SAC3099Q3

GaAs MMIC Low Noise Amplifier
0.8~2.5GHz

Rev 1.0

Features

- Frequency: 0.8 ~ 2.5GHz
- Gain: 36dB
- Noise Figure: 0.6dB Typ., 0.8dB Max.
- Output P_{-1}dB: 16dBm@+5V
- Power Supply: +5V/70mA
- Package Size: 3mm×3mm×1.1mm
- Bare die size: 1.25mm×1.25mm×0.1mm

Typical Applications

- Wideband Communication Systems

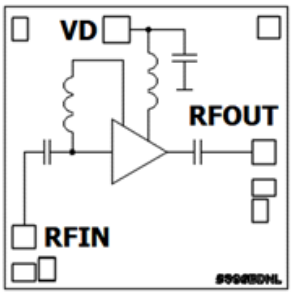
General Description

SAC3099Q3 is a GaAs MMIC Low Noise Amplifier in QFN air cavity surface mount package, which operates from 0.8GHz to 2.5GHz.

The amplifier can provide 36dB of gain, 16dBm of output P_{-1}dB and 0.6dB noise figure and from a 70mA supply current.

SAC3099Q3 is assembled in a 3mm×3mm×1.1mm QFN plastic package.

Functional Diagram



Electrical Performance (T_A=25℃, V_D=+5V, I_D=70mA, Z_0=50Ω)

Parameter	Min.	Typ.	Max.	Units
Frequency Range		0.8 ~ 2.5		GHz
Gain	33	36	—	dB
Gain Flatness	—	±1	—	dB
Input VSWR/ Output VSWR	—	1.5	2.0	:1
Noise Figure	—	0.6	0.8	dB
Reverse Isolation	—	-47	—	dB
Output P_{-1}dB	14	16	—	dBm
Output IP_3	—	33	—	dBm
Supply Current (I_D)	—	70	85	mA

Absolute Maximum Ratings

Maximum Input Power	+17dBm, CW 30s	Operating Temperature	-55°C ~ +85°C
Channel Temperature	+150°C	Storage Temperature	-55°C ~ +150°C
Supply Voltage	+7V		

RoHS

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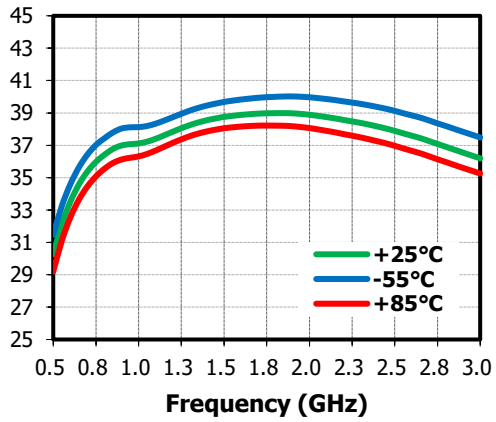
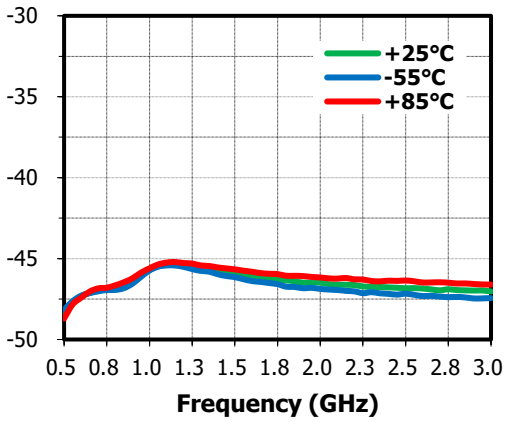
Typical Performance Curve

V_D=+5V, I_{DQ}=70mA, the following curves are taken from SAC3099Q3 evaluation board.

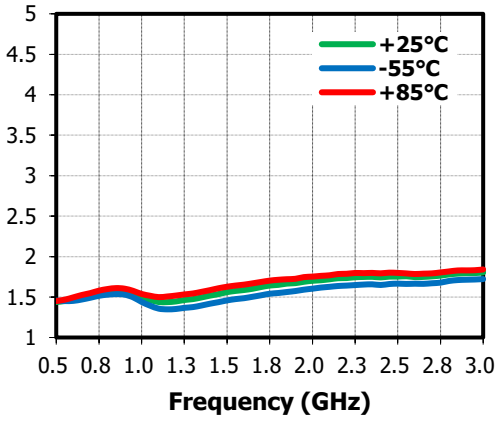
Small Signal Gain (dB) vs. Temperature



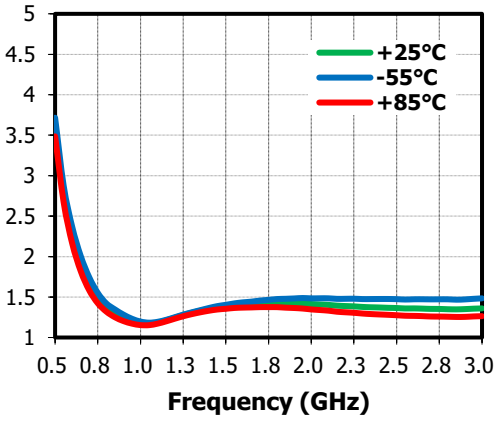
Reverse Isolation (dB) vs. Temperature



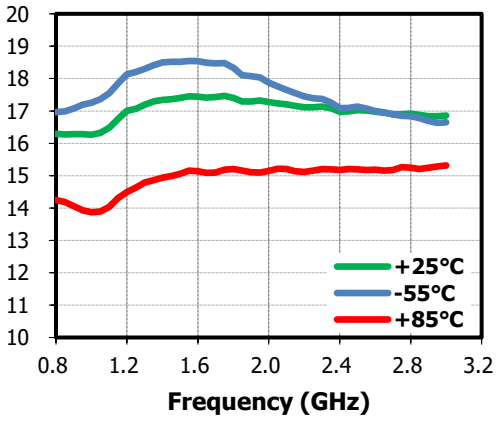
Input VSWR (:1) vs. Temperature



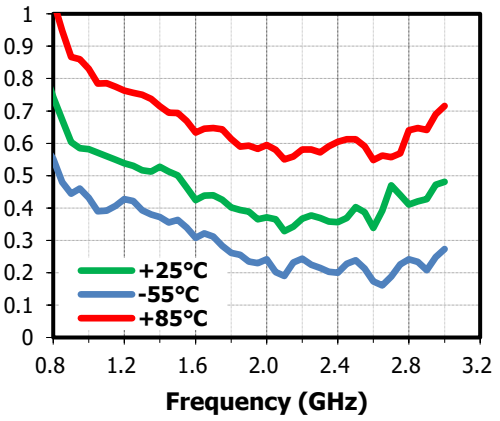
Output VSWR (:1) vs. Temperature



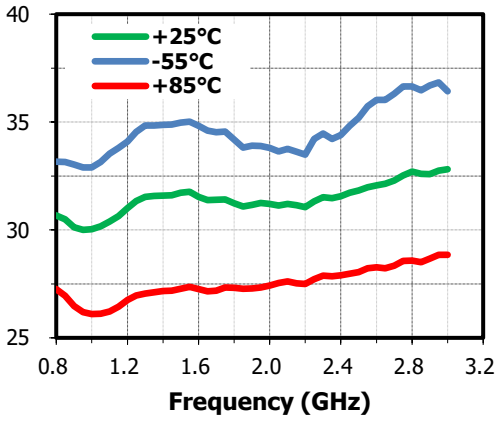
Output P_{-1}dB (dBm) vs. Temperature



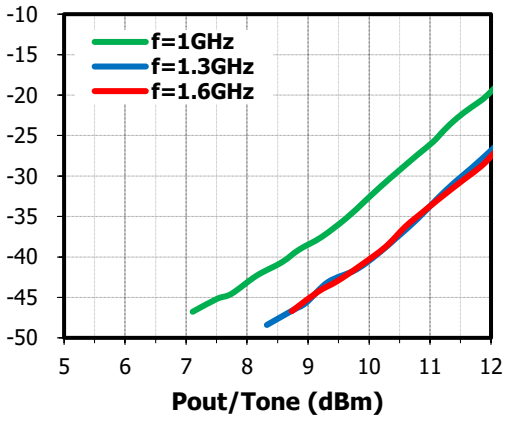
Noise Figure (dB) vs. Temperature



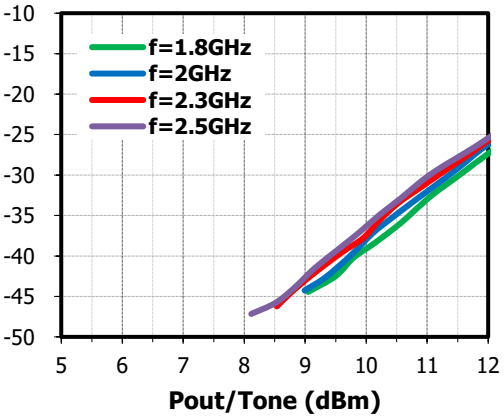
Output IP_3 (dBm) vs. Temperature



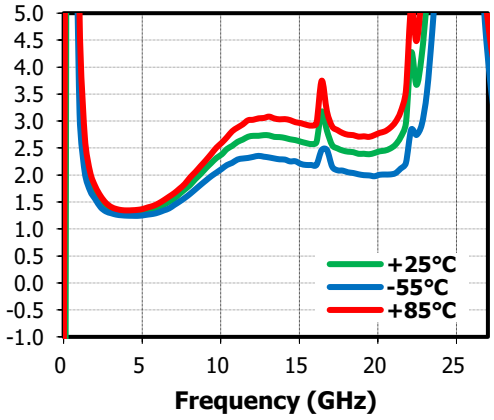
IM_3 (dBc) vs. Pout/Tone, T_A=+25°C



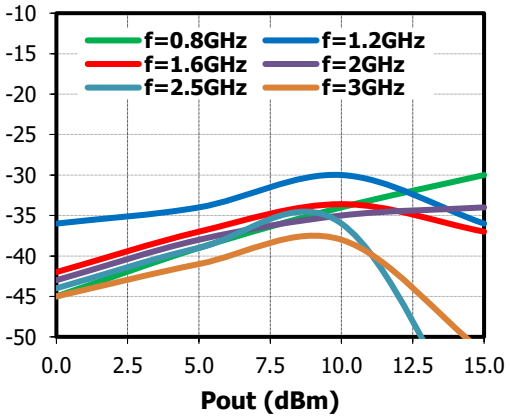
IM_3 (dBc) vs. Pout/Tone, T_A=+25°C



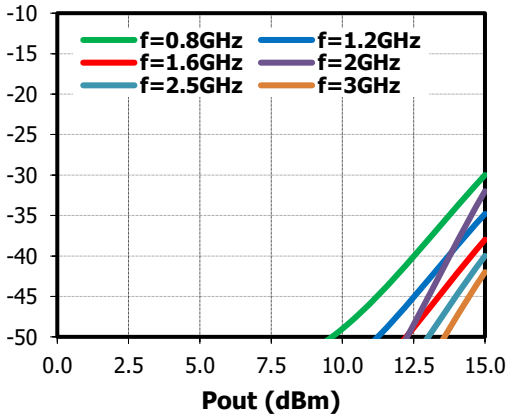
K factor (U) vs. Temperature

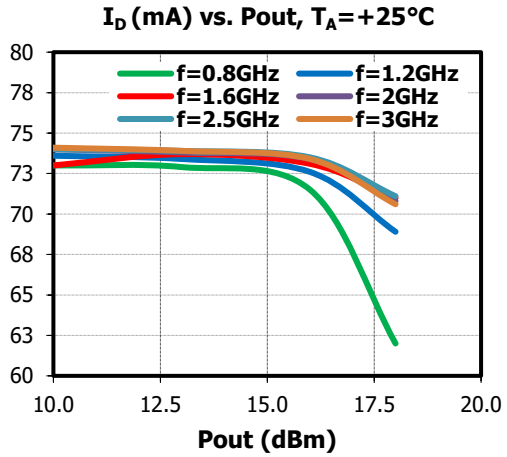


2ND Harmonic vs. Pout, T_A=+25°C

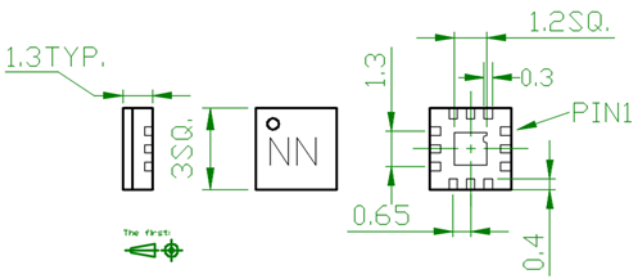


3RD Harmonic vs. Pout, T_A=+25°C

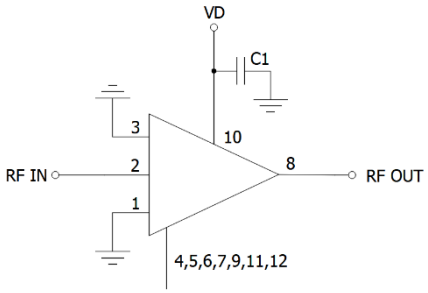




Outline Drawing
(All dimensions in mm)



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

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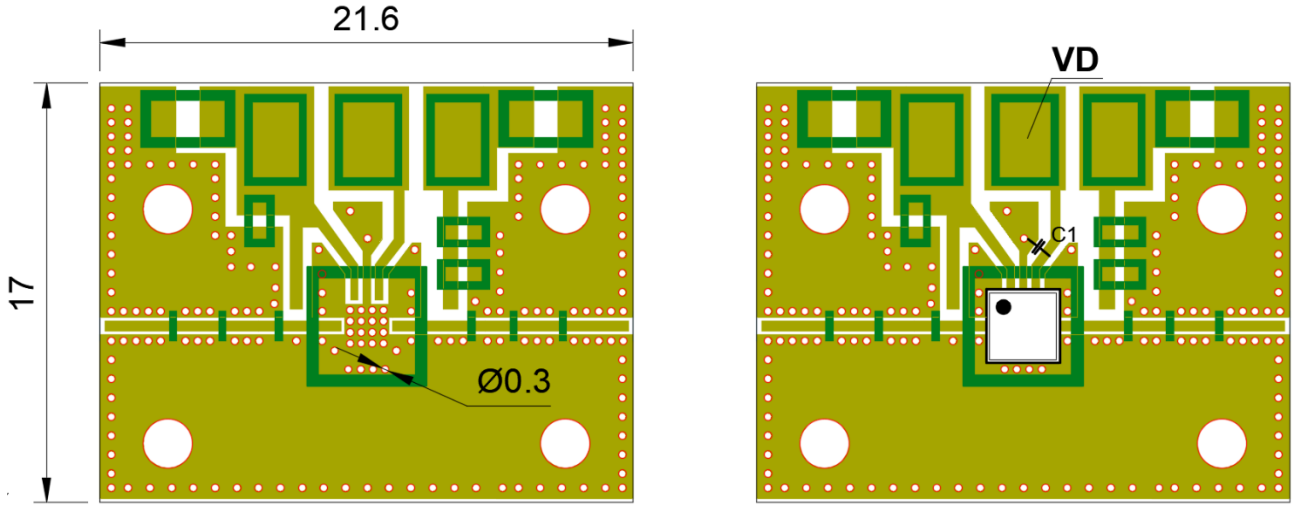
SAC3099Q3 Evaluation Board

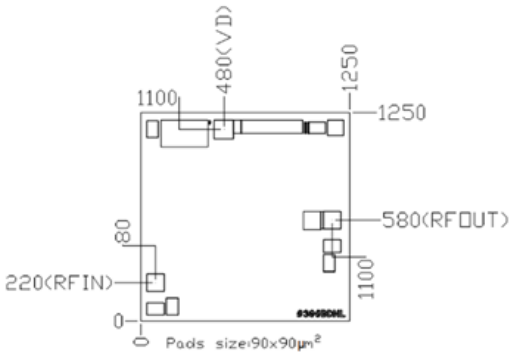


The Evaluation board is a 2-layer board fabricated using Rogers 4350 t=0.254 and using best practices for high frequency RF design. The RF input and RF output traces have a 50 Ω characteristic impedance.

Components List

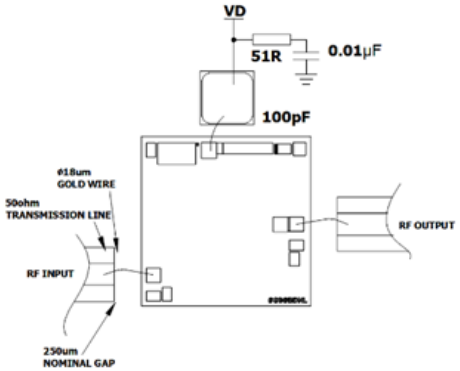
Reference Des.	Value	Part Number	Manuf.
C1	0.01μF	GRM0336R61A103KE	Murata

Bare Die Outline (μm)



t=100μm

Assembly Diagram



Attention:

1. The moisture resistant grade of SAC3099Q3 is 2a, the storage environment ≤30°C/60% RH, and 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 29, 2022	First Release