

# SAC3133A

GaAs MMIC Power Amplifier  
14GHz~18GHz 38dBm

Rev 1.0

## Features

- Frequency: 14GHz~18GHz
- Small Signal Gain: 20dB
- Output P<sub>-1dB</sub>: 38 dBm
- PAE: 25%
- IM<sub>3</sub>: -24dBc, 30dBm/Tone@16GHz
- Die Size: 3.4mm×3.57mm×0.1mm
- Supply Voltage: +7V/-V<sub>G</sub>
- Packaged: Bare Die

## Typical Applications

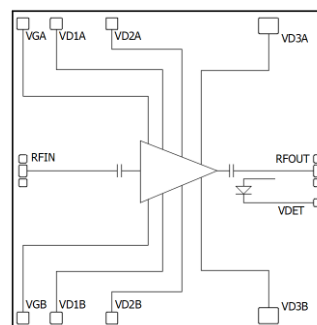
- Point-to-Point Radios
- SATCOM
- Military and Space
- Radar

## General Description

The SAC3133A is a Ku-band GaAs MMIC power amplifier. The SAC3133A provides 20 dB of gain, and 38dBm of output power for 1 dB compression and 25% 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>=2.5A, Z<sub>0</sub>=50Ω, CW)

Parameter	Min.	Typ.	Max.	Units
Frequency Range	14	—	18	GHz
Small Signal Gain	16	20	—	dB
Small Signal Gain Flatness	—	±1.5	—	dB
Reverse Isolation	—	-65	—	dB
RF Input Port Return Loss	—	-8	—	dB
Power Added Efficiency	—	25	—	%
Output P-1dB	37	38	—	dBm
IM <sub>3</sub> *	—	24	—	dBc
Drain Voltage (VD)	—	7	—	V
Gate Current	—	2	22	mA
Supply Current (ID)***	—	—	4.75	A
Thermal Resistance**	—	3.3	—	°C/W

\* P<sub>out</sub>/Tone= 30dBm, f<sub>c</sub> = 16GHz, Δf = 4MHz

\*\* Measurement taken at P<sub>out</sub> = OP<sub>-1dB</sub>

\*\*\* Adjust V<sub>G</sub> between -1V to -0.6V to achieve I<sub>DQ</sub>= 2.5A typical.

## Absolute Maximum Ratings

Maximum Input Power	+25dBm	Operating Temperature (Backside)	-55°C~+85°C
Channel Temperature	165°C	Storage Temperature	-55°C~+150°C
Maximum V <sub>D</sub>	+8V	V <sub>G</sub> Range	-1.5V~-0.5V

## SuperApex Corporation

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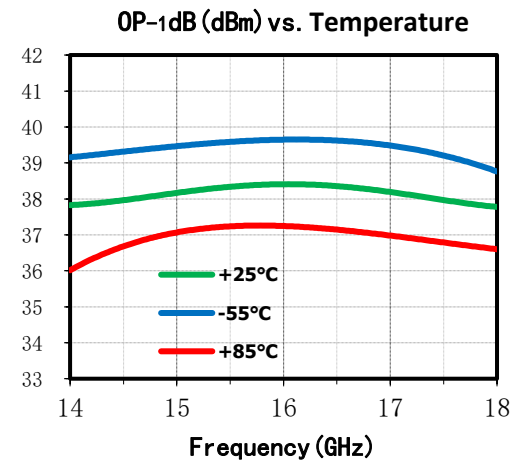
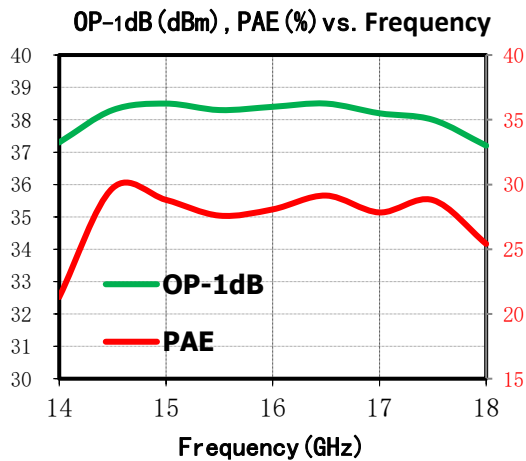
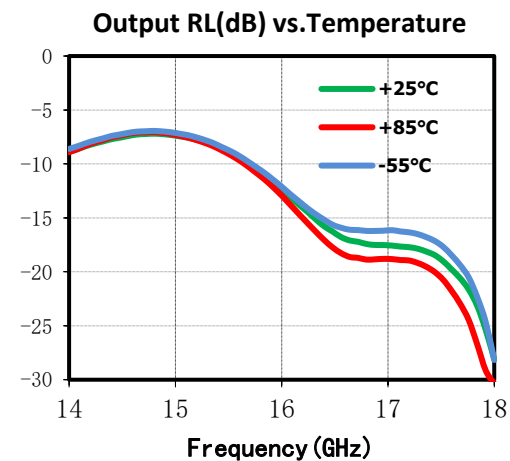
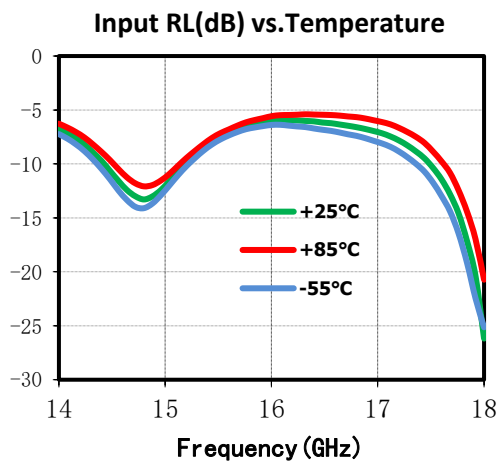
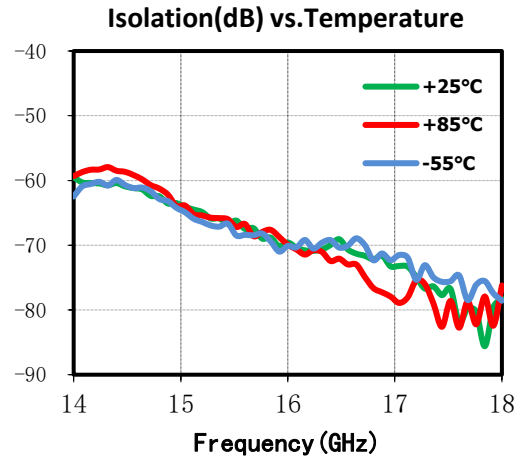
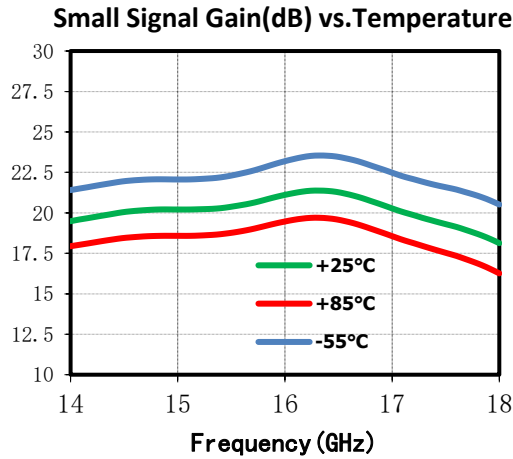
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## Typical Performance Curve

The following data are obtained by SAC3133A evaluation board

$V_D = +7V, I_{DQ} = 2.5A, CW, T_A = +25^\circ C$



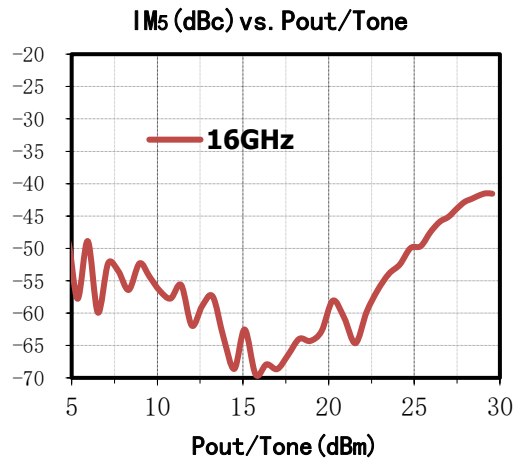
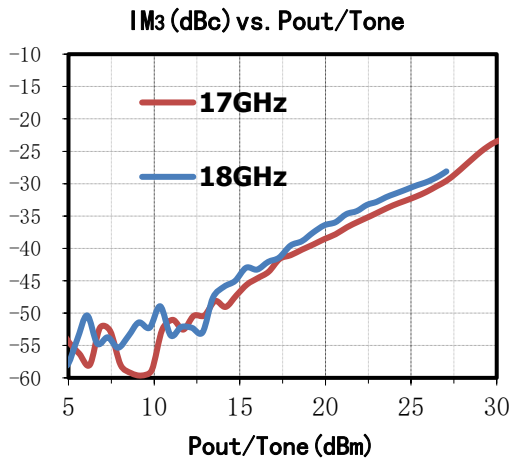
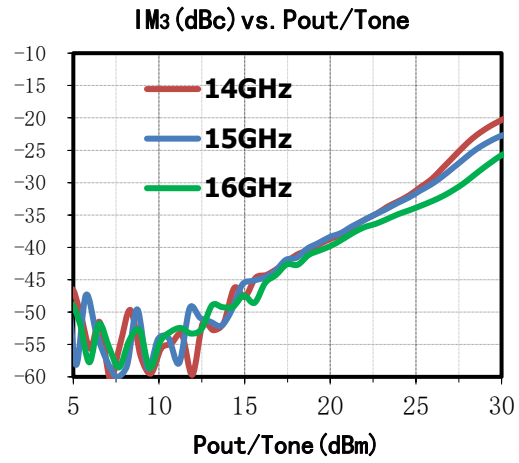
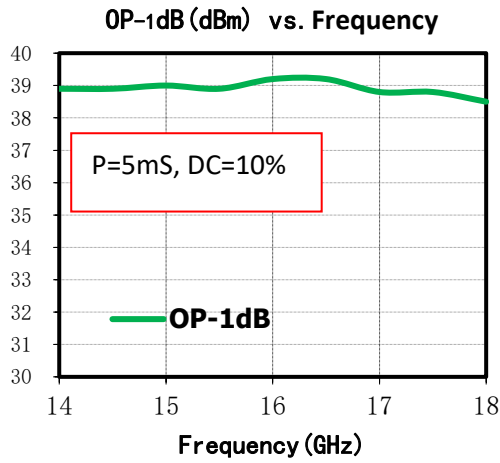
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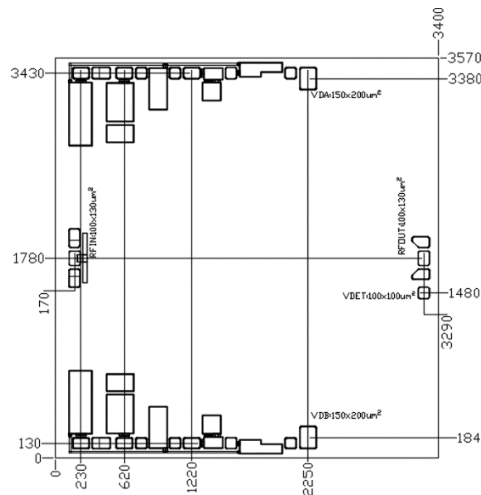
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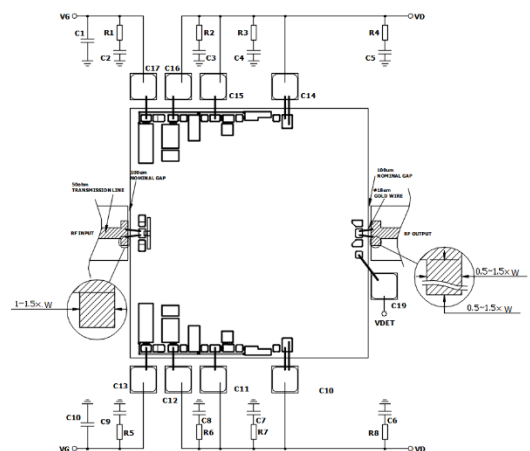


## Die Outline (all dimensions in $\mu\text{m}$ )



Pads size: 100x130 $\mu\text{m}^2$ , t=100 $\mu\text{m}$

## Assembly Diagram



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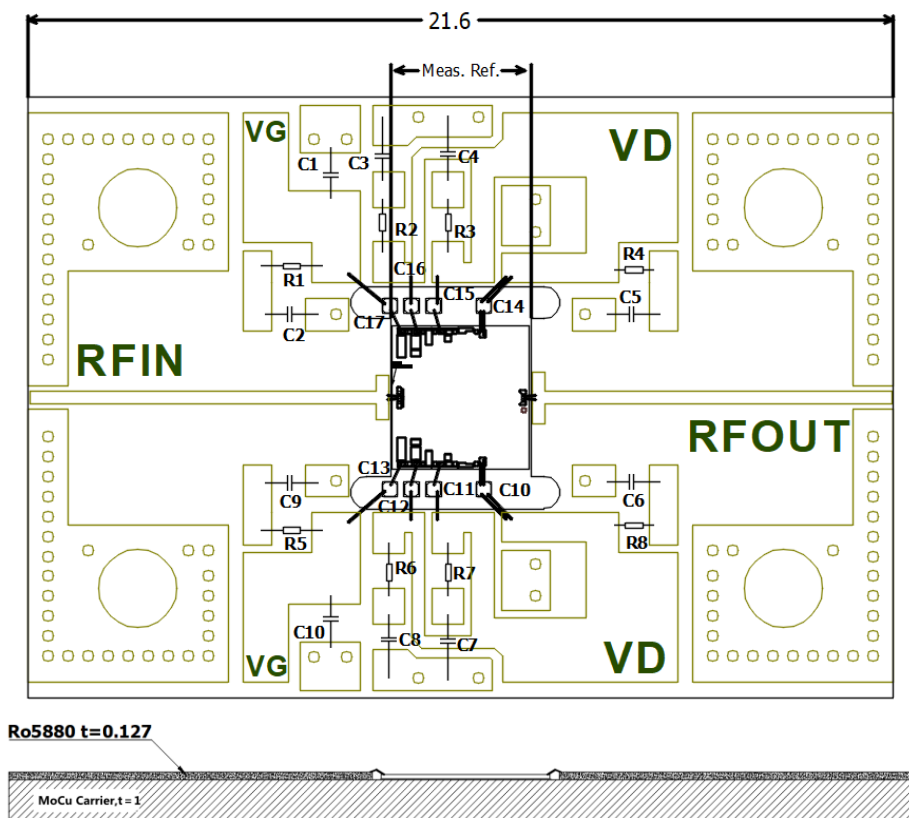
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## Components List

Reference Des.	Value	Part Number	Manuf.	Size
C10~C17、C19	100pF	—	—	SLC
C2~C9	0.47μF	—	—	0603
C1、C10	10μF	—	—	0805
R1~R8	1Ω	—	—	0603

## SAC3133A EVB



### Attention:

1. The SAC3133A is biased with a positive drain supply and negative gate supply. The recommended gate voltage is set to -0.6 to -1V when the drain voltage is set to 7V;
2. RF connections should be made as short as possible to reduce the inductive effect of the bond wire. Use of a 0.8 mil thermosonic wedge bonding is highly recommended as the loop height will be minimized;
3. Vacuum AuSn eutectic soldering is recommended;
4. The maximum spike voltage at drains (VDxx) should not exceed 8.5v.

### Revision History

Revision	Date	Comment
1.0	August 15, 2021	First Release

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