

# SAC3941A



GaAs MMIC Power Amplifier  
18GHz~41GHz 21dBm

Rev 1.1

## Features

- Frequency: 18GHz~41GHz
- Small Signal Gain: 19dB
- Output P<sub>-1dB</sub>: 21dBm
- Supply Voltage: +5V/-0.7Vg
- Die Size: 1.84mm×0.85mm×0.1mm
- Packaged: Bare Die

## Typical Applications

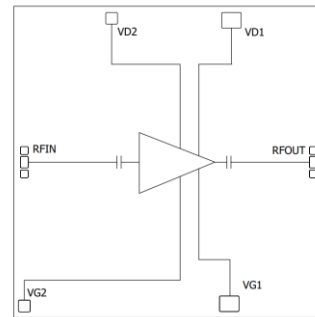
- Microwave radio
- Telecommunication
- Test instrumentation
- SatCom
- VSAT

## General Description

SAC3941A is a wideband GaAs MMIC power amplifier. SAC3941A provides 19 dB of gain, and 21dBm of Output P<sub>-1dB</sub> power from a +5V supply voltage.

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>=+5V, I<sub>DQ</sub>=180mA, Z<sub>0</sub>=50Ω

Parameter	Min.	Typ.	Max.	Units
Frequency Range	18	—	41	GHz
Small Signal Gain	17	19	23	dB
Small Signal Gain Flatness	—	±3	—	dB
Reverse Isolation	—	-55	-40	dB
Input VSWR	—	1.5	2.2	dB
Output VSWR	—	1.5	4.5	dB
Output Power for 1 dB Compression (OP <sub>-1dB</sub> )	19	22	—	dBm
Drain Voltage (V <sub>D</sub> )	4.5	—	6.5	V
Gate Current (V <sub>G</sub> )	—	-0.7	—	V
Supply Current (I <sub>D</sub> )	—	180	250	mA

## Absolute Maximum Ratings

Maximum Input Power	+20dBm	Operating Temperature (Chip back temperature)	-55°C~+85°C
Channel Temperature	165°C	Storage Temperature	-55°C~+150°C
Maximum V <sub>D</sub>	+7V	V <sub>G</sub> Voltage Range	-1.5V~-0.55V

## SuperApex, LLC

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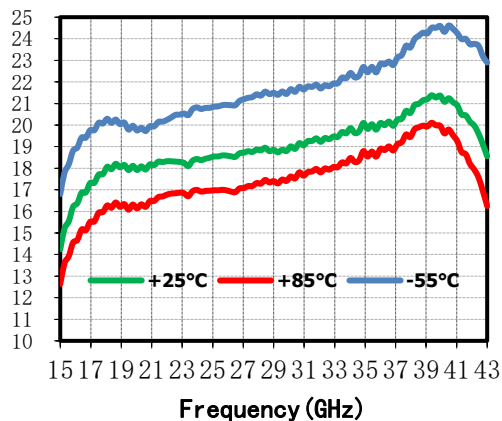
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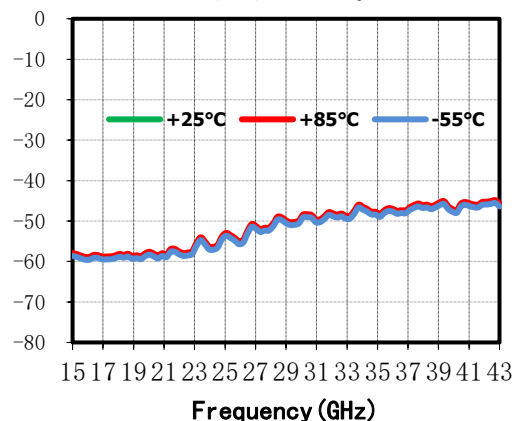
## Typical Performance Curve

$V_D=+5V, I_{DQ}=-0.7V, I_{DQ}=180mA, T_A=+25^\circ C$  The following curves are taken from SAC3941A bare die.

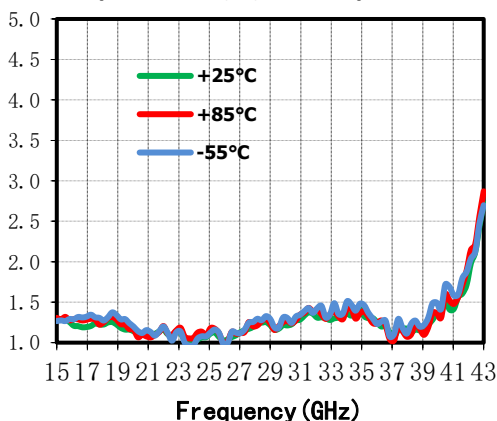
Small Signal Gain(dB) vs.Temperature



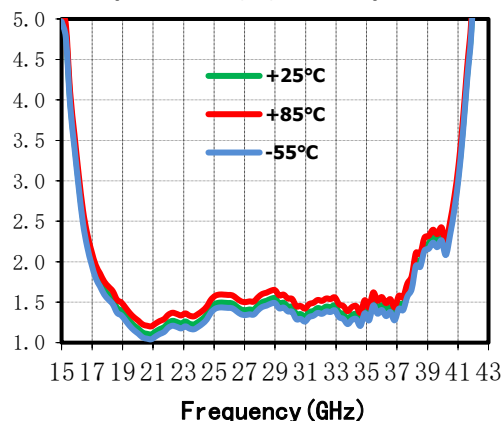
Isolation(dB) vs.Temperature



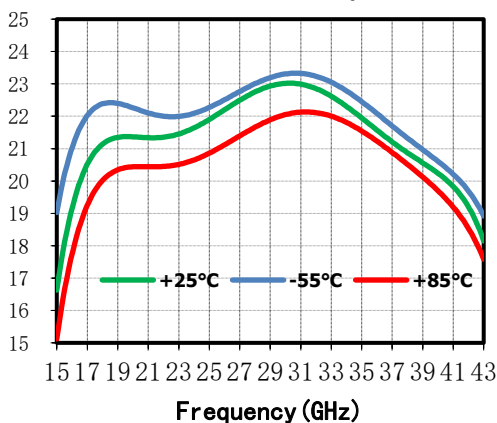
Input VSWR(:1) vs.Temperature



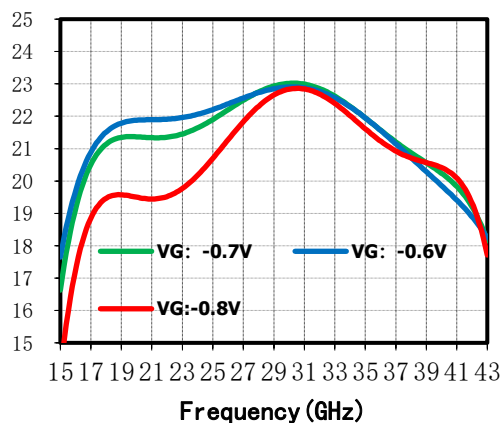
Output VSWR(:1) vs.Temperature



OP-1dB (dBm) vs. Temperature



OP-1dB (dBm) vs. VG



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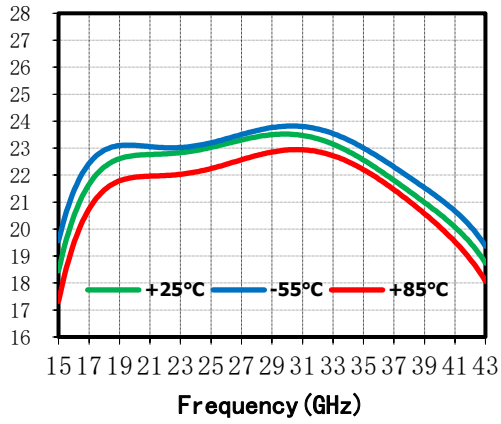
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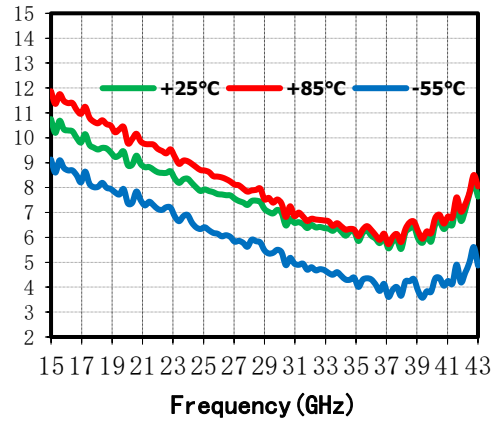
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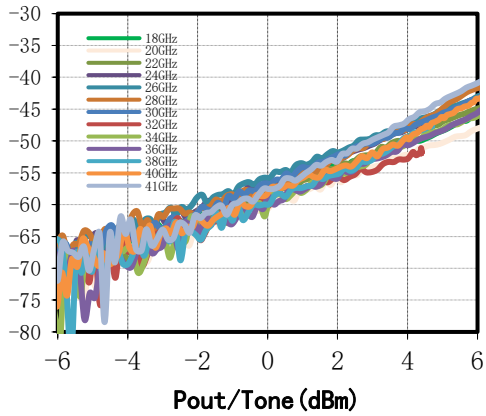
OP-3dB (dBm) vs. Temperature



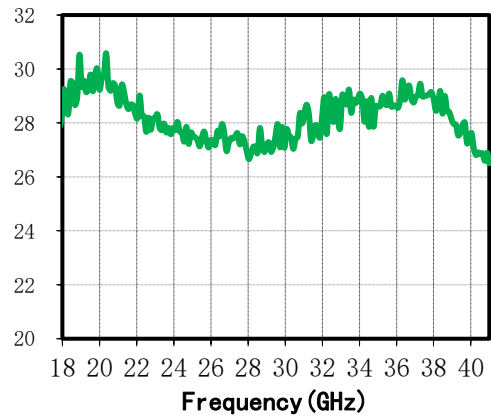
Noise Figure (dB) vs. Frequency



IM3 (dBC) vs. Pout/Tone



OIP3 (dBm) vs. Frequency



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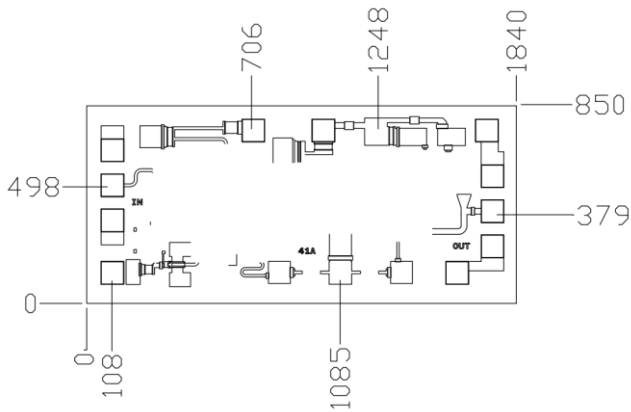
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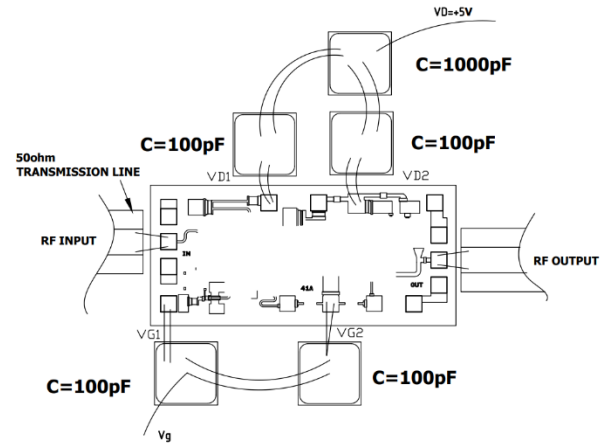
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**Die Outline(μm)**



**Assembly Diagram**



## Notes

1. SAC3941A is biased with a positive drain supply (VDx) and negative gate supply (VGx). Before applying the drain positive voltage, it is necessary to ensure that the gate negative voltage has been applied.
2. RF connections should be made as short as possible to reduce the inductive effect of the bond wire. Use of a 25 mil thermosonic wedge bonding is highly recommended as the loop height will be minimized. The RF input require a single bond wire output require a double bond wire as shown.
3. The backside of the SAC3941A is RF ground. Eutectic mounting is preferred, if using conductive epoxy, recommended epoxies are CT2700R7S or EK2000 cured per the manufacturer's cure schedule. Epoxy should be applied in accordance with the manufacturers specifications and should avoid contact with the top surface of the die. An epoxy fillet should be visible around the total die periphery.

## Revision History

Revision	Date	Comment
1.0	Sep 03, 2024	First Release
1.1	Feb 26, 2025	Text errata correction

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