SAC3125Q6

GaN Power Amplifier
0.1GHz~2GHz 39dBm

Rev1.2

Features

- Frequency: 0.1GHz~2GHz
- Gain: 15dB
- Output P_{-3}dB: 39dBm
- Supply Voltage: +28V
- Power-Added Efficiency: 45%
- Package Size: 6mm×6mm×1.1mm

Typical Applications

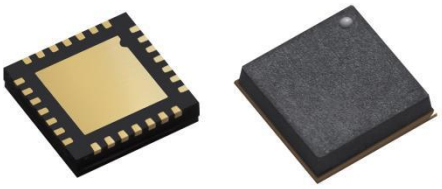
- Two-way Radio
- Satellite Communication

General Description

SAC3125Q6 is a wide band GaN power amplifier. The SAC3125Q6 provides 15 dB of gain, and 39dBm of output power for 3 dB compression and 45% PAE from a +28V supply voltage.

SAC3125Q6 is plastic SMT package that eliminates the need for wire bonding, and is compatible with high volume surface mount manufacturing techniques.

Picture



Electrical Performance

T_A=25℃, V_D=+28V, I_D=0.1A, Z_0=50Ω, CW, 50 Ohm Test Fixture

Parameter	Min.	Typ.	Max.	Units
Frequency Range		0.1~2		GHz
Small Signal Gain	13	15	—	dB
Small Signal Gain Flatness	—	±2	±2.8	dB
Reverse Isolation	—	-30	—	dB
Input Return Loss	—	-15	—	dB
Power-Added Efficiency	—	45	—	%
Output Power for 3 dB Compression (OP_{-3}dB)	38	39	—	dBm
IM_3**	—	-23	—	dBc
Drain Voltage(V_D)	24	28	30	V
Gate Current(I_G)	—	5	8	mA
Supply Current(I_D)	—	0.45	0.65	A
Thermal Resistance*	—	12	—	℃/W

*Test condition: The device is soldered on Ro4350b t=0.168mm, with 121 filled metal vias for grounding

** Test condition: Pout / Tone = 32dBm, fc= 1GHz, Δf=4MHz

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Absolute Maximum Ratings

Maximum Input Power	+31dBm	Operating Temperature	-40℃~+70℃***
Channel Temperature	+215℃	Storage Temperature	-65℃~+120℃
Maximum V_D	+31V	Maximum V_G	-3.5V
Maximum Soldering Temperature	240℃ 8s		

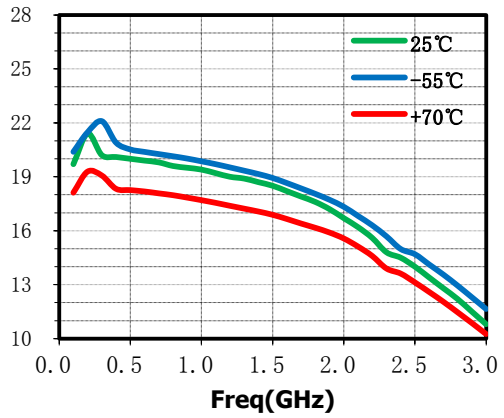
*** With sufficient heat dissipation

Typical Small Signal Performance Curve

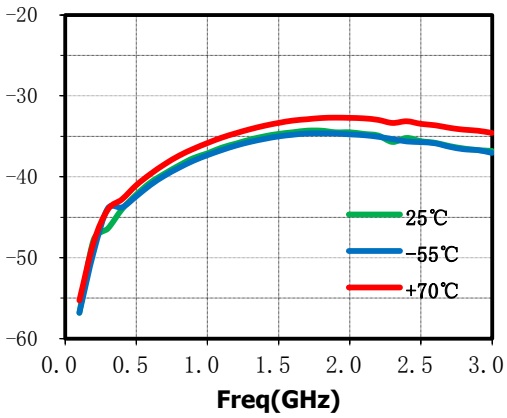
The following data are obtained using the SAC3125Q6 fixture test.

V_D=+28V I_D=0.1A CW

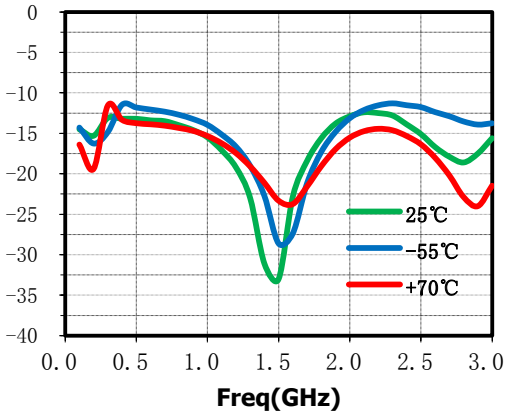
Small Signal Gain (dB) vs. Temperature



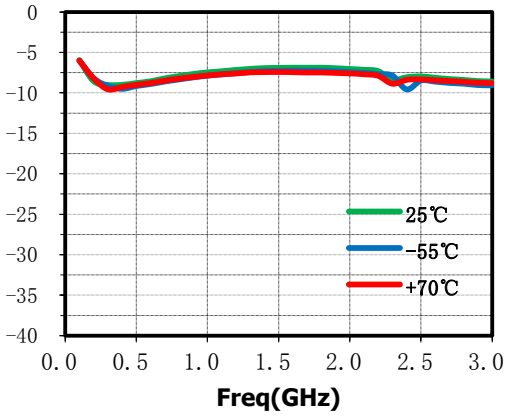
Reverse Isolation (dB) vs. Temperature



Input Return Loss (dB) vs. Temperature



Output Return Loss (dB) vs. Temperature

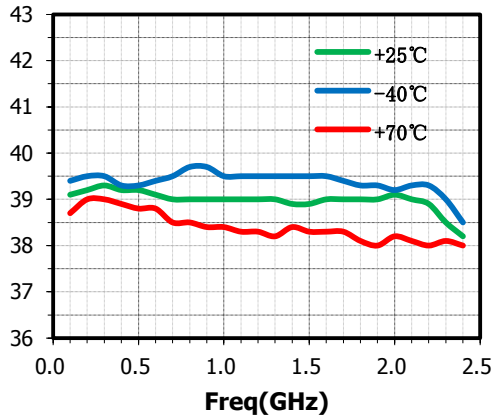


Power and PAE Performance Curve

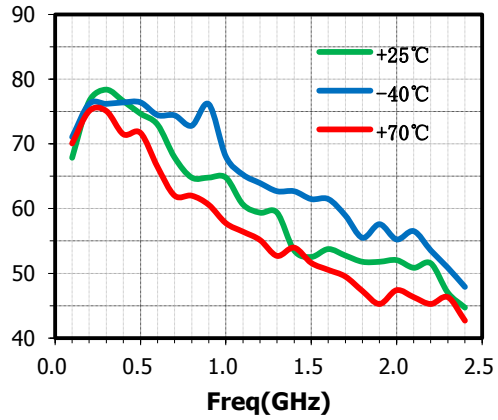
The results captured in the test-jig environment within connector plan, then de-embedded the housing an come back in the die plan.

V_D=+28V I_D=0.1A CW

OP_{-3}dB(dBm) vs. Temperature



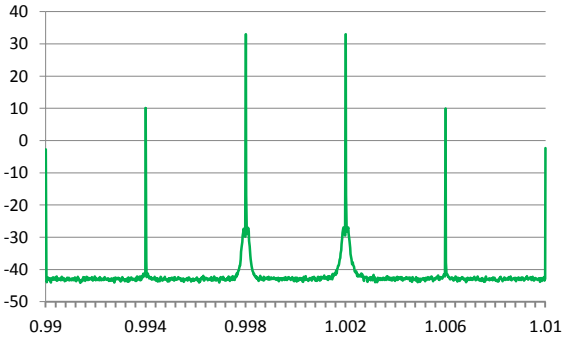
PAE(%) vs. Temperature



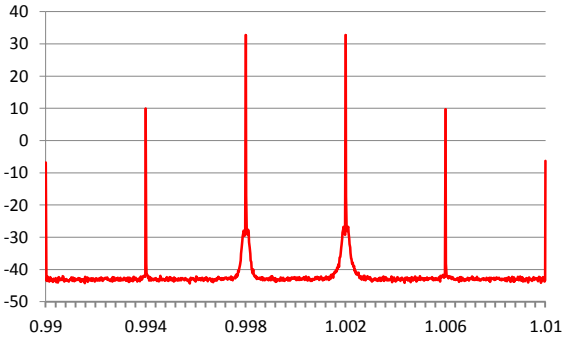
Output IM_3、Harmonic Performance Curve

The results captured in the test-jig environment within connector plan, then de-embedded the housing an come back in the die plan.

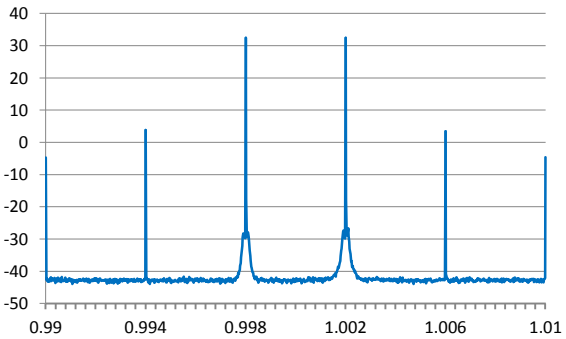
IM3 Pout=32dBm/Tone
fc=1GHz TA=25℃



IM3 Pout=32dBm/Tone
fc=1GHzTA=70℃



IM3 Pout=32dBm/Tone
fc=1GHz TA=-40℃



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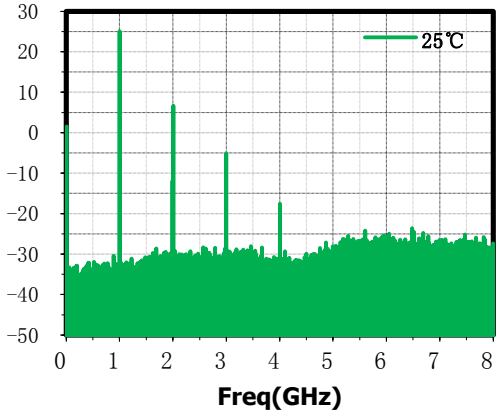
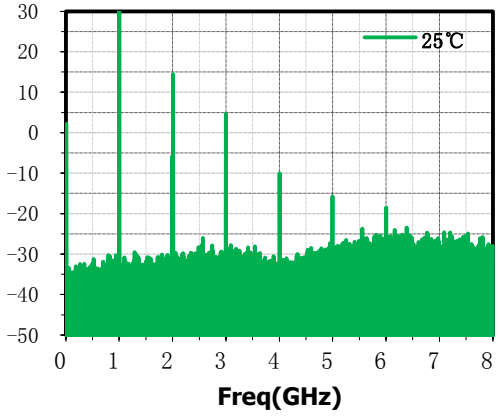
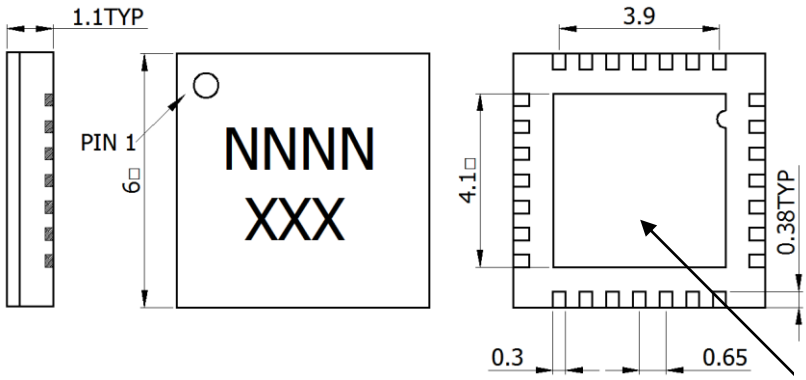
Harmonics@ f=1GHz Pout=25dBm



Harmonics@ f=1GHz Pout=30dBm



Outline Dimension（mm）



Pin Descriptions

Pin No.	function	Pin No.	function
1	Gate Supply	15	NC
2	Gate Supply	16	NC
3	NC	17	NC
4	RF Input	18	RF Output /Drain Supply
5	NC	19	NC
6	NC	20	NC
7	NC	21	NC
8	NC	22	NC
9	NC	23	NC
10	NC	24	NC
11	NC	25	NC
12	NC	26	NC
13	NC	27	NC
14	NC	28	NC

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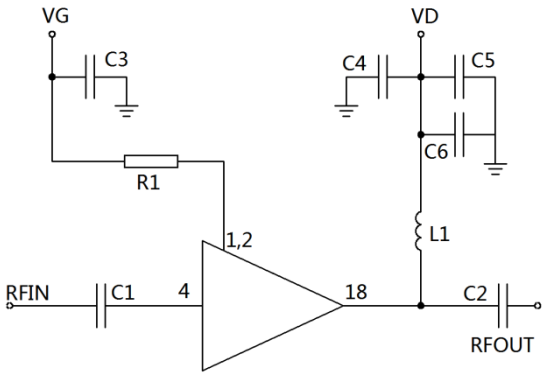
Assembly Diagram



The other Pins keeps NC

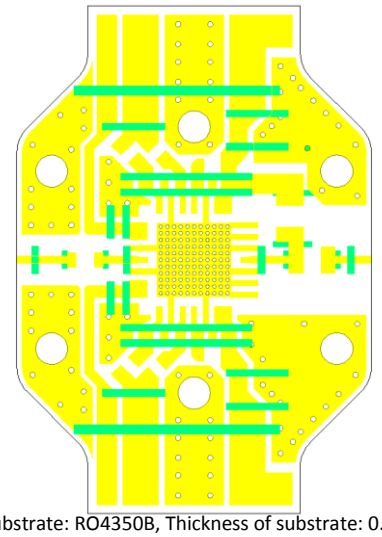
Components List

Reference Des.	Value	Part Number	Manuf.	Size
C1、C2、C6	0.01uF	GRM033R61A103KE47D	Murata	0603
C3、C4	10uF	—	—	—
C5	0.047uF	—	—	—
L1**	68nH	0805HP-82NX	Coilcraft	0805
R1*	20Ω	—	ANY	0603

*The value of R1 varies with the internal resistance of the gate bias circuit. When the internal resistance value of the gate bias circuit is less than 2Ω, R1=10 to 30 ohm is suitable.

** A larger Inductance of L1 can extend the low operation frequency to lower, Pay attention to the self-resonance of inductor.

SAC3125Q6 test fixture layout

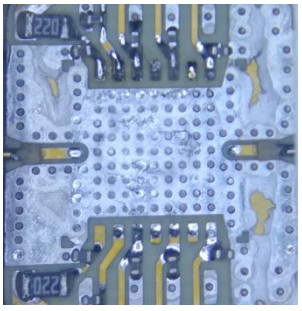


a. PCB substrate: RO4350B, Thickness of substrate: 0.168mm

b. Electronic copy of board design documents are available for reference.

Recommended use of this chip with special

1. Put all de-coupling capacitors as closer as possible to the device.
2. In order to prevent the device being destroyed by bad heat dissipation, make sure most of the ground via be filled with solder paste once device soldering work has been done.



3. Use thin PCB board to short the thermal dissipation path.

Notes

1. SAC3125Q6 is biased with a positive drain supply and negative gate supply.The recommended gate voltage is set to -2.5~-3.3V.
2. The moisture resistant grade of products is 2A, the storage environment ≤30° C/60% RH，The surrounding workshop Life is 4 weeks.
3. After un-packing, It is necessary to bake the parts for 6 hours in 125+/-5 degree environment before welding.

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