

SAC3145Q4

GaAs MMIC Power Amplifier
2GHz~6GHz 30dBm

Rev 1.1

Features

- Frequency: 2GHz~6GHz
- Small Signal Gain: 21dB
- Output P_{-1dB}: 30dBm CW
- PAE: 29%@OP-1dB, f=4GHz
- IM₃: -30dBc, 23dBm/Tone@4GHz
- Supply Voltage: +8V/-V_g
- Packaged: 4mm×4mm×1.2mm

Typical Applications

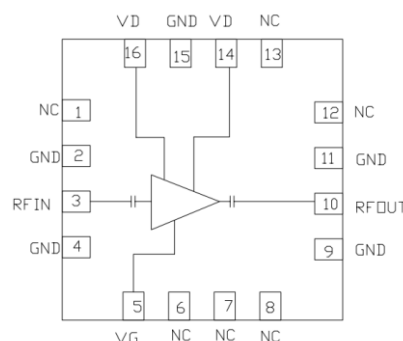
- S-band and C-band multifunction radar
- Point-to-Point Radios

General Description

SAC3145Q4 is a S-band and C-band GaAs power amplifier. SAC3145Q4 provides 21 dB of gain, and 30dBm of output power for 1 dB compression (Typ.) from a +8 supply.

SAC3145Q4 is assembled in a lead-free 4mm x 4mm 16-lead QFN plastic package.

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)	—	8	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

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

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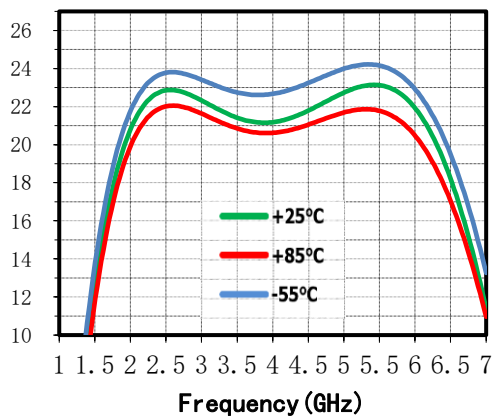
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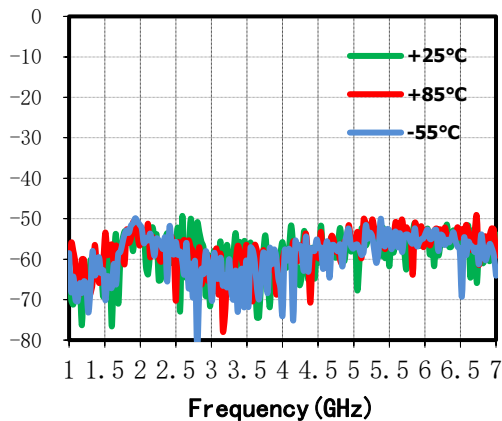
Typical Performance Curve

The following data are obtained by SAC3145Q4 evaluation board test, $V_D = +8V$, $I_{DQ} = 0.45A$, working mode CW, $T_A = +25^\circ C$

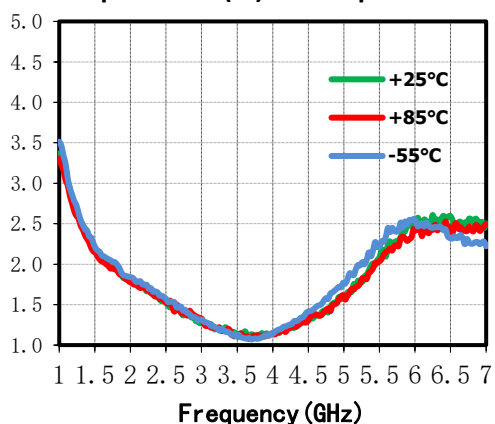
Small Signal Gain(dB) vs.Temperature



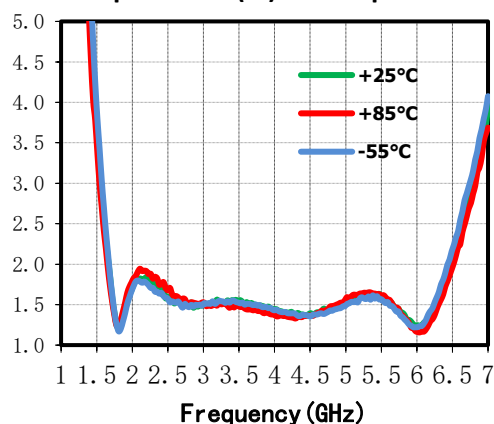
Isolation(dB) vs.Temperature



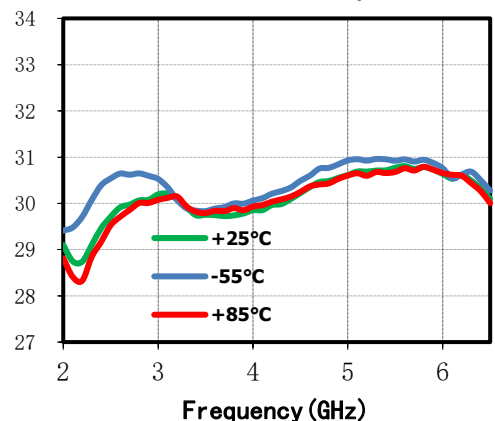
Input VSWR(:1) vs.Temperature



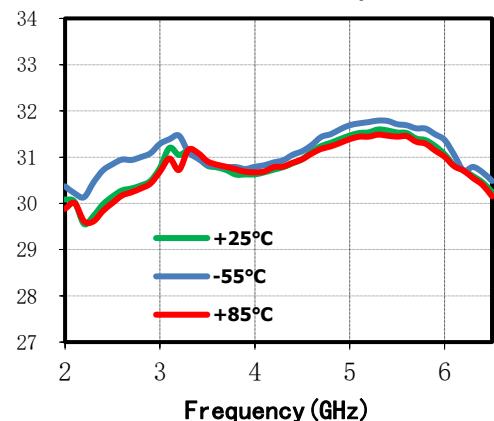
Output VSWR(:1) vs.Temperature



OP-1dB (dBm) vs. Temperature



OP-3dB (dBm) vs. Temperature



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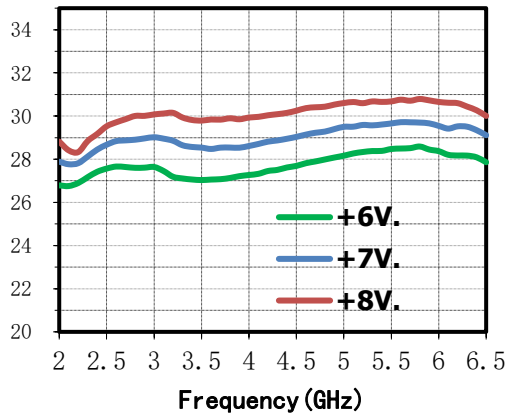
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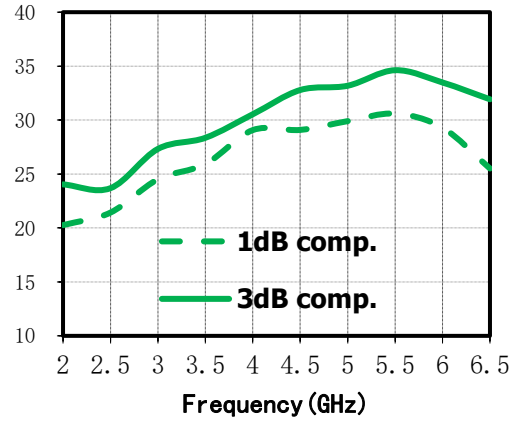
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Rev 1.1

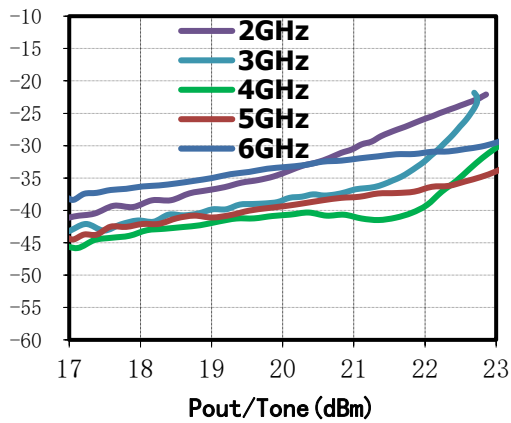
OP-1dB (dBm) vs. Bias



PAE (%) vs. Comp. point



IM3 (dBc) vs. Pout/Tone



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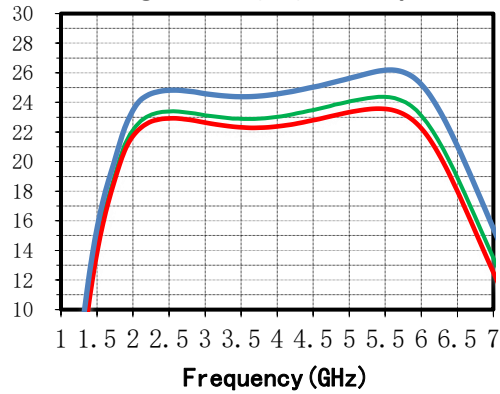


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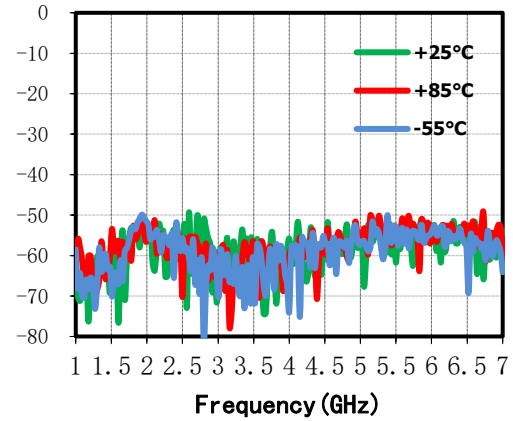
Rev 1.1

The following data are obtained by SAC3145Q4 evaluation board test, $V_D = +5V$, $I_{DQ} = 0.45A$, working mode CW, $T_A = +25^\circ C$

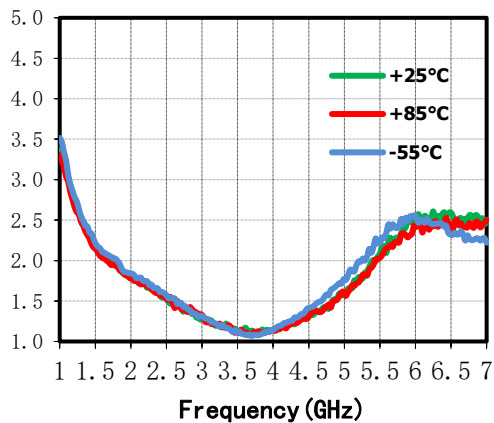
Small Signal Gain(dB) vs.Temperature



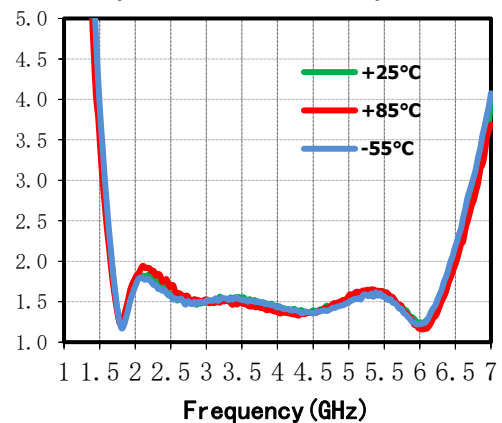
Isolation(dB) vs.Temperature



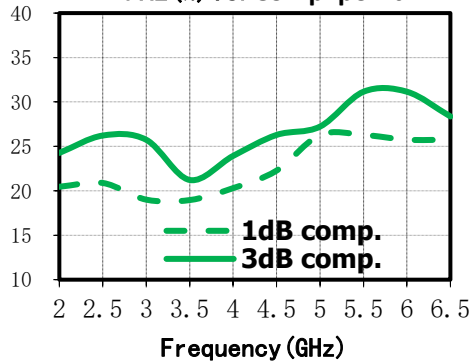
Input VSWR(:1) vs.Temperature



Output VSWR(:1) vs.Temperature



PAE(%) vs. Comp. point



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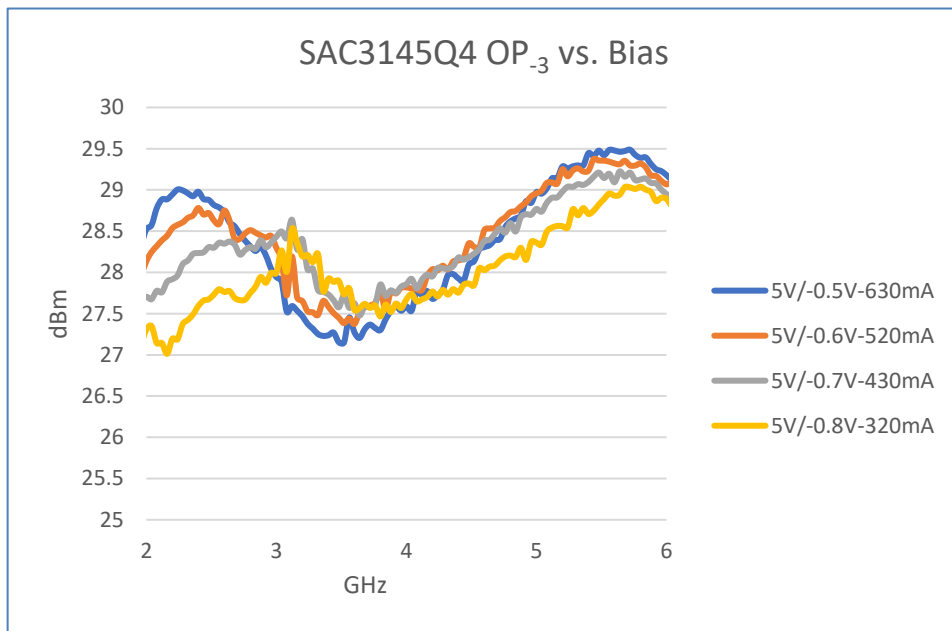
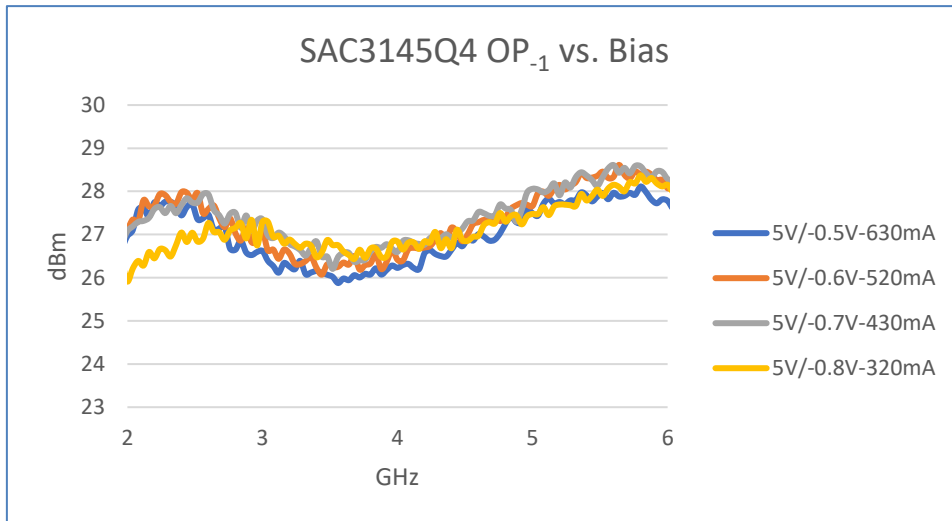
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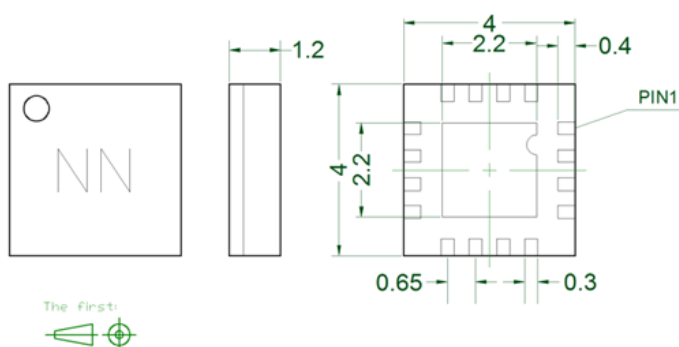
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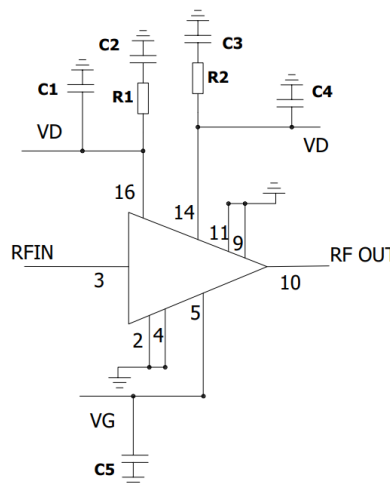
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Outline Drawing (All dimensions in mm)



Assembly Diagram



Pin Function

Pin No.	Description	Pin No.	Description
2	ground	11	ground
3	RF input, AC Coupled	14	VD
4	ground	16	VD
5	VG	1、6、7、	NC
9	ground	8、12、	
10	RF output, AC Coupled	13、15	

Components List

Reference Des.	Value	Part Number	Manuf.	Size
C1、C4、C5	10 μ F	—	—	0805
C2、C3	0.47 μ F	—	—	0603
R1、R2	2.2 Ω	—	—	0603

Attention:

SAC3145Q4 requires drain positive voltage (VD_x) and gate negative voltage (VG_x) 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.

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Revision History

Revision	Date	Comment
1.0	September 17, 2022	First Release
1.1	February 25, 2025	Add 5V test data

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