SAC3154

GaAs MMIC Power Amplifier
5GHz~8GHz 39dBm

Rev 1.0

Features

- Frequency: 5GHz~8GHz
- Small Signal Gain: 23dB
- Output P_{-1}dB: 39dBm
- Die size: 5mm×4.5mm×0.1mm
- Supply Voltage: +8V/-Vg
- Packaged: Bare Die

Typical Applications

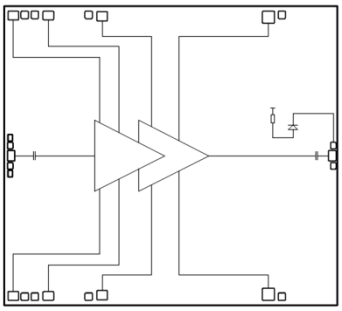
- Point-to-Point Radios

General Description

SAC3154 is a C-band GaAs MMIC power amplifier. SAC3154 provides 23dB of gain, and 39dBm of output power for 1 dB compression from +8V supply.

The chip has surface passivation for protection and backside via holes and gold metallization to allow a conductive epoxy die attach process.

Functional Diagram



Electrical Performance

T_A=25℃, V_D=+8V, I_{DQ}=2.5A, Z_0=50Ω, CW

Parameter	Min.	Typ.	Max.	Units
Frequency Range	5	—	8	GHz
Small Signal Gain	20	23	—	dB
Small Signal Gain Flatness	—	±2	—	dB
Reverse Isolation	—	-70	—	dB
RF Input Port Return Loss	—	-8	—	dB
Output P_{-1}dB	37.5	39	—	dBm
Drain Voltage (V_D)	8	—	8.5	V
Gate Current	—	2	26	mA
Supply Current (I_D)***	—	—	5.5	A
Thermal Resistance**	—	2.8	—	℃/W

** Measurement taken at Pout = OP_{-1}dB, IR method. 100% DC power is dissipated on the device the thermal resistance is 3.3℃/W

*** Adjust Vg between -1.5V to -0.4V to achieve I_{DQ}= 2.5A , and typical Vg voltage is -0.8V.

Absolute Maximum Ratings

Maximum Input Power	+24dBm	Operating Temperature (Backside)	-55℃~+85℃
Channel Temperature	150℃	Storage Temperature	-55℃~+150℃
Maximum V_D	+8.5V	V_G Range	-3V~-0.4V

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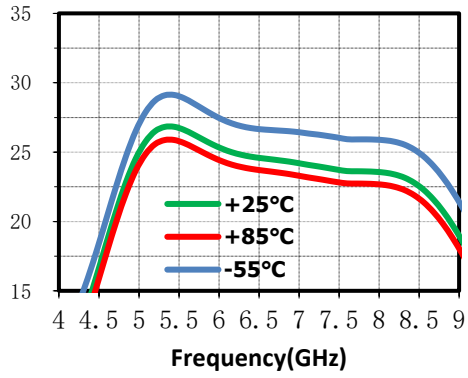
Typical Performance Curve

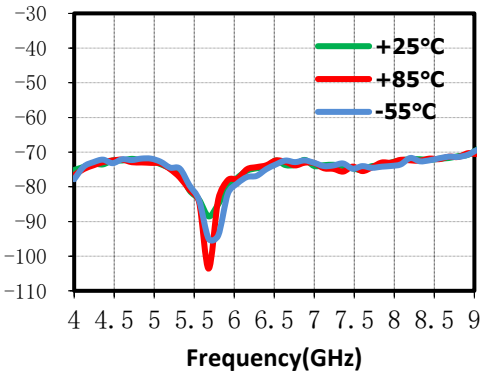
The following data are obtained by SAC3154 evaluation board

V_D = + 8V, I_{DQ} = 2.5A, CW, T_A = + 25℃

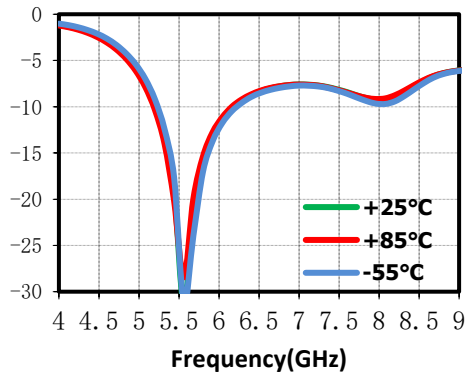
Small Signal Gain(dB) vs. Temperature



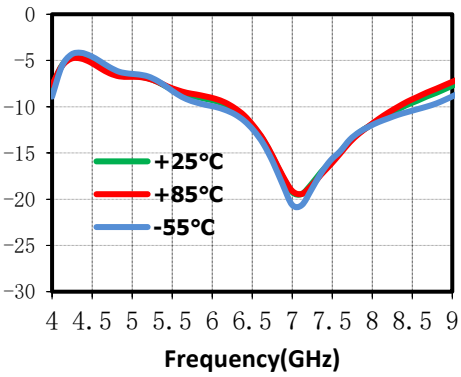
Isolation(dB) vs. Temperature



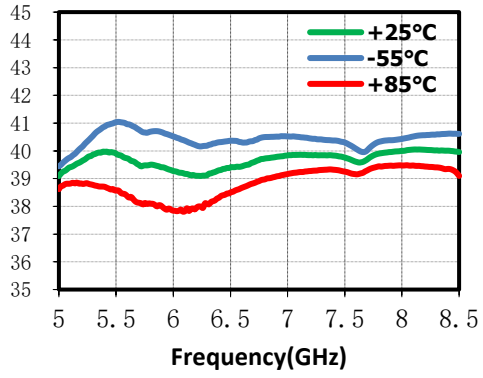
RF Input RL (dB) vs. Temperature



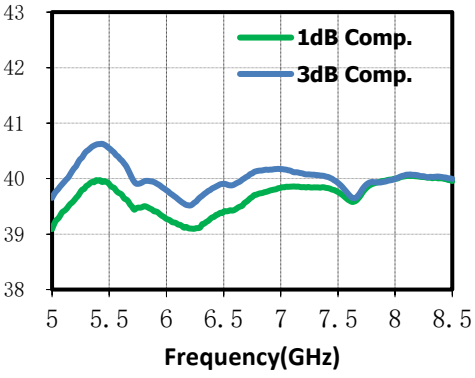
RF Input RL (dB) vs. Temperature



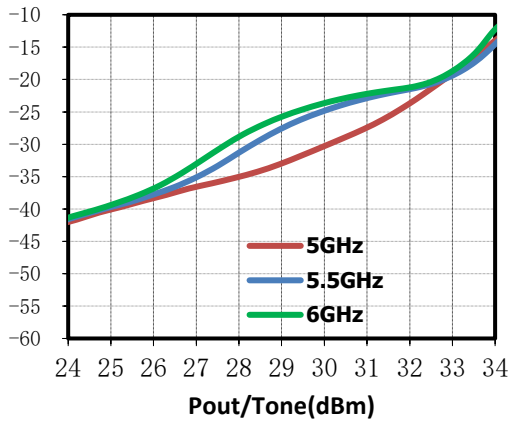
Output P_{-1}dB(dBm)vs. Temperature



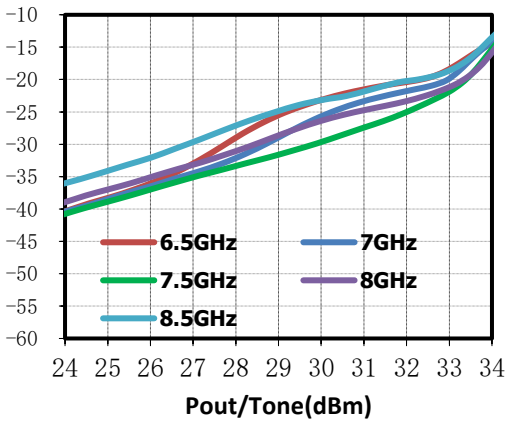
Output P_{-3}dB(dBm)vs. Frequency



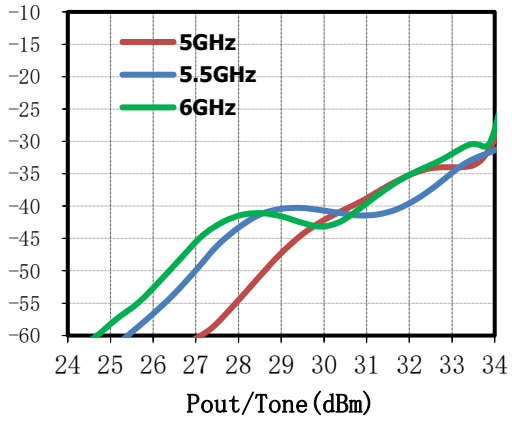
IM$_3$(dBc) vs. Pout/Tone



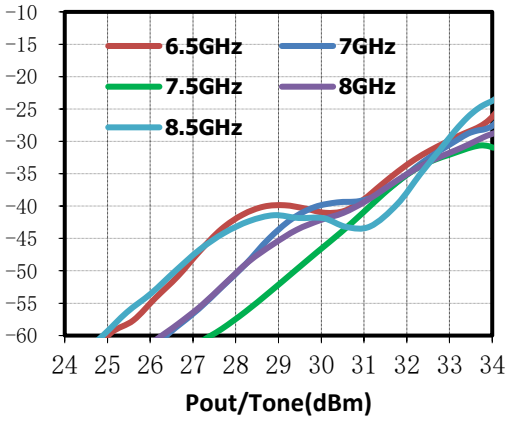
IM$_3$(dBc) vs. Pout/Tone



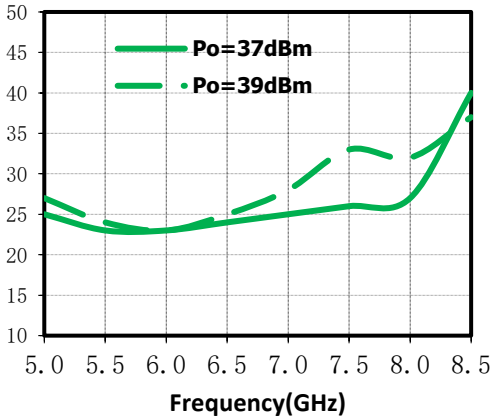
IM$_5$(dBc) vs. Pout/Tone



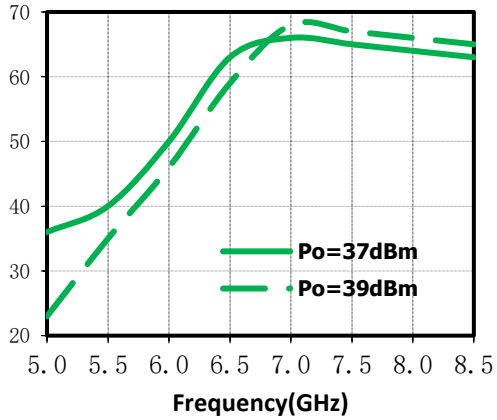
IM$_5$(dBc) vs. Pout/Tone



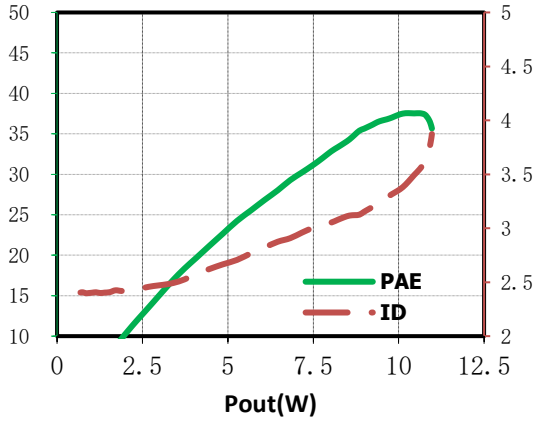
2ND Harmonic Rej. vs. Frequency



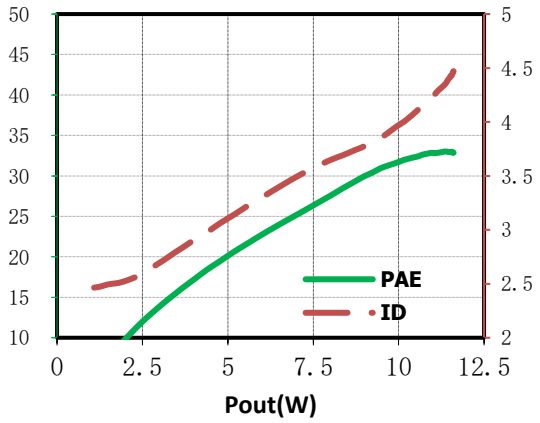
3RD Harmonic Rej. vs. Frequency



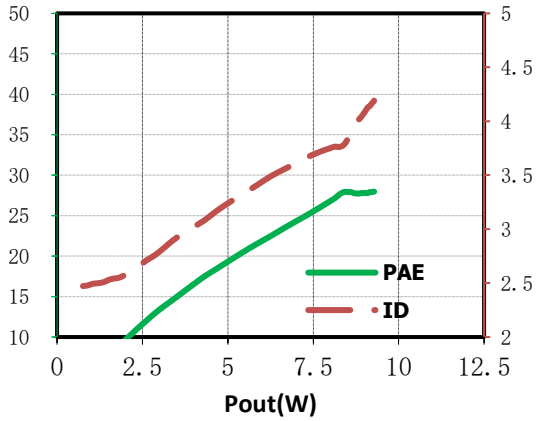
PAE(%)、ID(A) vs. Pout, f=5GHz



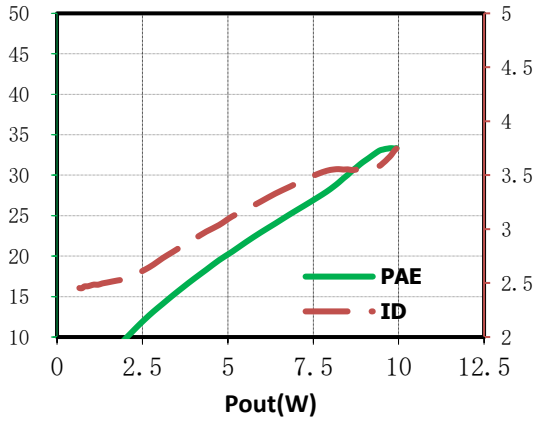
PAE(%)、ID(A) vs. Pout, f=5.5GHz



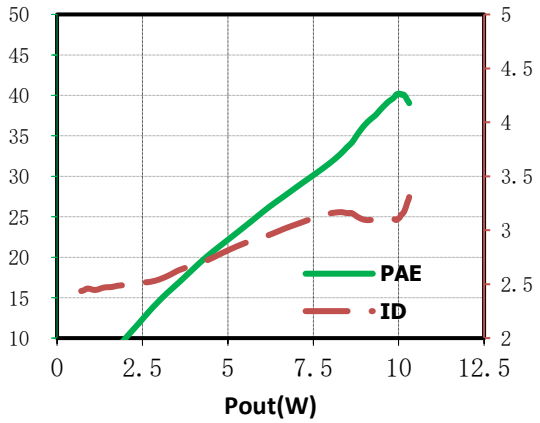
PAE(%)、ID(A) vs. Pout, f=6GHz



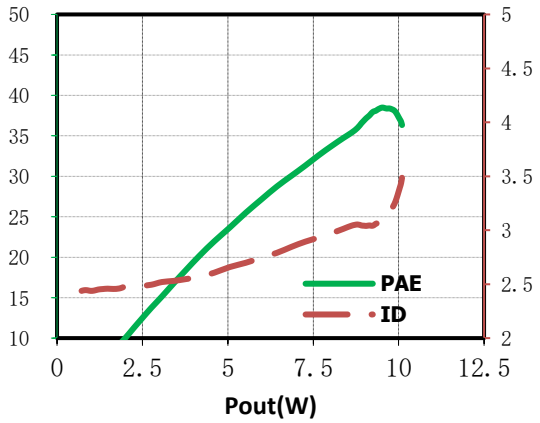
PAE(%)、ID(A) vs. Pout, f=6.5GHz



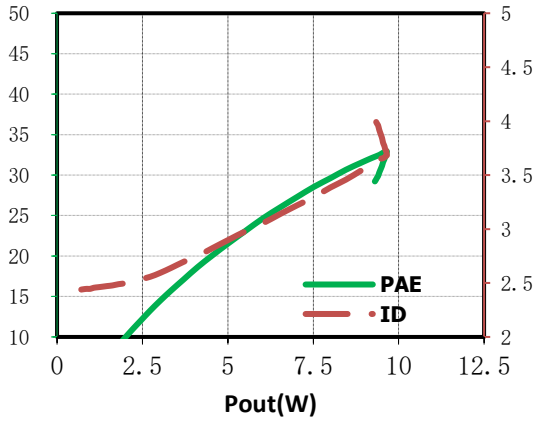
PAE(%)、ID(A) vs. Pout, f=7GHz



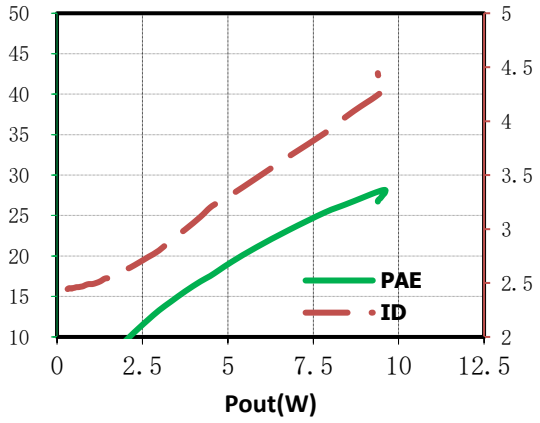
PAE(%)、ID(A) vs. Pout, f=7.5GHz



PAE(%)、ID(A) vs. Pout, f=8GHz

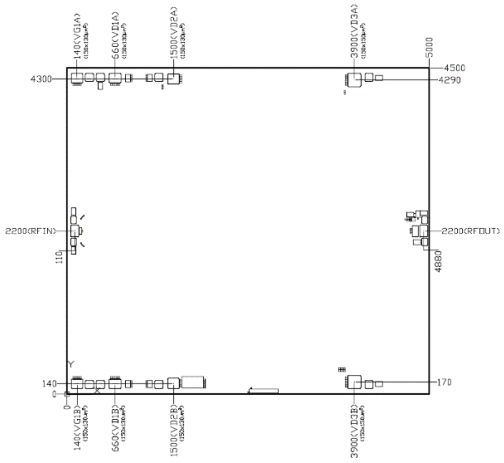


PAE(%)、ID(A) vs. Pout, f=8.5GHz



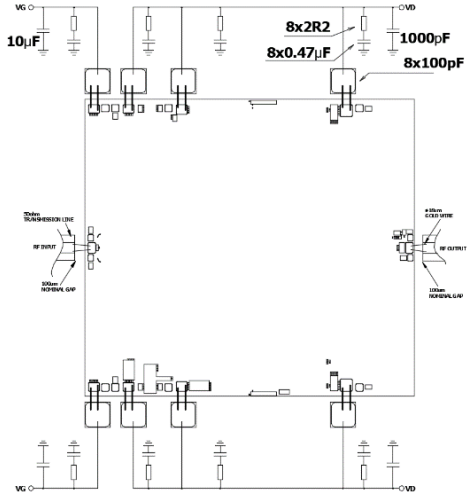
Die Outline

(All dimensions in μm)



t=100μm

Assembly Diagram



VDx and VGx need to be fed simultaneously on both sides

Attention:

1. SAC3154 requires drain positive voltage (VDx) and gate negative voltage (VGx) bias, which shall be applied before applying drain positive voltage Ensure that the gate negative voltage is applied;
2. Vacuum AuSn eutectic soldering is recommended;
3. When using drain pulse voltage modulation, ensure that the maximum overshoot voltage does not exceed 8.5V.

Revision History

Revision	Date	Comment
1.0	December 1, 2022	First Release