

# SAC3113B

GaAs MMIC Power Amplifier  
8.5GHz~11GHz 40dBm

Rev 1.0

## Features

- Frequency: 8.5GHz~11GHz
- Small Signal Gain: 23dB
- Output P<sub>-3dB</sub>: 40.5 dBm CW
- Power-Added Efficiency: 32%
- IM<sub>3</sub>: -24dBc, 33dBm/Tone@10.5GHz
- Die Size: 4mm×4mm×0.1mm
- Supply Voltage: +8V/-Vg
- Packaged: Bare Die

## General Description

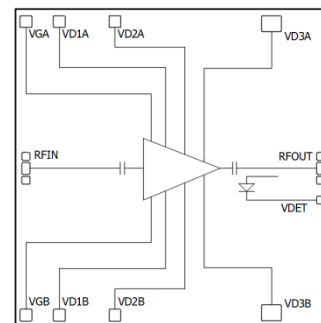
SAC3113B is a X-band GaAs MMIC power amplifier. SAC3113B provides 23 dB of gain, and 40.5dBm of output power for 3 dB compression and more than 32% PAE from a +8V supply.

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.

## Typical Applications

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

## Functional Diagram



## Electrical Performance

T<sub>A</sub>=25°C, V<sub>D</sub>=+8V, I<sub>DQ</sub>=3.5A, Z<sub>0</sub>=50Ω, CW

Parameter	Min.	Typ.	Max.	Units
Frequency Range	8.5	—	11	GHz
Small Signal Gain	20	23	—	dB
Gain Flatness	—	±1	—	dB
Reverse Isolation	—	-65	—	dB
VSWR <sub>i</sub>	—	1.5	2	:1
Power-Added Efficiency	—	32	—	%
Output P <sub>-3dB</sub>	39.5	40.5	—	dBm
IM <sub>3</sub> *	—	24	—	dBc
Drain Voltage (VD)	7	—	8.5	V
Gate Current	—	4	45	mA
Supply Current (ID)*	—	—	5.55	A
Thermal Resistance **	—	2.3	—	°C/W

\* P<sub>out</sub>/Tone=33dBm, f<sub>c</sub>=10GHz, Δf=4MHz

\*\* Measurement taken at P<sub>out</sub> = OP<sub>-3dB</sub>, IR method. 100% DC power is dissipated on the device the thermal resistance is 3.42 °C/W

\*\*\* Adjust Vg voltage (-1~-0.65V) to make I<sub>DQ</sub> about 3A, and typical Vg voltage is -0.85V

# SAC3113B



GaAs MMIC Power Amplifier  
8.5GHz~11GHz 40dBm

Rev 1.0

## Absolute Maximum Ratings

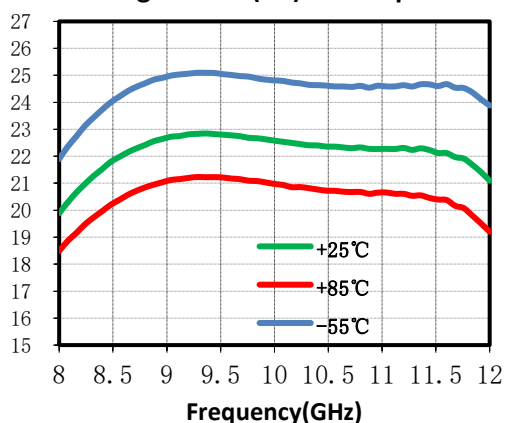
Maximum Input Power	+26dBm	Operating Temperature (Backside)	-55°C~+85°C
Channel Temperature	165°C	Storage Temperature	-55°C~+150°C
Maximum VD Supply	+8.5V	VG Range	-1.5V~-0.6V

## Typical Performance Curve

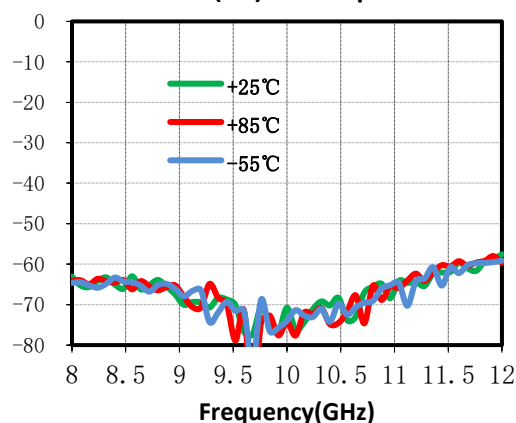
The following data are obtained from SAC3113B evaluation board

VD = + 8V, I<sub>DQ</sub> = 3A, CW, T<sub>A</sub> = + 25°C

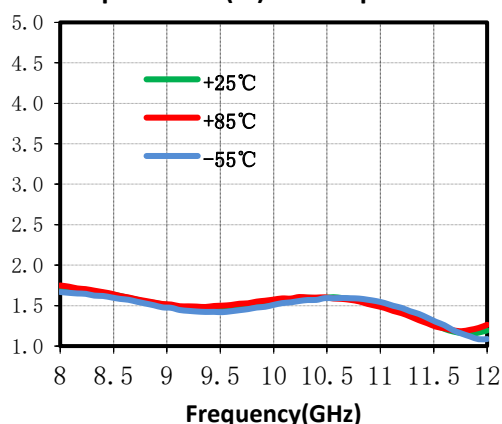
Small Signal Gain(dB) vs.Temperature



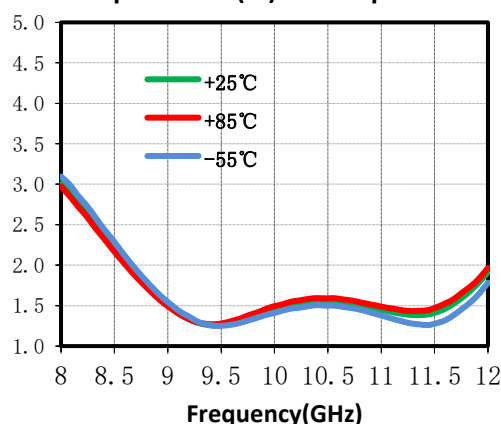
Isolation(dB) vs.Temperature



Input VSWR(:1) vs.Temperature



Output VSWR(:1) vs.Temperature



### SuperApex, LLC

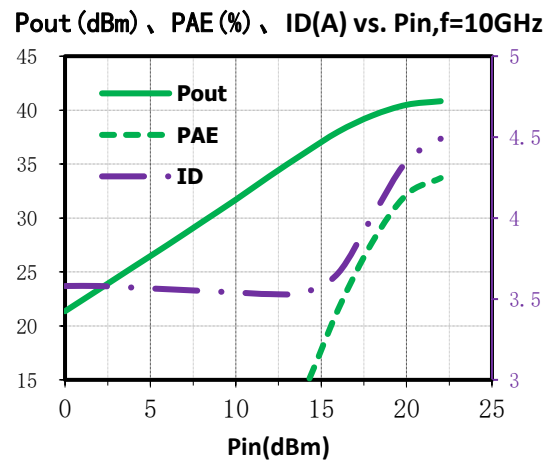
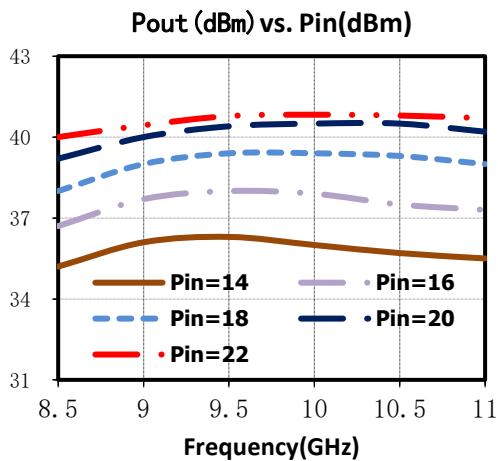
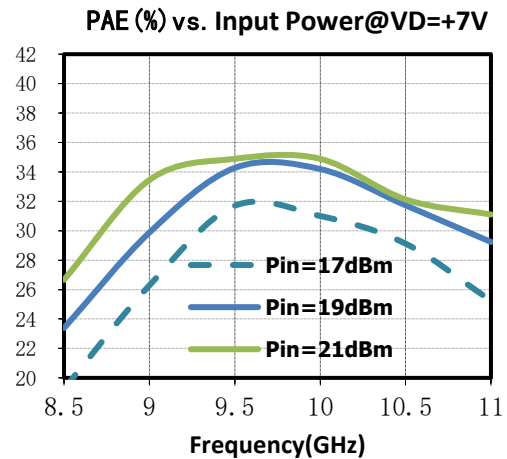
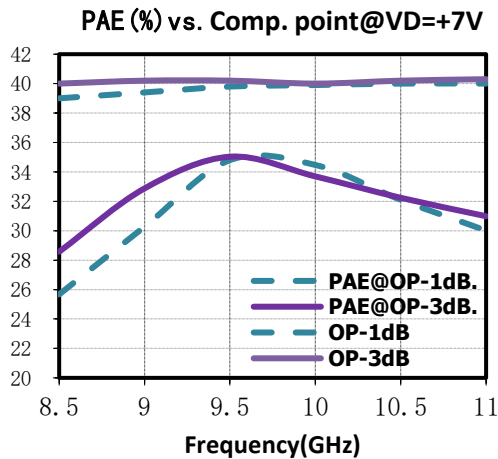
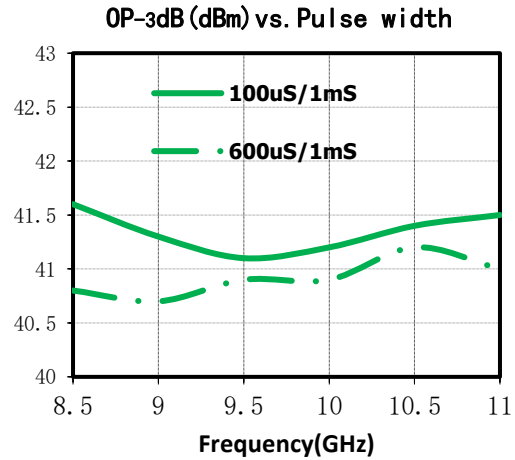
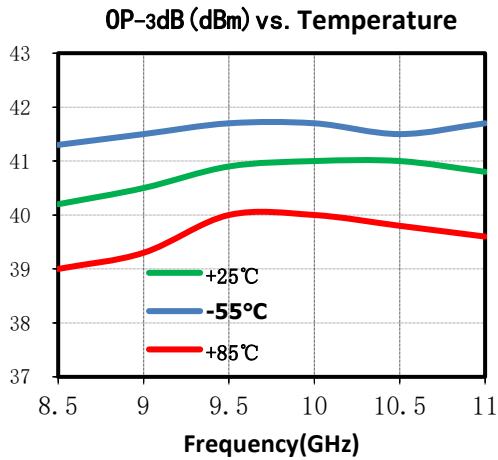
1580 S. Milwaukee Ave. Suite 405, Libertyville, IL 60048, USA  
Tel: 1-847-505-8319, 1-847-573-9866  
E-mail: sales@superapexco.com  
Website: www.superapexco.com

# SAC3113B



GaAs MMIC Power Amplifier  
8.5GHz~11GHz 40dBm

Rev 1.0



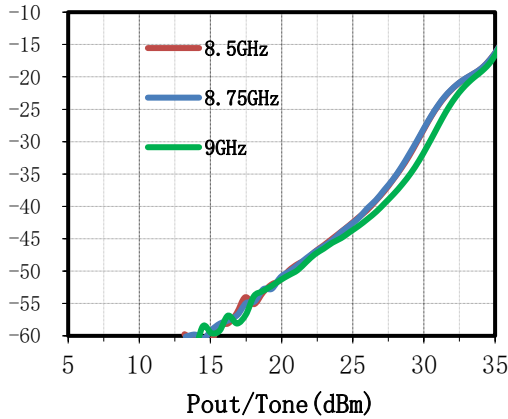
# SAC3113B



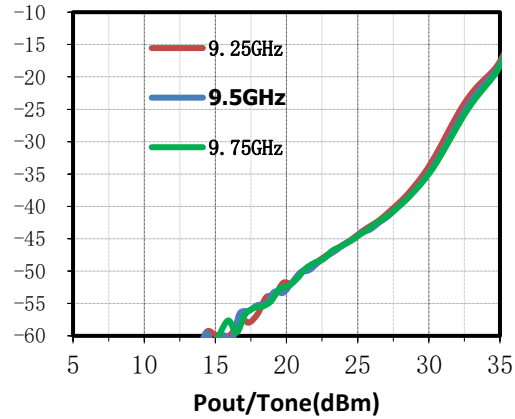
GaAs MMIC Power Amplifier  
8.5GHz~11GHz 40dBm

Rev 1.0

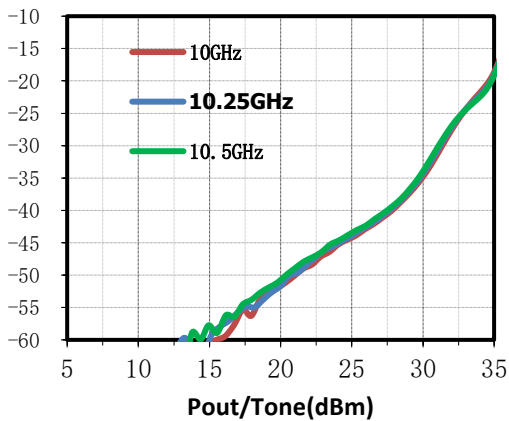
IM3 (dBc) vs. Pout/Tone



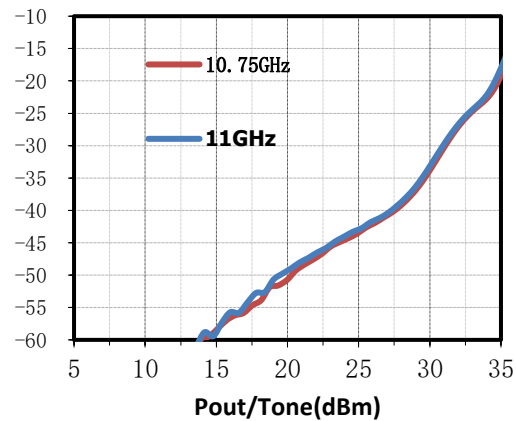
IM3 (dBc) vs. Pout/Tone



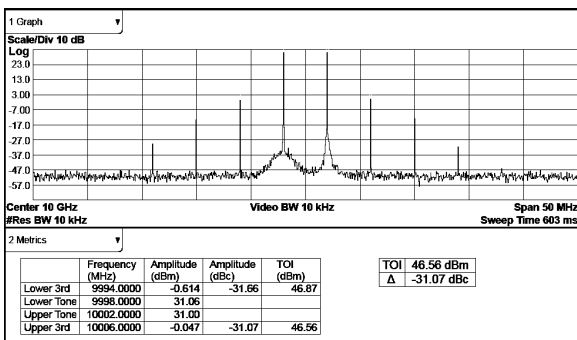
IM3 (dBc) vs. Pout/Tone



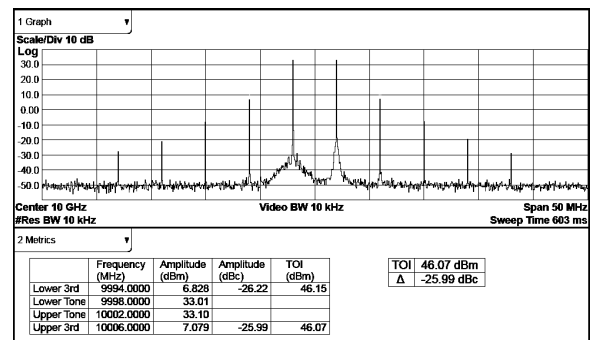
IM3 (dBc) vs. Pout/Tone



IM Spectrum, Pout/Tone=31dBm, fc=10GHz, Δf=4MHz



IM Spectrum, Pout/Tone=33dBm, fc=10GHz, Δf=4MHz



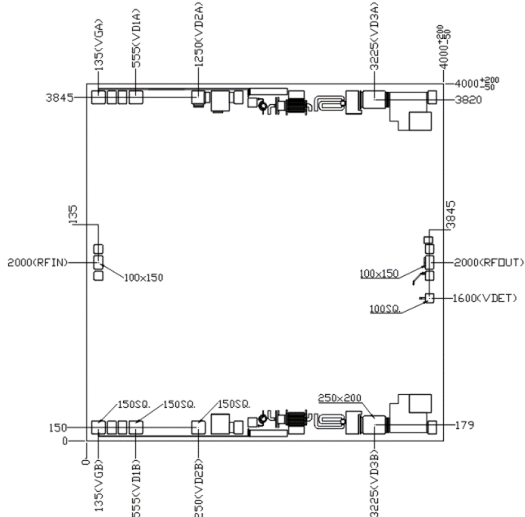
# SAC3113B

GaAs MMIC Power Amplifier  
8.5GHz~11GHz 40dBm

Rev 1.0

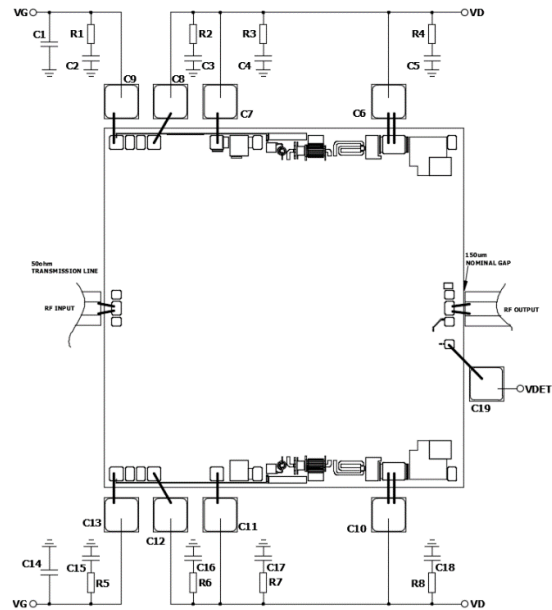
## Die Outline

(All dimensions in  $\mu\text{m}$ )



\*\*\*\*VDx and VGx need to be fed simultaneously on both sides

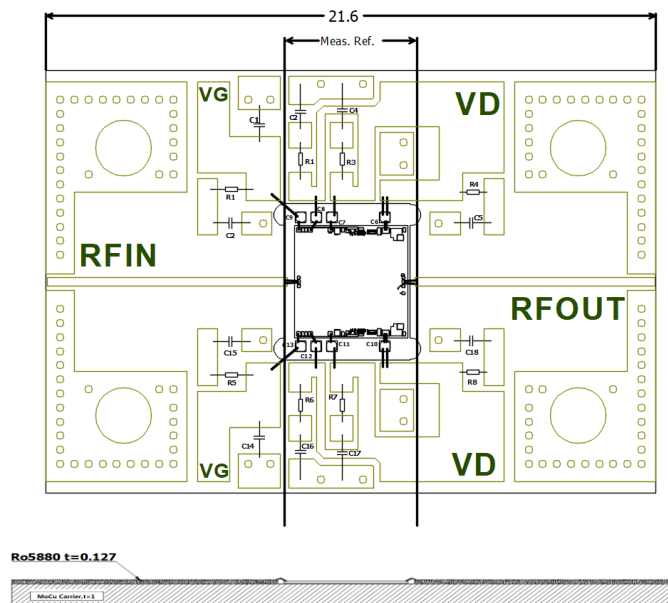
## Assembly Diagram



## BOM

Reference Des.	Value	Part Number	Manuf.	Size
C1、C14	10 $\mu\text{F}$	—	—	0805
C6~C13、C19	100pF	—	ANY	SLC
C2~C5	0.47 $\mu\text{F}$	—	—	0603
C15~C18	0.47 $\mu\text{F}$	—	—	0603
R1~R8	2R2	—	—	0603

## SAC3113B Evaluation board



# SAC3113B



GaAs MMIC Power Amplifier  
8.5GHz~11GHz 40dBm

Rev 1.0

## Notes

1. SAC3113B requires drain positive voltage (VDx) and grid negative voltage (VGx) bias. Before applying drain positive voltage, ensure that grid negative voltage has been applied;
2. The length of RF input/output gold wire should be as short as possible. It is recommended to use gold wire with diameter of 25  $\mu\text{m}$  for jointing;
3. Vacuum AuSn eutectic soldering is recommended, and sintered silver materials such as CT2700R7S can also be used for sintering;
4. When using drain pulse voltage modulation, ensure that the maximum overshoot voltage does not exceed 8.75V.

## Revision History

Revision	Date	Comment
1.0	November 10, 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