SAC3938QP3

GaAs MMIC Driver Amplifier
0.05GHz~6GHz 20dBm

Rev 1.2

Features

- Frequency: 0.05GHz~6GHz
- Gain: 10dB
- Output P_{-1}dB: 20dBm/+5V,22dBm/+8V typ.
- Supply Voltage: +5~+8V
- Packaged: 3mm×3mm×0.75mm
- Bare die size:1.25 mm x1.25 mm x0.1mm

Typical Applications

- IF Amplifier
- Driver Amplifier

General Description

SAC3938QP3 is a GaAs MMIC driver amplifier. SAC3938QP3 provides 10dB of gain, and 20dBm(1GHz)of output power for 1 dB compression a +5V supply.

Electrical Performance

T_A=25℃, V_D=+5V, I_{DQ}=0.1A, Z_0=50Ω, CW

Parameter		Min.	Typ.	Max.	Units
Frequency Range		0.05	—	6	GHz
Small Signal Gain		9	10	—	dB
Small Signal Gain Flatness		—	±0.5	±1.25	dB
Isolation		—	-20	—	dB
VSWRio		—	1.5	2.2	:1
Output P_{-1}dB	f=1GHz	—	20	—	dBm
	f=3GHz	—	19	—	
	f=6GHz	—	16	—	
Supply current (I_D)		—	—	0.12	A

Electrical Performance II

T_A=25℃, V_D=+8V, I_{DQ}=0.11A, Z_0=50Ω, CW

Parameter		Min.	Typ.	Max.	Units
Frequency Range		0.05	—	6	GHz
Small Signal Gain		9	10	—	dB
Small Signal Gain Flatness		—	±0.5	±1.25	dB
Isolation		—	-20	—	dB
VSWRio		—	1.5	2.2	:1
Output P_{-1}dB	f=1GHz	—	21	—	dBm
	f=3GHz	—	21.5	—	
	f=6GHz	—	20	—	
Supply current (I_D)		—	—	0.13	A

Absolute Maximum Ratings

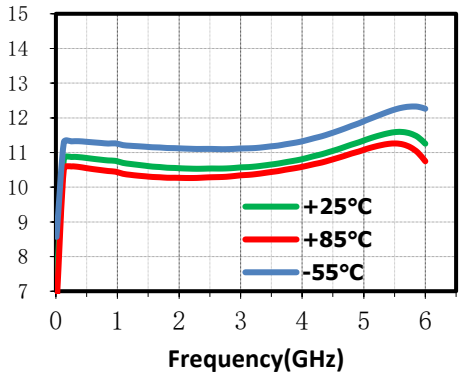
Maximum Input Power	+16dBm	Operating Temperature	-55℃~+85℃
Channel temperature	150℃	Storage Temperature	-55℃~+150℃
V_D supply	+8.5V		

SuperApex, LLC
1580 S. Milwaukee Ave. Suite 405, Libertyville, IL 60048, USA
Tel: 1-847-505-8319, 1-847-573-9866
E-mail: sales@superapexco.com
Website: www.superapexco.com

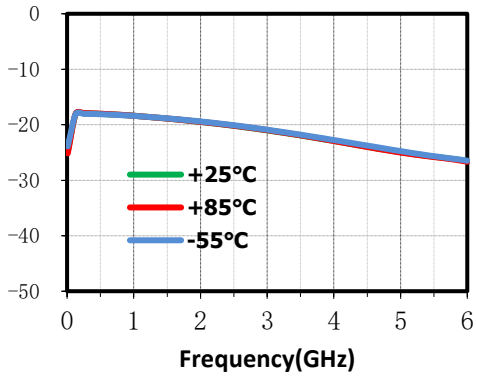
Typical Performance Curve

The following data are obtained by SAC3938QP3 evaluation board, VD=+5V, I_{DQ} = 0.1A, CW, T_A = + 25℃

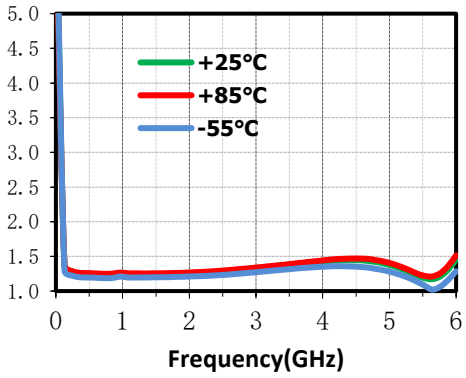
Small Signal Gain(dB) vs. Temperature



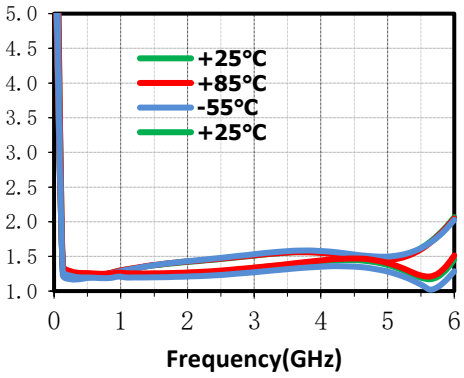
Isolation(dB) vs. Temperature



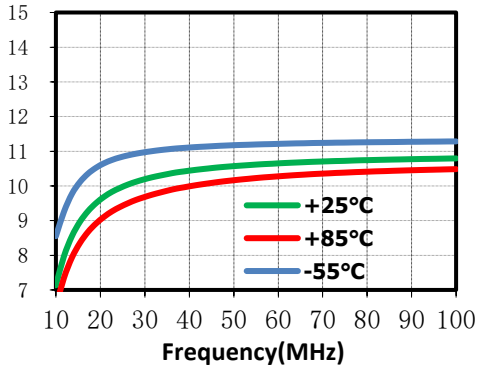
Input VSWR(:1) vs. Temperature



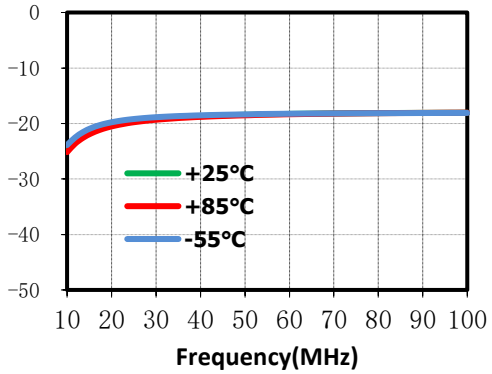
Output VSWR(:1) vs. Temperature



Small Signal Gain(dB) vs. Temperature



Isolation(dB) vs. Temperature



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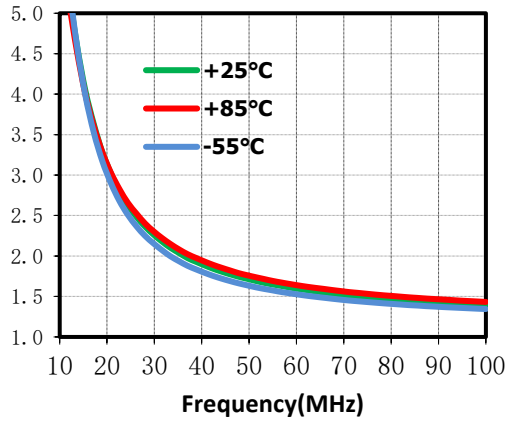
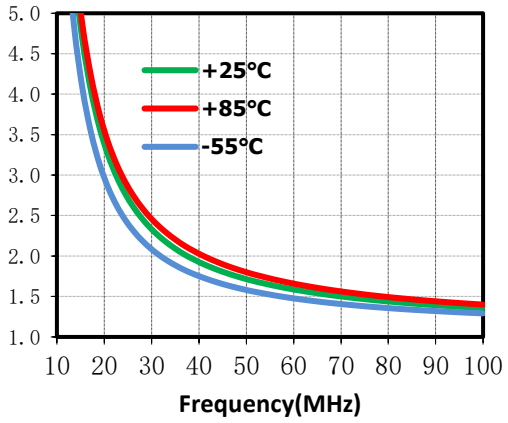
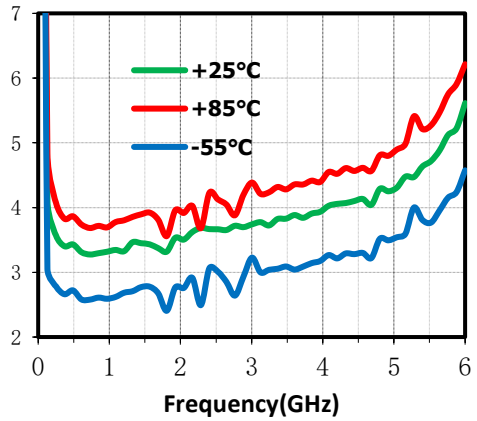
Input VSWR(:1) vs. Temperature



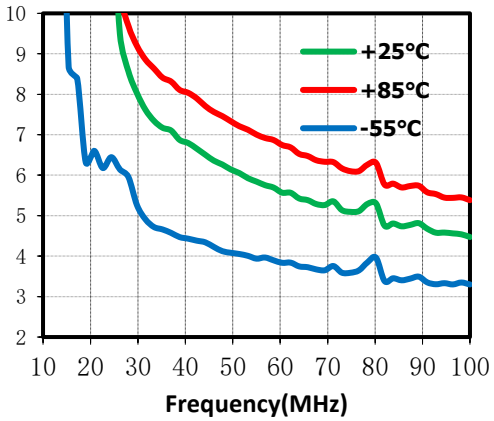
Output VSWR(:1) vs. Temperature



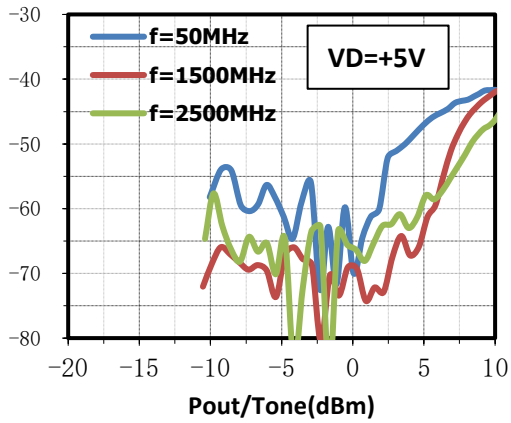
Noise Figure(dB) vs. Frequency



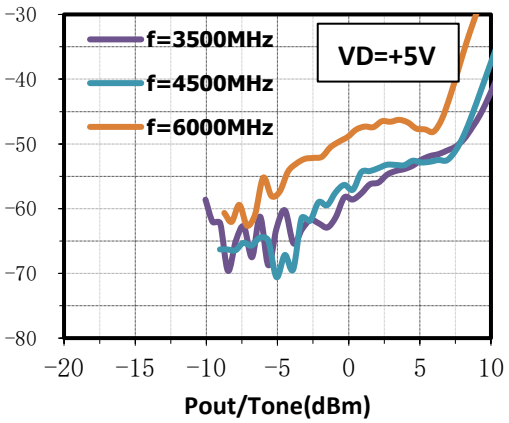
Noise Figure(dB) vs. Frequency



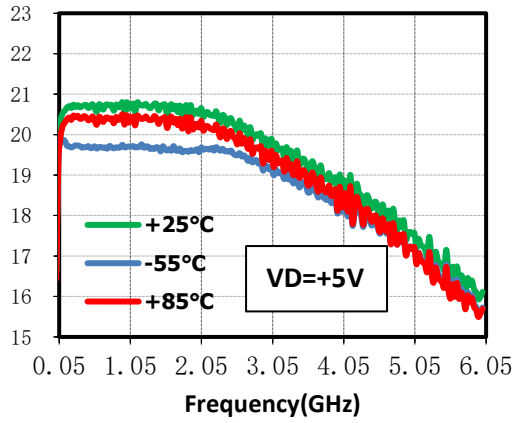
IM_3(dBc)vs. Temperature



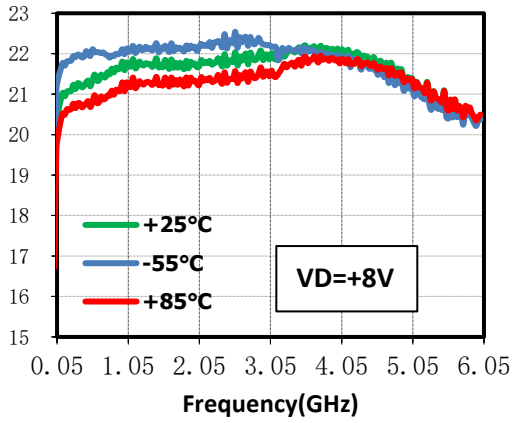
IM_3(dBc)vs. Temperature



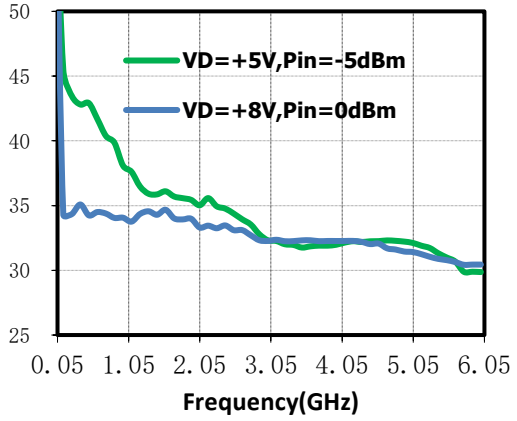
OP$_{-1}$dB(dBm)vs. Temperature



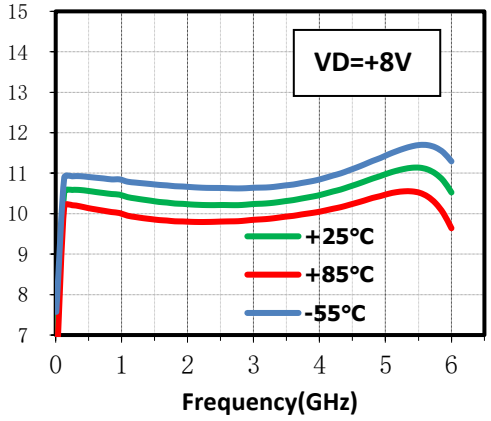
OP$_{-1}$dB(dBm)vs. Temperature



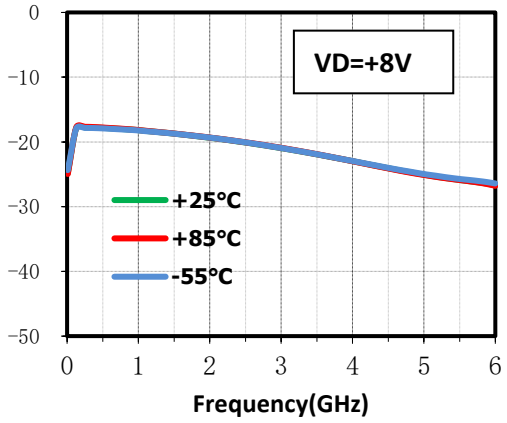
OIP$_3$(dBm)vs. VD



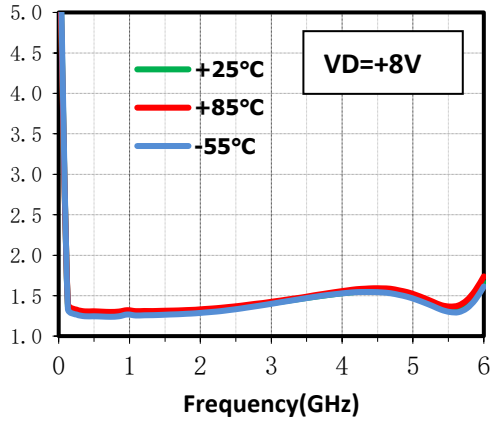
Small Signal Gain(dB) vs. Temperature



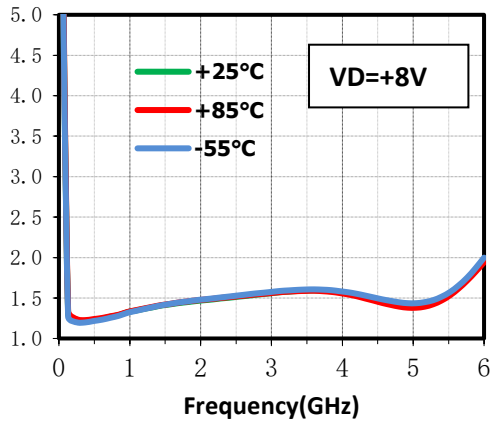
Isolation(dB) vs. Temperature



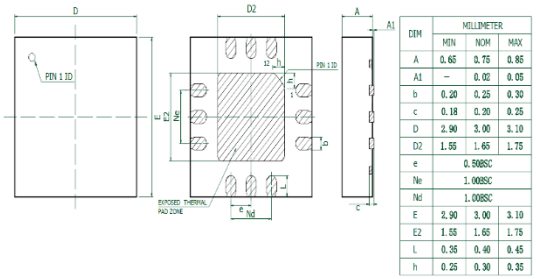
Input VSWR(:1) vs. Temperature



Output VSWR(:1) vs. Temperature

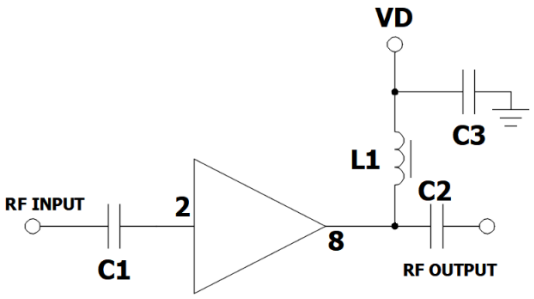


Outline Drawing



DIM	MILLIMETER		
	MIN	NOM	MAX
A	0.65	0.75	0.85
A1	–	0.02	0.05
b	0.20	0.25	0.30
c	0.18	0.20	0.25
D	2.90	3.00	3.10
D2	1.55	1.65	1.75
e	0.50BSC		
Ne	1.00BSC		
Nd	1.00BSC		
E	2.90	3.00	3.10
E2	1.55	1.65	1.75
L	0.35	0.40	0.45
h	0.25	0.30	0.35

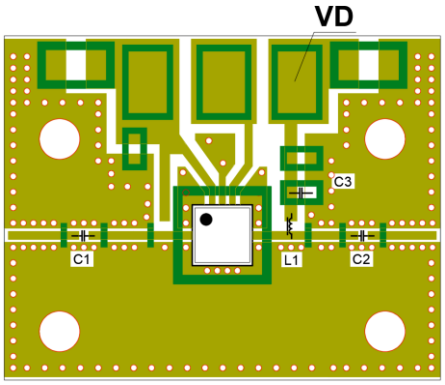
Application Circuit



BOM

Reference Des.	Value	Part Number	Manuf.	Size
C1、C2	0.47μF	—	—	0402
C3	1uF	—	—	0402
L1	-	BLM15HG102SND1	Murata	0402

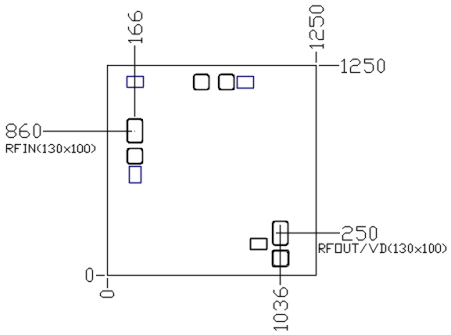
SAC3938QP3 Evaluation Board



The Evaluation board is a 2-layer board fabricated using Rogers 4350b 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.

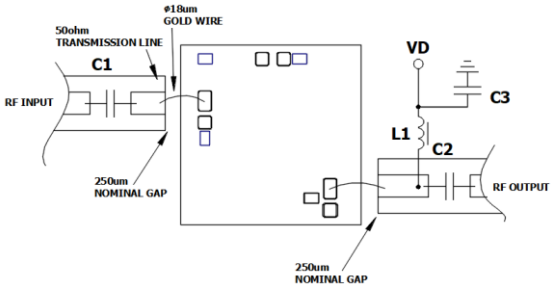
Die Outline

(All dimensions in μm)



t=100μm

Assembly



Notes

1. The moisture resistant grade of products is 2a, the storage environment ≤30° C/60% 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° environment before soldering;
3. GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.

Revision History

Revision	Date	Comment
1.0	Mar 4, 2021	First Release
1.1	Oct 14, 2021	1. Add noise performance with temperature curves 2. Revise typo
1.2	Nov 29, 2022	1. Revise curve 2. Revise typo