

## Features

- Frequency: 8GHz~12GHz
- Small Signal Gain: 24dB
- Output P<sub>-3dB</sub>: 39dBm
- PAE: 40%@P<sub>-3dB</sub>, f=10GHz
- IM<sub>3</sub>: -26dBc, 30dBm/Tone@10GHz
- Die size: 4.1mm×4.5mm×0.1mm
- Supply Voltage: +7V/-V<sub>g</sub>
- Packaged: Bare Die

## Typical Applications

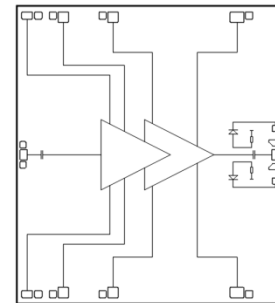
- X-band multifunction radar
- Point-to-Point Radio

## General Description

SAC3153 is a X-band GaAs MMIC power amplifier. SAC3153 provides 24dB of gain, and 39dBm of output power for 3 dB compression and 40% PAE from +7V 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<sub>A</sub>=25°C, V<sub>D</sub>=+7V, I<sub>DQ</sub>=2A, Z<sub>0</sub>=50Ω, CW

Parameter	Min.	Typ.	Max.	Units
Frequency Range	8	—	12	GHz
Small Signal Gain	21	24	—	dB
Small Signal Gain Flatness	—	±1.5	—	dB
Reverse Isolation	—	-65	—	dB
RF Input Port Return Loss	—	8	—	dB
Output P <sub>-3dB</sub>	37.5	39	—	dBm
Drain Voltage (V <sub>D</sub> )	7	—	8	V
Gate Current	—	2	35	mA
Supply Current (I <sub>D</sub> )***	—	—	5.5	A
Thermal Resistance	—	2.9	—	°C/W

\*\*\* Adjust V<sub>g</sub> between -1.5V to -0.4V to achieve I<sub>DQ</sub>= 2A , and typical V<sub>g</sub> voltage is -0.8V.

## Absolute Maximum Ratings

Maximum Input Power	+24dBm	Operating Temperature (Backside)	-55°C~+85°C
Channel Temperature	150°C	Storage Temperature	-55°C~+150°C
Maximum V <sub>D</sub>	+8.5V	V <sub>G</sub> Range	-3V~-0.4V

# SAC3153



GaAs MMIC Power Amplifier  
8GHz~12GHz 39dBm

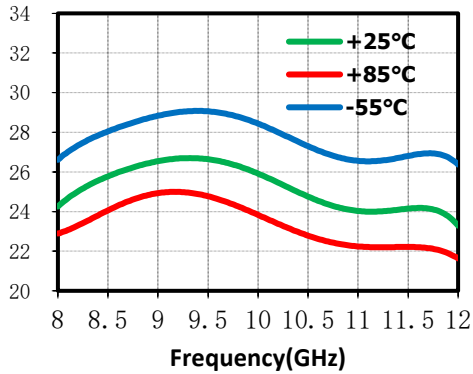
Rev 1.0

## Typical Performance Curve

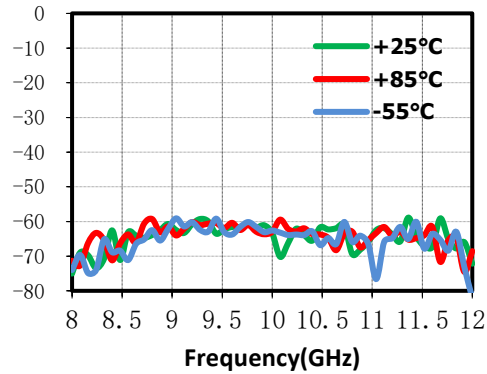
The following data are obtained by SAC3153 evaluation board

$V_D = +7V$ ,  $I_{DQ} = 2A$ , CW,  $T_A = +25^\circ C$

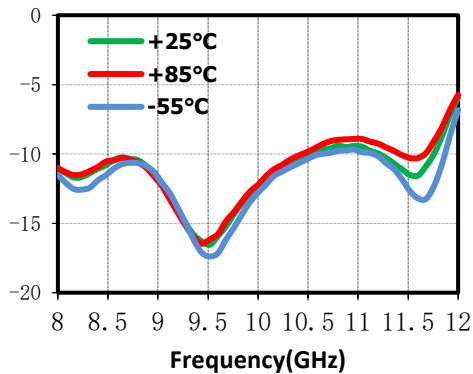
Small Signal Gain(dB) vs. Temperature



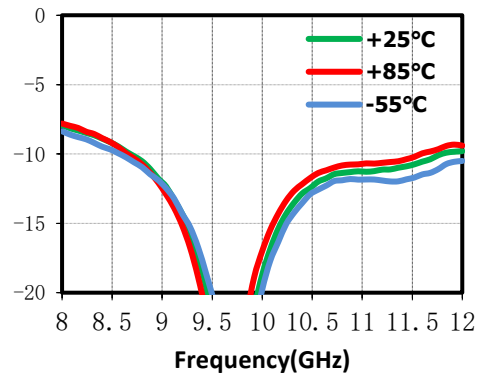
Isolation(dB) vs. Temperature



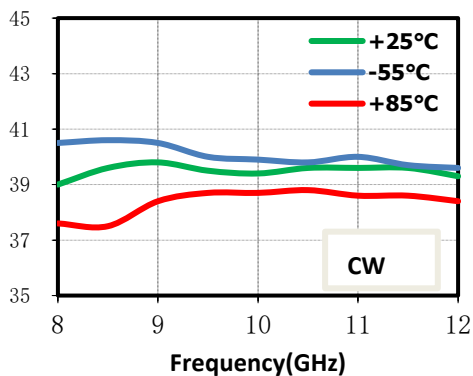
RF Input RL (dB) vs. Temperature



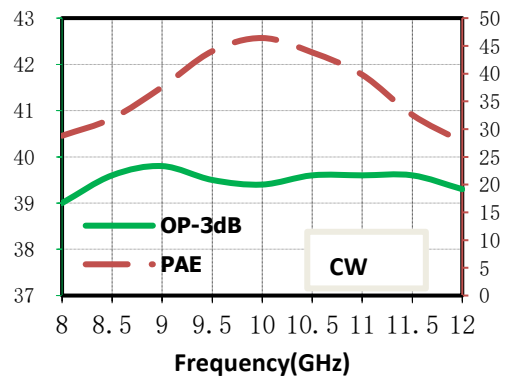
RF Output RL (dB) vs. Temperature



Output P<sub>3dB</sub>(dBm) vs. Temperature



OP<sub>3dB</sub>(dBm), PAE vs. Frequency



### 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

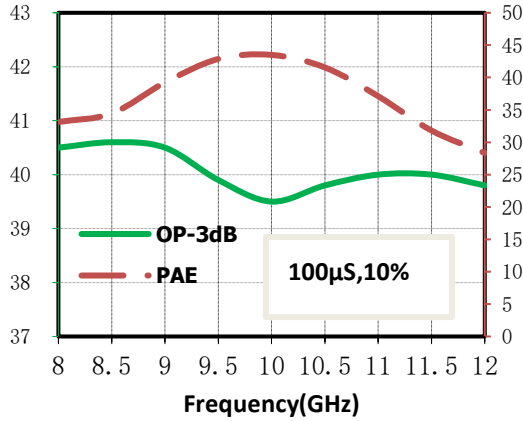
# SAC3153



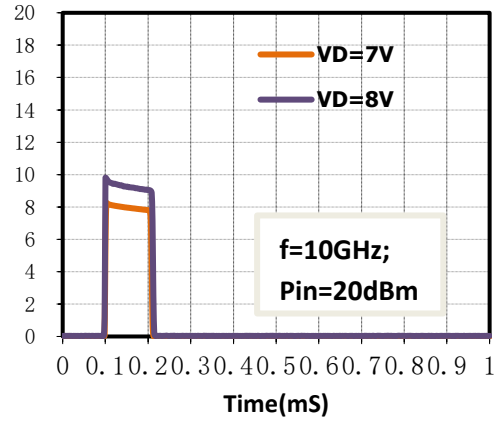
GaAs MMIC Power Amplifier  
8GHz~12GHz 39dBm

Rev 1.0

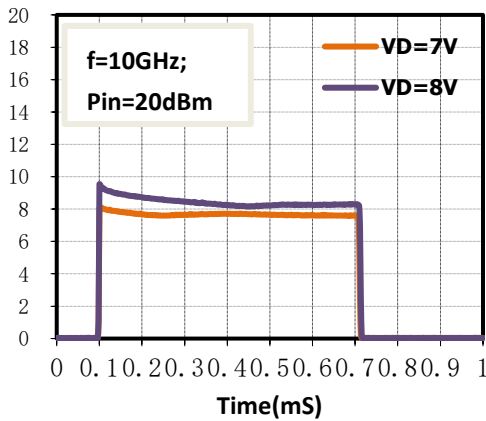
OP<sub>-3dB</sub>(dBm),PAE(%) vs. Frequency



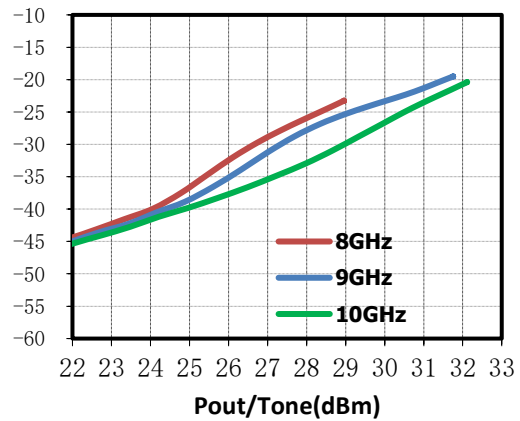
Output Power(W) vs. VD, 100µs, 10%



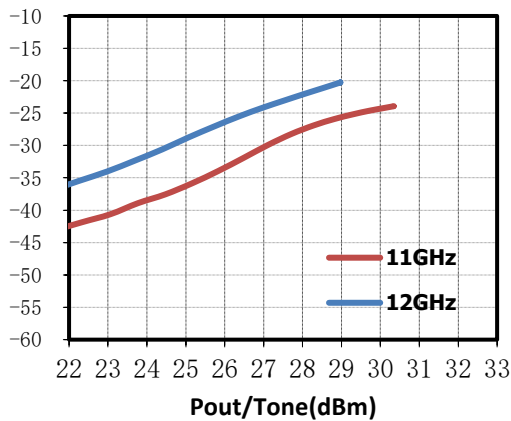
Output Power(W) vs. VD, 600µs, 60%



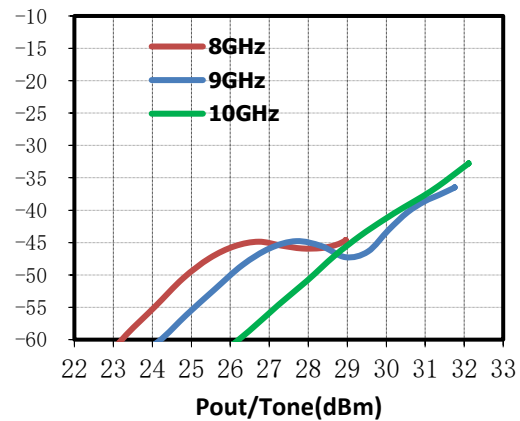
IM<sub>3</sub>(dBc) vs. Pout/Tone, CW



IM<sub>3</sub>(dBc) vs. Pout/Tone, CW



IM<sub>5</sub>(dBc) vs. Pout/Tone, CW



## 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

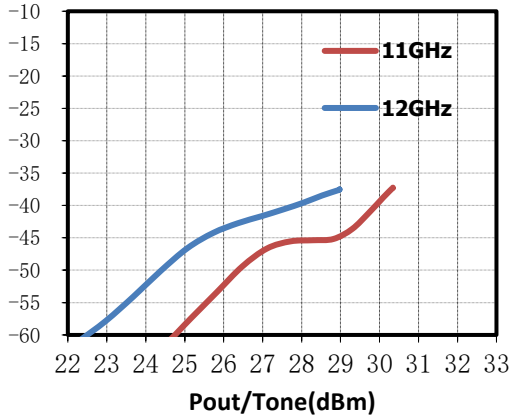
# SAC3153



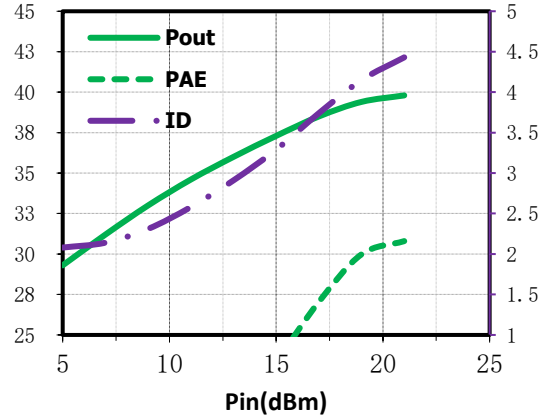
GaAs MMIC Power Amplifier  
8GHz~12GHz 39dBm

Rev 1.0

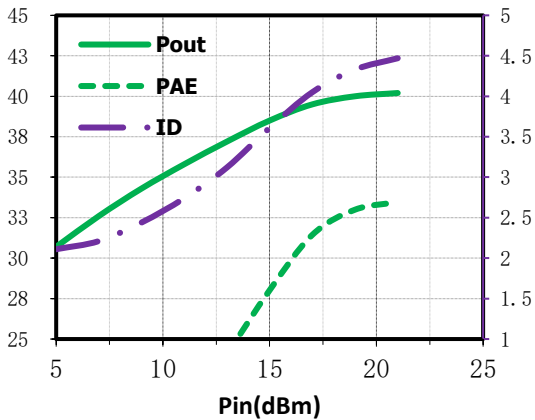
IM5(dBc)vs. Pout/Tone, CW



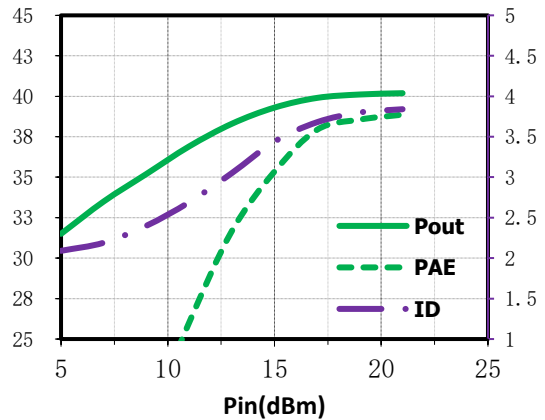
Pout(dBm)、PAE(%)、ID(A) vs. Pin, f=8GHz



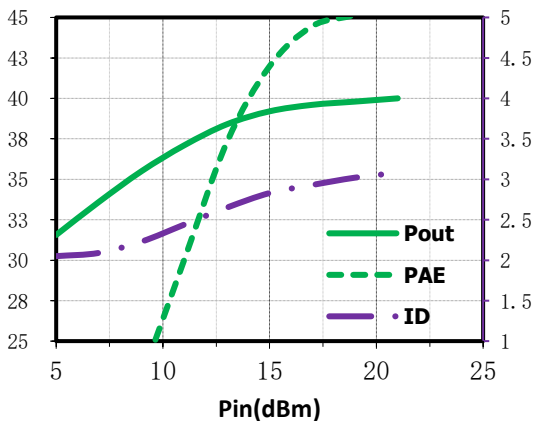
Pout(dBm)、PAE(%)、ID(A) vs. Pin, f=8.5GHz



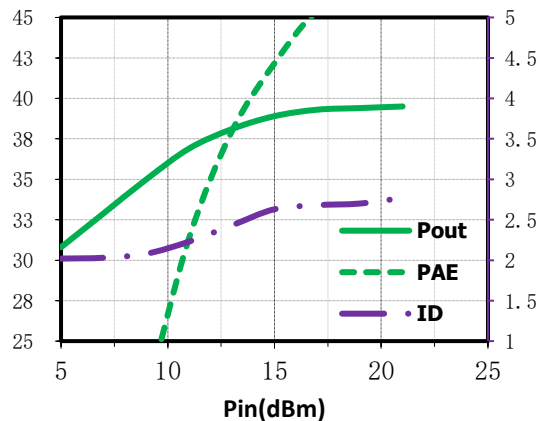
Pout(dBm)、PAE(%)、ID(A) vs. Pin, f=9GHz



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



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



**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

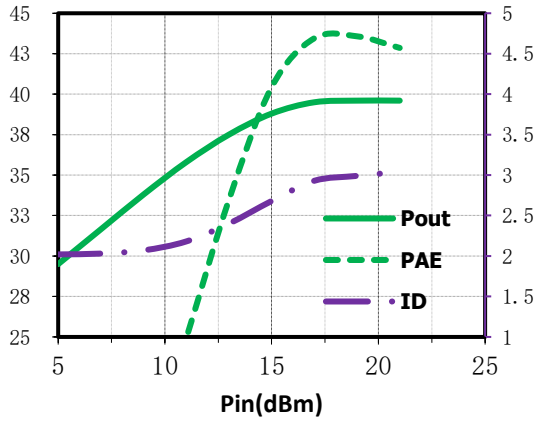
# SAC3153



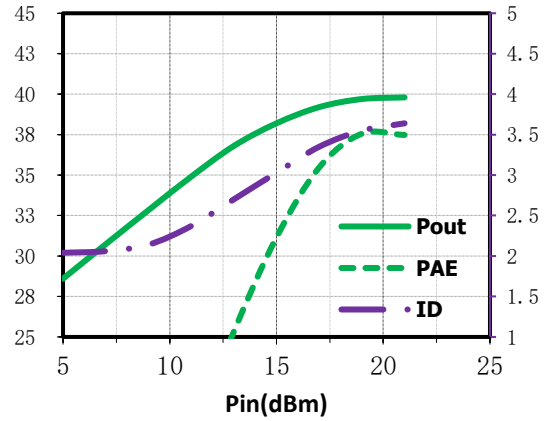
GaAs MMIC Power Amplifier  
8GHz~12GHz 39dBm

Rev 1.0

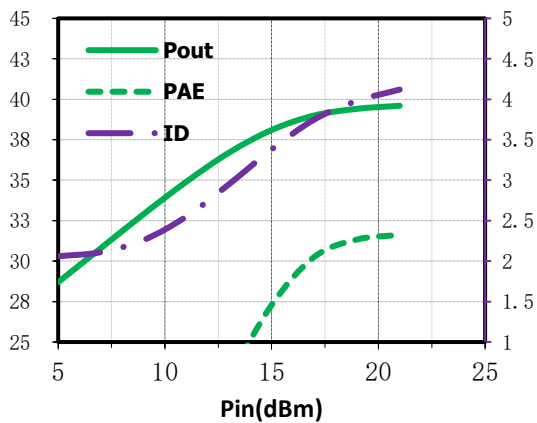
Pout(dBm)、PAE(%)、ID(A) vs. Pin, f=10.5GHz



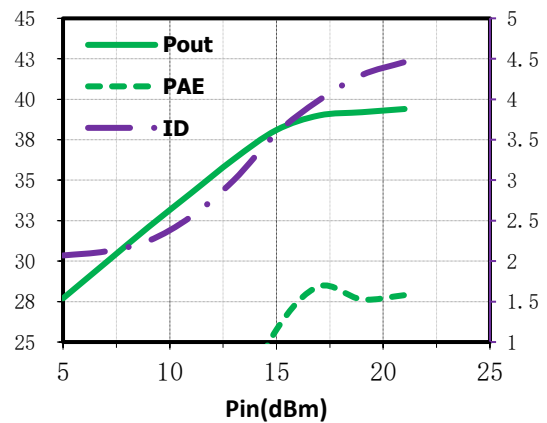
Pout(dBm)、PAE(%)、ID(A) vs. Pin, f=11GHz



Pout(dBm)、PAE(%)、ID(A) vs. Pin, f=11.5GHz



Pout(dBm)、PAE(%)、ID(A) vs. Pin, f=12GHz



## 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

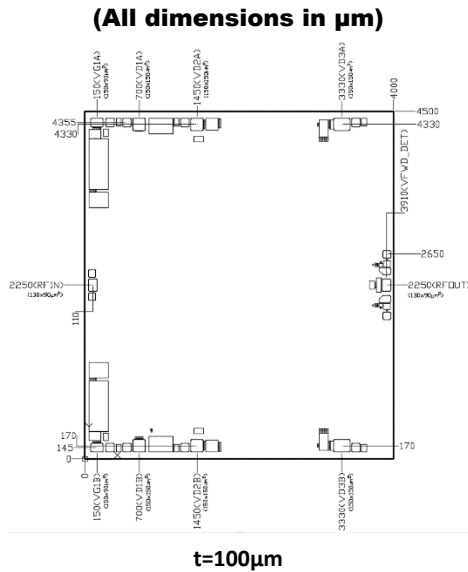
# SAC3153



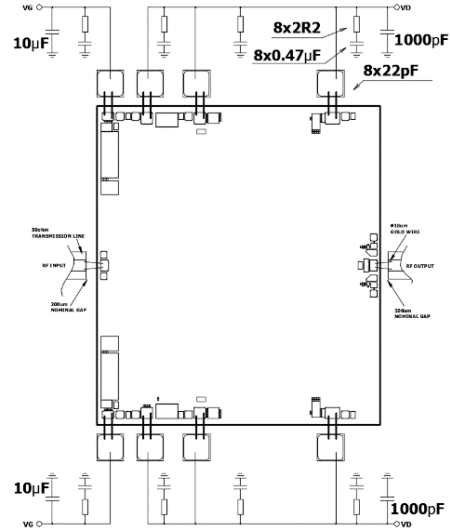
GaAs MMIC Power Amplifier  
8GHz~12GHz 39dBm

Rev 1.0

## Die Outline



## Assembly Diagram



V<sub>Dx</sub> and V<sub>Gx</sub> need to be fed simultaneously on both sides

## Attention:

1. SAC3153 requires drain positive voltage (V<sub>Dx</sub>) and gate negative voltage (V<sub>Gx</sub>) 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. The single-layer decoupling capacitor shall be of small volume and thin dielectric type as far as possible;
4. 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

## 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