

SAC3145

GaAs MMIC Power Amplifier
2GHz~6GHz 30dBm

Rev 1.0

Features

- Frequency: 2GHz~6GHz
- Small Signal Gain: 21dB
- Output P_{1dB}: 30dBm CW
- PAE: 29%@OP-1dB,f=4GHz
- IM3: -30dBc, 23dBm/Tone@4GHz
- Die Size: 2.3mm × 1.39mm × 0.1mm
- Supply Voltage: +8V/-Vg
- Packaged: Bare Die

General Description

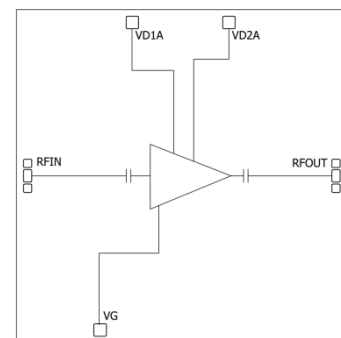
SAC3145 is a S-band and C-band GaAs power amplifier. SAC3145 provides 21 dB of gain, and 30dBm of output power for 1 dB compression (Typ.) from a +8 supply.

The surface of SAC3145 chip is covered with dielectric layer protective layer, which has good environmental adaptability and stability. At the same time, the chip adopts on-chip metallization process to ensure good grounding. The back of the chip is metallized.

Typical Applications

- S-band and C-band multifunction radar
- Point-to-Point Radios

Functional Diagram



Electrical Performance

T_A=25°C, V_D=+8V, I_{DQ}=0.45A, Z₀=50Ω, CW

Parameter	Min.	Typ.	Max.	Units
Frequency	2	—	6	GHz
Small Signal Gain	20	21	—	dB
Small Signal Gain Flatness	—	±1	—	dB
Reverse Isolation	—	-50	—	dB
RF input port VSWR	—	1.7	2.8	:1
RF output port VSWR	—	1.6	2.2	:1
Power-Added Efficiency	—	29	—	%
Output P _{1dB}	28	30	—	dBm
IM ₃ *	—	30	—	dBc
Drain Voltage (V _D)	7	—	8.5	V
Gate Current	—	20	—	μA
Supply Current(I _D)* *	—	—	0.7	A
Thermal Resistance	—	28.8	—	°C/W

* P_{out}/Tone=23dBm, f_c=4GHz, Δf=4MHz

**Adjust the V_g voltage (-1 ~ -0.6v) so that the I_{DQ} is about 0.45A, and the typical V_g voltage is -0.65V

SuperApex, LLC

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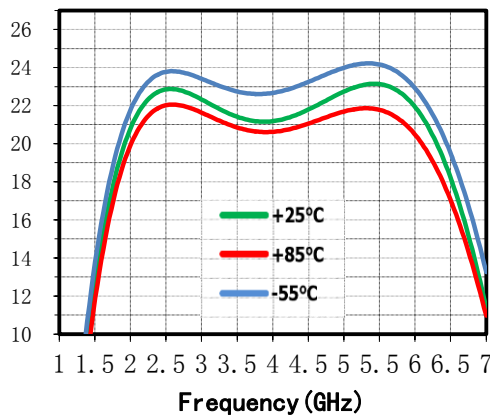
Absolute Maximum Ratings

Maximum Input Power	+24dBm(30s)	Operating Temperature (Backside)	-55°C~+85°C
Channel Temperature	165°C	Storage Temperature	-55°C~+150°C
Maximum V _D Supply	+8.5V	V _G Range	-1.3V(Pinch Off)~-0.5V

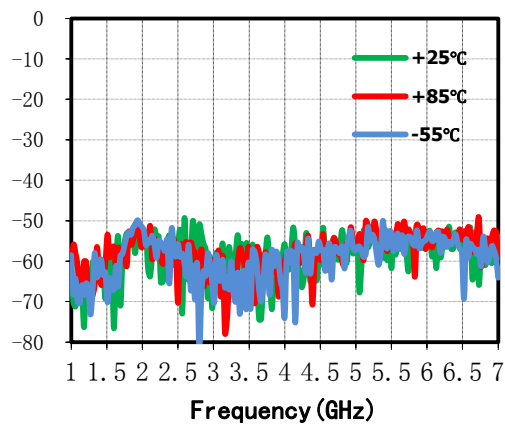
Typical Performance Curve

The following data are obtained by SAC3145 evaluation board test, V_D = + 8V, I_{DQ} = 0.45A, working mode CW, T_A = + 25°C

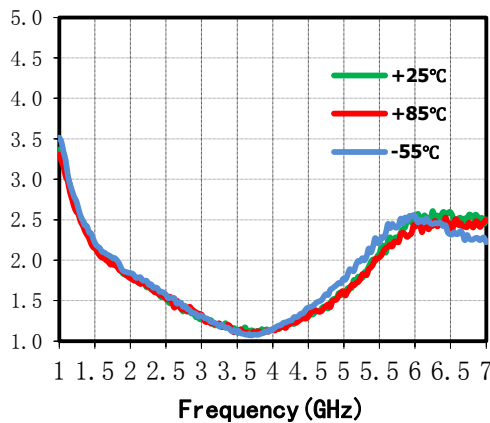
Small Signal Gain(dB) vs.Temperature



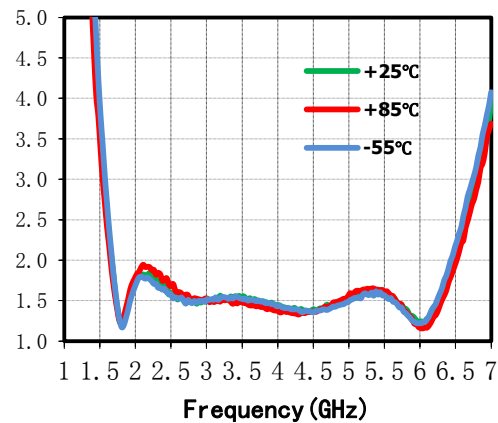
Isolation(dB) vs.Temperature



Input VSWR(:1) vs.Temperature



Output VSWR(:1) vs.Temperature



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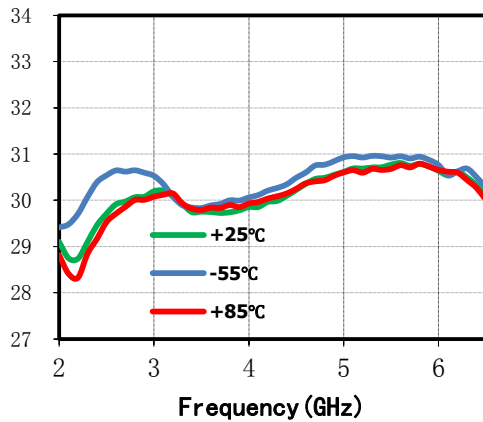
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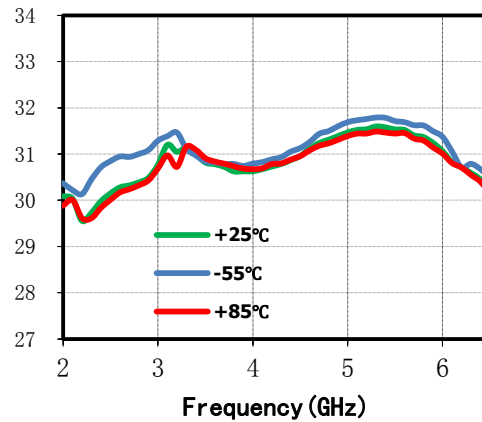
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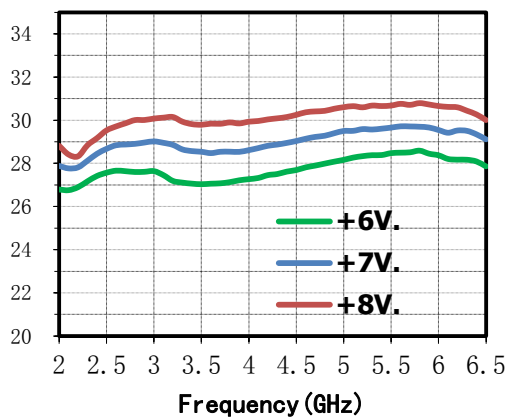
OP-1dB (dBm) vs. Temperature



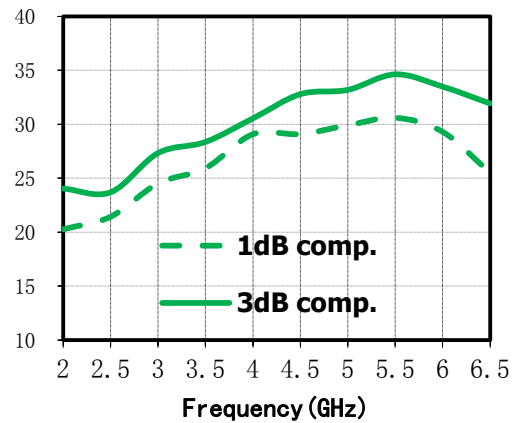
OP-3dB (dBm) vs. Temperature



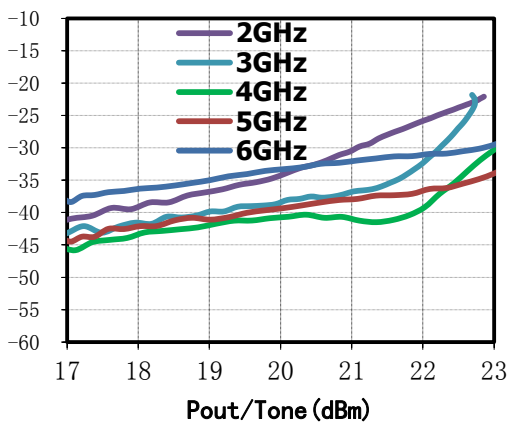
OP-1dB (dBm) vs. Bias



PAE (%) vs. Comp. point



IM3 (dBc) vs. Pout/Tone



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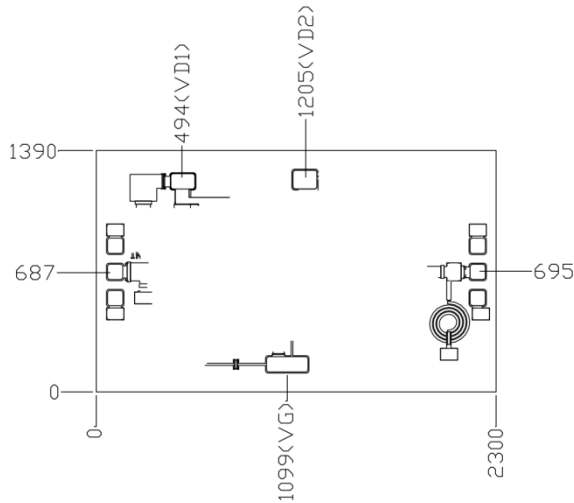
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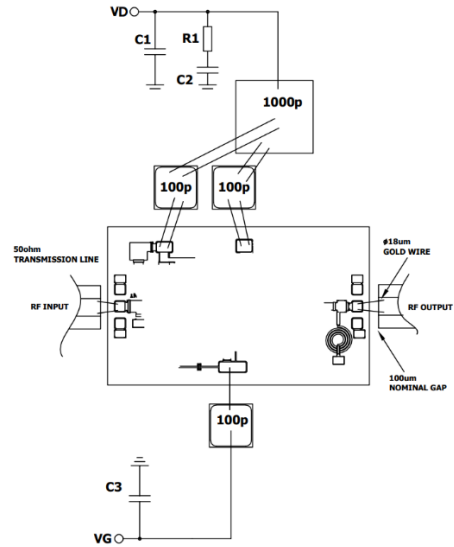
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Outline Drawing (All dimensions in μm)



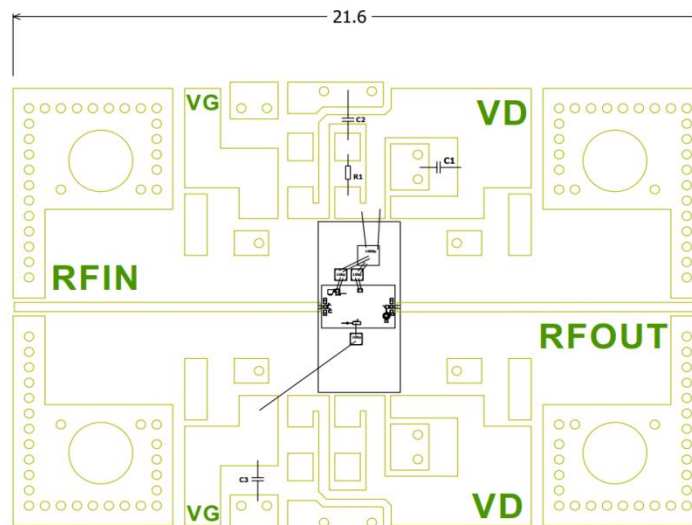
Assembly Diagram



Components List

Reference Des.	Value	Part Number	Manuf.	Size
C1, C3	10 μF	—	—	0805
C2	0.47 μF	—	—	0603
R1	2.2 Ω	—	—	0603

SAC3145 Chip Test Fixture



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Attention:

1. SAC3145 requires drain positive voltage (V_{Dx}) and grid negative voltage (V_{Gx}) bias. Before applying drain positive voltage, ensure that grid negative voltage has been applied. When closing, ensure that drain positive voltage is turned off before grid negative pressure;
2. The length of RF input / output gold wire shall be shortened as much as possible. It is recommended to use gold wire with a diameter of 25 μ m;
3. It is recommended to use vacuum AuSn eutectic welding.

Revision History

Revision	Date	Comment
1.0	August 26, 2021	First Release

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