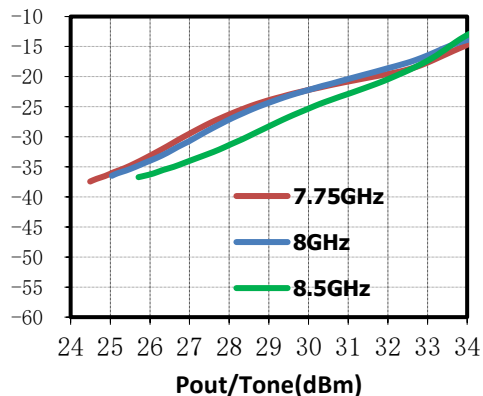
RF Input Return Loss (dB) vs. Temperature



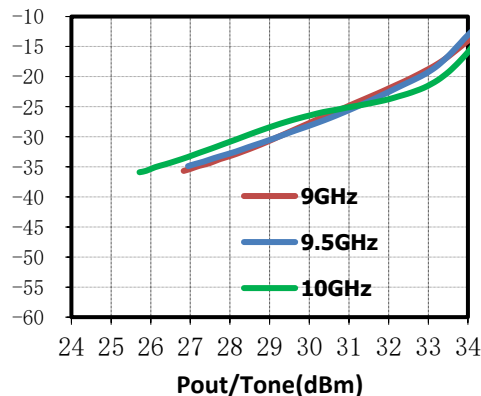
RF Output Return Loss(dB) vs. Temperature



IM3(dBc) vs. Pout/Tone



IM3(dBc) vs. Pout/Tone



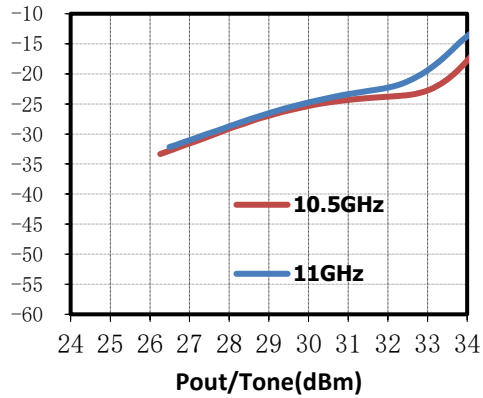
SAC3149



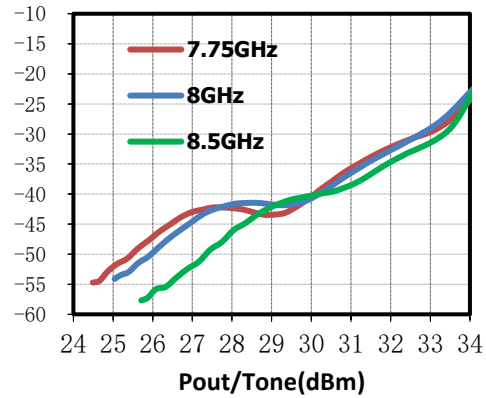
GaAs MMIC Power Amplifier
8GHz~10.5GHz 37dBm

Rev 1.0

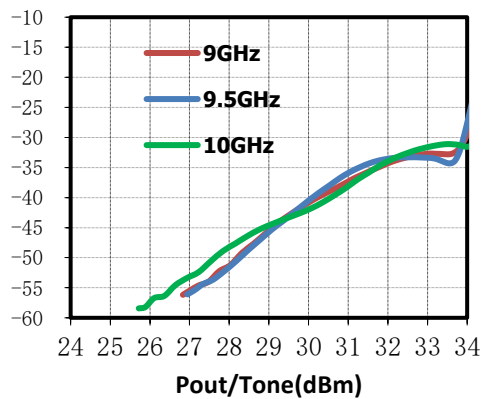
IM3(dBc)vs. Pout/Tone



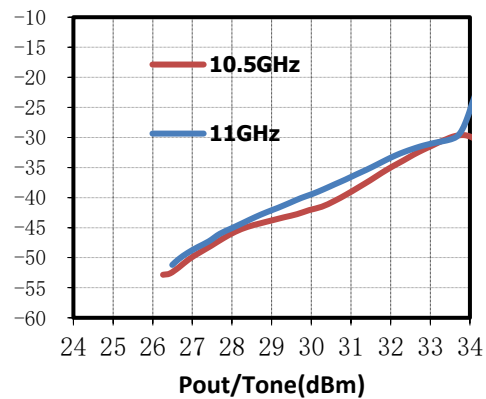
IM5(dBc)vs. Pout/Tone



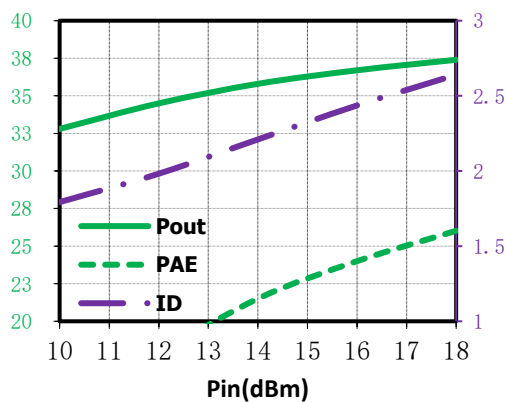
IM5(dBc)vs. Pout/Tone



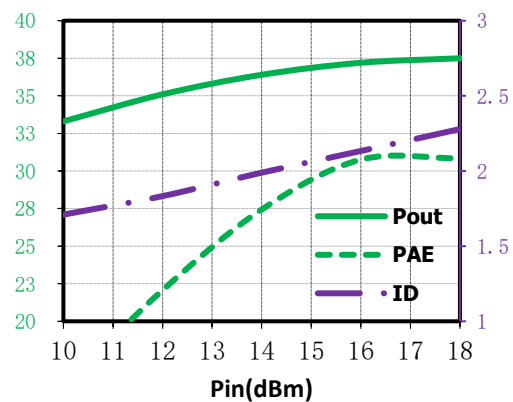
IM5(dBc)vs. Pout/Tone



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



Pout(dBm)、PAE(%)、ID(A) vs. Pin, f=8.5GHz



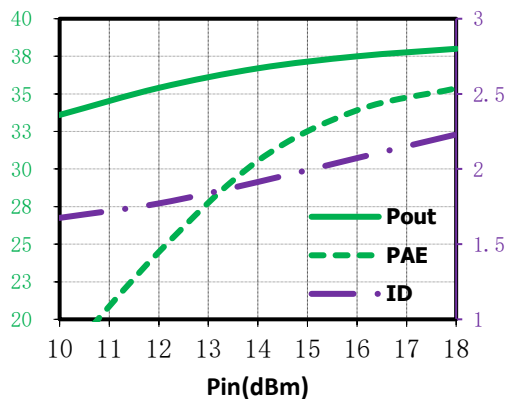
SAC3149



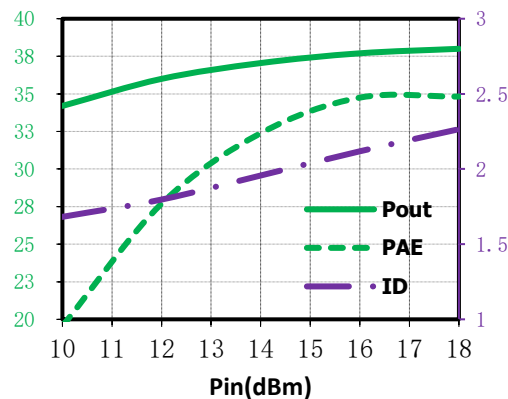
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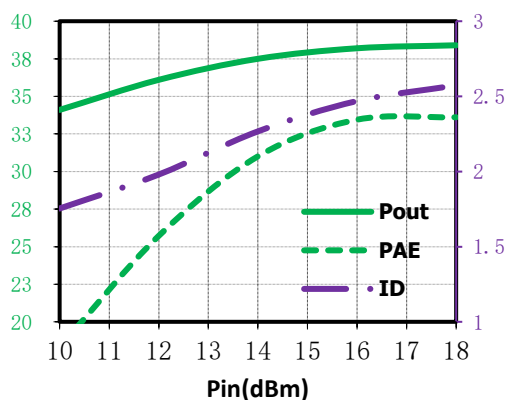
Pout(dBm)、PAE(%)、ID(A) vs. Pin, f=9GHz



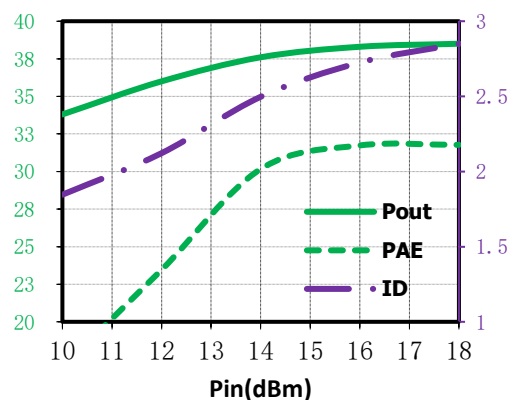
Pout(dBm)、PAE(%)、ID(A) vs. Pin, f=9.5GHz



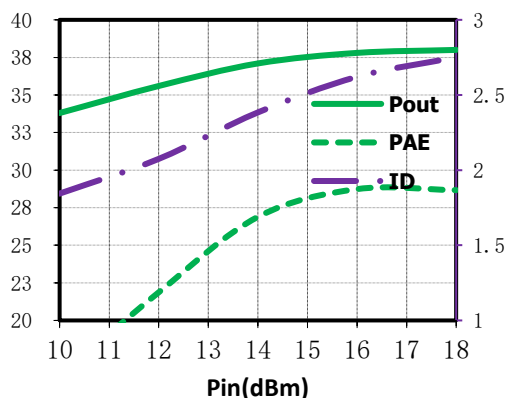
Pout(dBm)、PAE(%)、ID(A) vs. Pin, f=10GHz



Pout(dBm)、PAE(%)、ID(A) vs. Pin, f=10.5GHz



Pout(dBm)、PAE(%)、ID(A) vs. Pin, f=11GHz



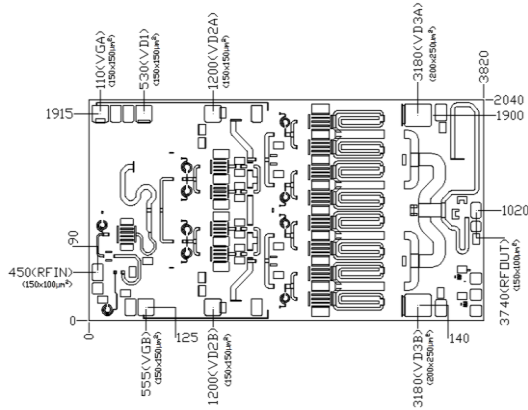
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8GHz~10.5GHz 37dBm

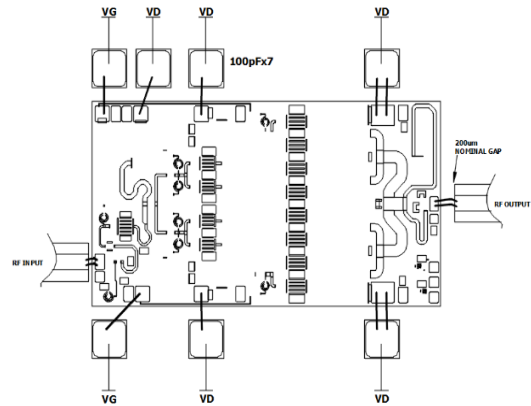
Rev 1.0

Die Outline Drawing

(All dimensions in μm)



Application Circuit



Notes

1. SAC3149 needs V_{Dx} and V_{Gx} bias. Before applying the positive drain voltage, make sure that the negative grid voltage has been applied;
2. The chip ratio shall be stored in a dry and nitrogen environment and used in an ultra-clean environment;
3. The GaAs material is brittle and cannot touch the chip surface. Be careful when using it;
4. The chip is sintered with conductive adhesive or alloy (the alloy temperature shall not exceed 300°C and the time shall not exceed 30 seconds) to make it fully grounded;
5. The gap between the chip microwave port and the substrate shall not exceed 0.35mm Φ eighteen μm gold wire bonding, recommended gold wire length is 350~450 μm ;
6. The chip is sensitive to static electricity, so pay attention to anti-static during storage and use;
7. There is no need to add DC isolation capacitors to the RF input and output ports of the chip.

Revision History

Revision	Date	Comment
1.0	Sept. 23, 2024	Bare die ver.