

Features

- Frequency: 1~2GHz
- Gain: 28dB
- Noise Figure: 0.5dB Typ. 0.65dB Max
- Output P₁dB: 5dBm@+5V
- Power Supply: +5V/13mA
- Package Size: 3mmx3mmx1.1mm
- Bare die size: 1.5mmx1.5mmx0.1mm

Typical Applications

- Radio Astronomy
- Wideband Communication Systems

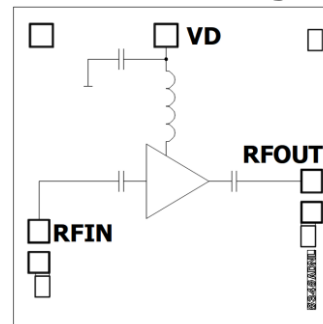
General Description

SAC3098Q3 is a GaAs MMIC Low Noise Amplifier in QFN air cavity surface mount package, which operates between in 1~2GHz.

The amplifier can provide 28dB of gain, 5dBm of output P₁dB and 0.5dB noise figure and from a 13mA supply current.

SAC3098Q3 is assembled in a 3mm x 3mm x 1.1mm QFN plastic package

Functional Diagram



Electrical Performance (T_A=25°C, V_D=+5V, I_D=13mA, Z₀=50Ω)

| Parameter | Min. | Typ. | Max. | Units |
|----------------------------------|------|------|------|-------|
| Frequency Range | 1~2 | | | GHz |
| Gain | 26 | 28 | — | dB |
| Gain Flatness | — | ±1 | ±1.5 | dB |
| Input VSWR/ Output VSWR | — | 1.5 | 2.2 | :1 |
| Noise Figure | — | 0.5 | 0.65 | dB |
| Reverse Isolation | — | -42 | — | dB |
| Output P ₁ dB | 3 | 5 | — | dBm |
| Output IP ₃ | — | 12 | — | dBm |
| Supply Current (I _D) | — | 13 | 20 | mA |

Absolute Maximum Ratings

| | | | |
|---------------------|---------------|-----------------------|--------------|
| Maximum Input Power | +16dBm,CW 30s | Operating Temperature | -55°C~+85°C |
| Channel Temperature | +150°C | Storage Temperature | -55°C~+150°C |
| Supply Voltage | +7V | | |

SAC3098Q3



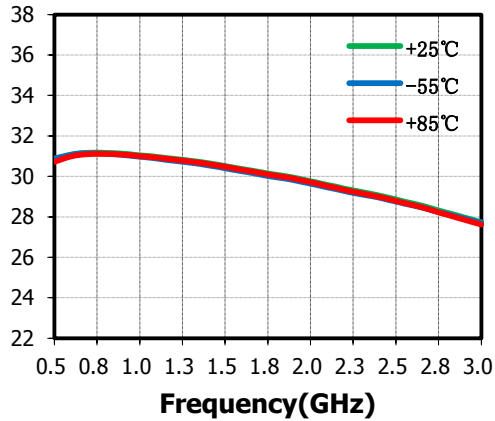
GaAs MMIC Low Noise Amplifier
1~2GHz

Rev 1.0

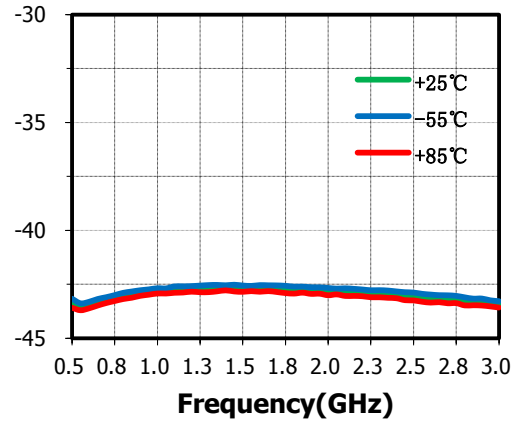
Typical Performance Curve

$V_D=+5V, I_{DQ}=13mA$, The following curves are taken from SAC3098Q3 evaluation board. De-embedding operation has been Implemented.

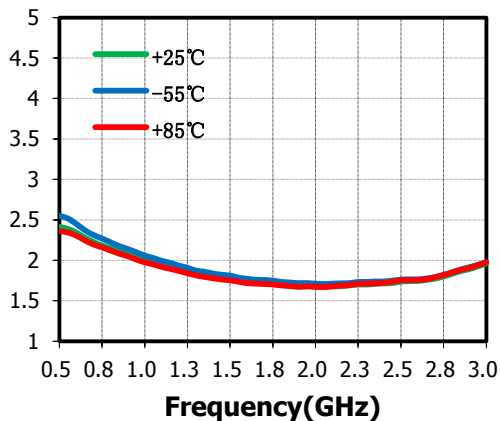
Small Signal Gain(dB) vs.Temperature



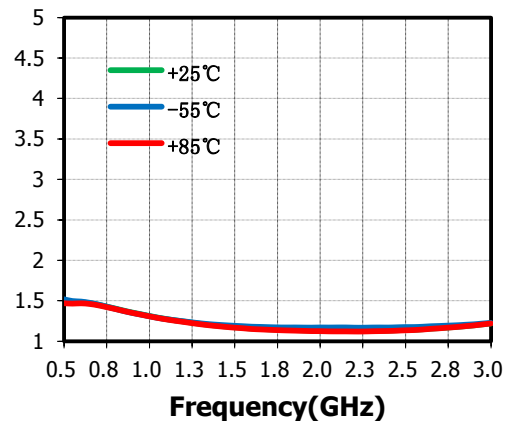
Reverse Isolation(dB) vs.Temperature



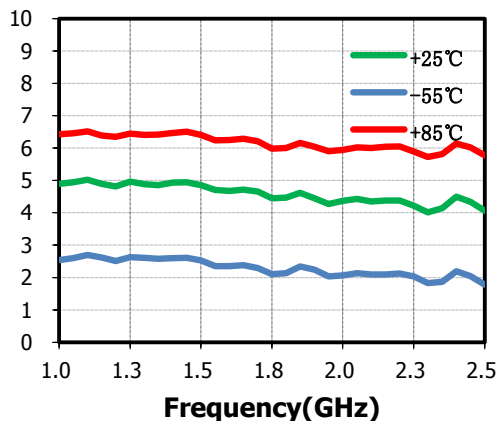
Input VSWR(:1) vs.Temperature



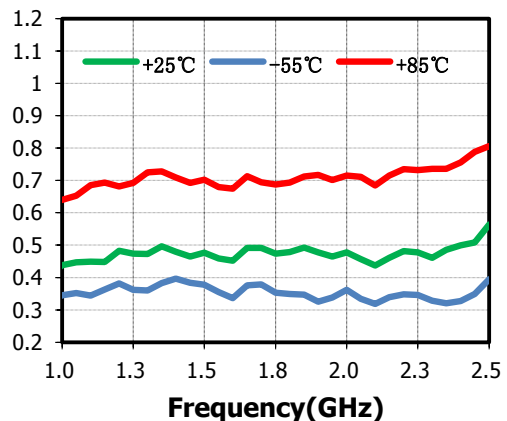
Output VSWR(:1) vs.Temperature



Output P-1dB(dBm) vs.Temperature



Noise Figure(dB) vs.Temperature



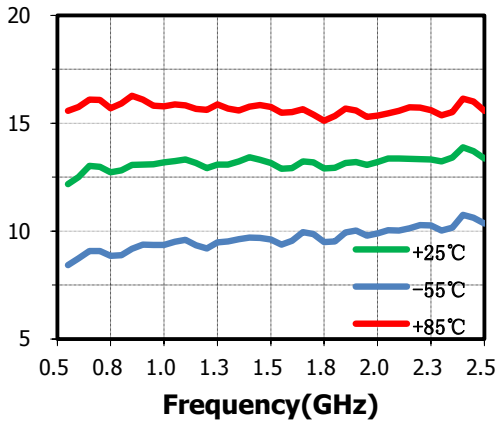
SAC3098Q3



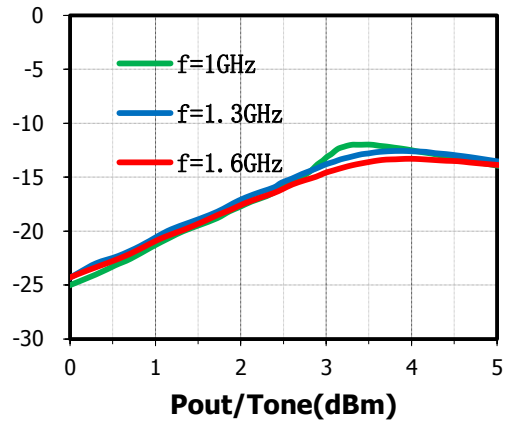
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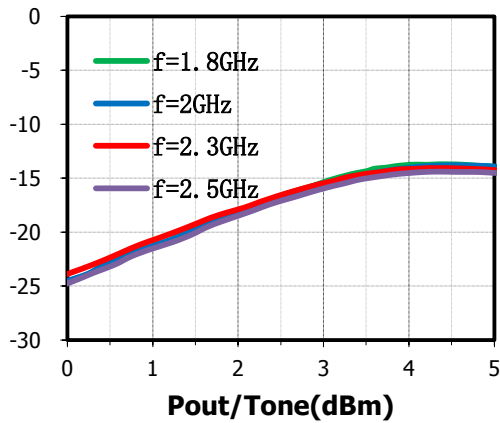
Output IP₃(dBm) vs. Temperature



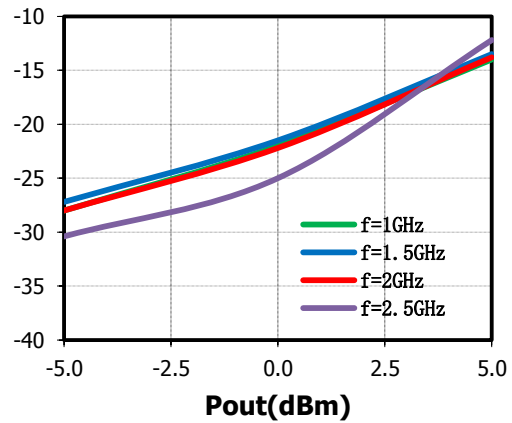
IM₃(dBc) vs. Pout/Tone, T_A = +25°C



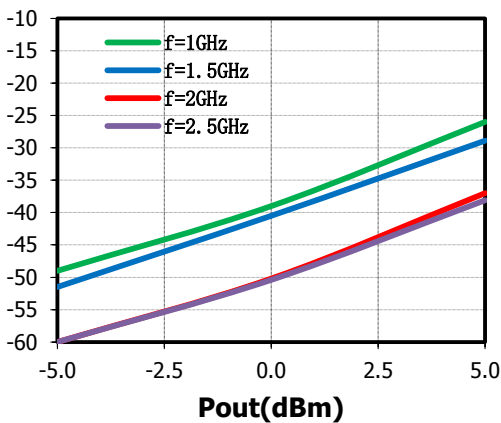
IM₃(dBc) vs. Pout/Tone, T_A = +25°C



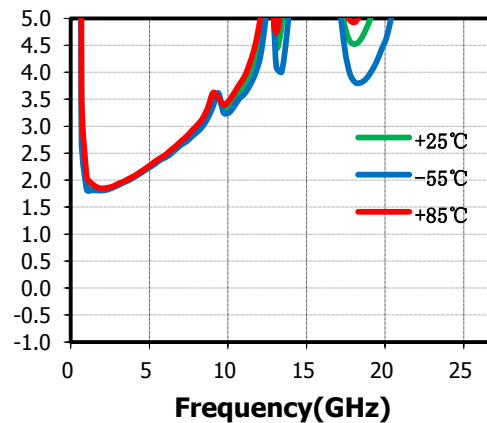
2ND Harmonic vs. Pout, T_A = +25°C



3RD Harmonic vs. Pout, T_A = +25°C



K factor (U) vs. Temperature



SuperApex, LLC

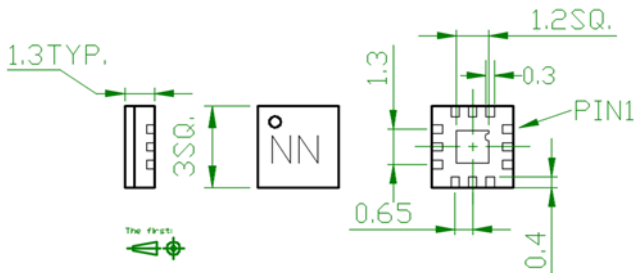
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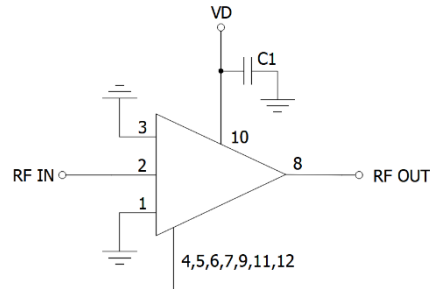
GaAs MMIC Low Noise Amplifier
1~2GHz

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Outline Drawing (All dimensions in mm)



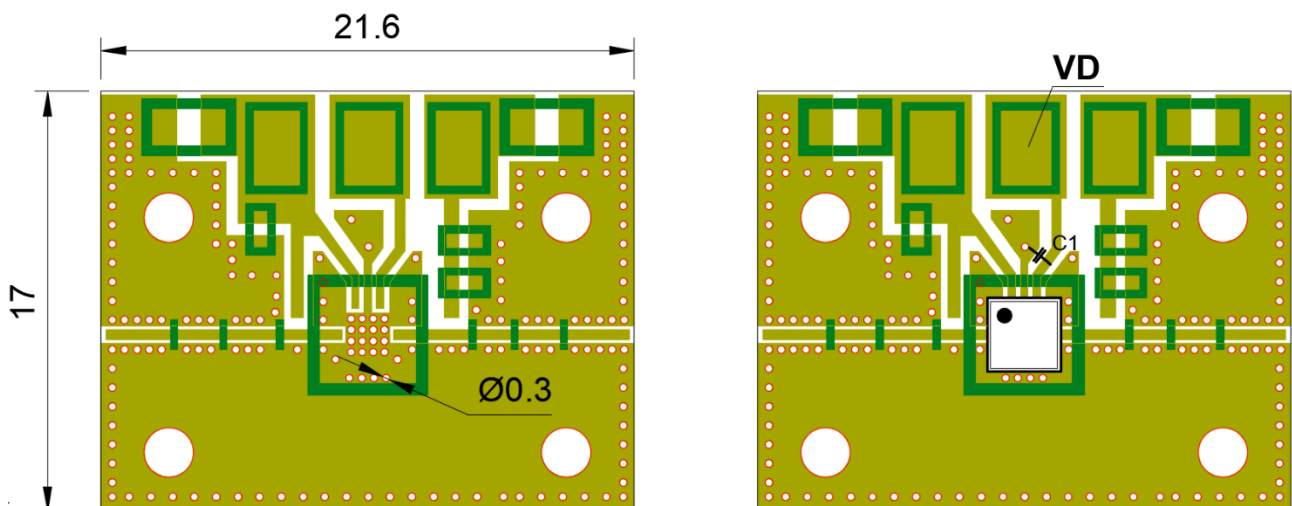
Application Circuit



Pin Function

| Pin No. | Description | Pin No. | Description |
|---------|----------------------|---------|-------------------------|
| 1 | Connect to ground | 7 | Connect to ground |
| 2 | RF input, AC Coupled | 8 | RF output, AC Coupled |
| 3 | Connect to ground | 9 | Connect to ground |
| 4 | Connect to ground | 10 | VD |
| 5 | Connect to ground | 11 | NC or connect to ground |
| 6 | Connect to ground | 12 | NC or connect to ground |

SAC3098Q3 Evaluation Board



The Evaluation board is a 2-layer board fabricated using Rogers 4350 t=0.254 and using best practices for high frequency RF design. The RF input and RF output traces have a 50 Ω characteristic impedance.

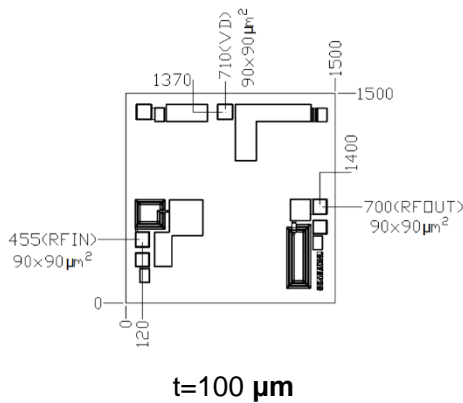
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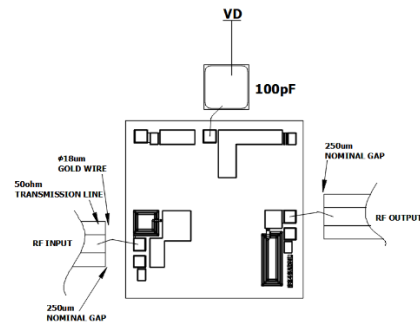
Components List

| Reference Des. | Value | Part Number | Manuf. |
|----------------|--------|------------------|--------|
| C1 | 1000pF | GRM0336R61A102KE | Murata |
| | | | |
| | | | |

Bare Die Outline (μm)



Assembly Diagram



Attention:

1. The moisture resistant grade of SAC3098Q3 is 2a, the storage environment $\leq 30^\circ \text{C}/60\% \text{RH}$, the surrounding workshop life is 4 weeks.
2. After un-packing, it is necessary to bake the parts for 6 hours in 125 ± 5 degree environment before soldering.
3. GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.
4. The back of bare chip is RF and DC ground.
5. RF connections should be made as short as possible to reduce the inductive effect of the bond wire. Use of a 1 mil thermosonic wedge bonding is highly recommended as the loop height will be minimized.

Revision History

| Revision | Date | Comment |
|----------|--------------|---------------|
| 1.0 | Mar 25, 2022 | First Release |