SAC3118

SUPERAPEX

GaaS MMIC Power Amplifier
27.5GHz~32GHz 35.5dBm

Rev2.1

Features

- Frequency: 27.5GHz~32GHz
- Gain: 27dB
- Output P_{-1}dB: 35.5dBm
- Supply Voltage: +6V
- Power-Added Efficiency: 18%
- Die Size: 3.55mm×3.85mm×0.1mm
- Packaged: Bare Die

Typical Applications

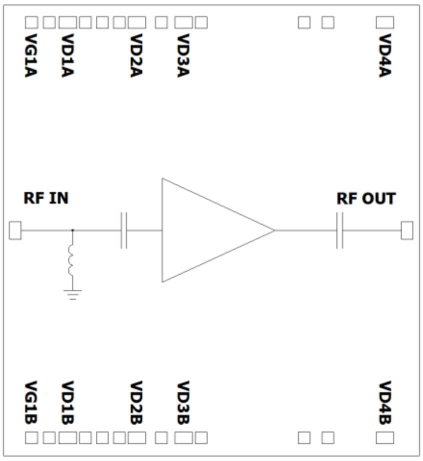
- Microwave radio including point to point communication
- Telecommunication
- Weather radar
- Optical communication
- Test instrumentation
- SatCom
- VSAT
- Military and Aerospace

General Description

SAC3118 is a Ka-band GaAs MMIC power amplifier. SAC3118 provides 27 dB of gain, and 35.5dBm of output power for 1 dB compression and 18%PAE from a +6V supply.

The chip has surface passivation for protection and backside via holes and gold metallization to allow a conductive epoxy die attach process. This device is well suited for communications, Point to Point radio and radar applications.

Functional Diagram



Electrical Performance

T_A=25℃, V_D=+6V, I_D=2A, Z_0=50Ω, CW

Parameter	Min.	Typ.	Max.	Units
Frequency Range	27.5~32			GHz
Small Signal Gain	23	27	—	dB
Small Signal Gain Flatness	—	±2	—	dB
Reverse Isolation	—	-55	—	dB
Input Return Loss	—	-10	—	dB
Power-Added Efficiency	—	18	—	%
Output Power for 1 dB Compression (OP_{-1}dB)	35	35.5	—	dBm
Output Third Order Intercept(OIP_3)*	—	39	—	dBm
Drain Voltage(V_D)	—	6	6.3	V
Gate Current(I_G)	—	5	28	mA
Supply Current(I_D)	—	3.2	3.7	A
Thermal Resistance	—	4.1	—	℃/W

* Measurement taken at Pout / Tone = 18 dBm, fc= 30GHz, Δ f=10MHz

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Absolute Maximum Ratings

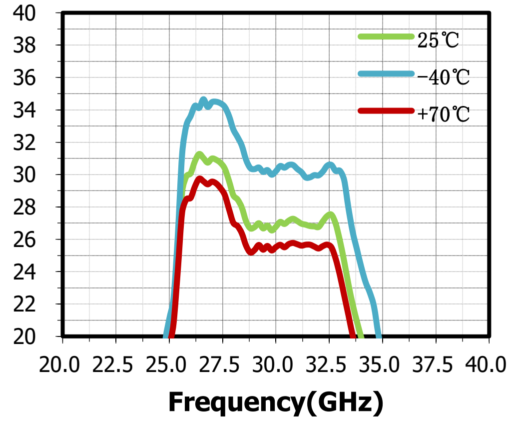
Maximum Input Power	+14dBm	Operating Temperature	-40℃~+70℃
Channel Temperature	+150℃	Storage Temperature	-65℃~+150℃
Maximum V_D	+6.5V	Maximum V_G	-1.2V

Typical Small Signal Performance Curve

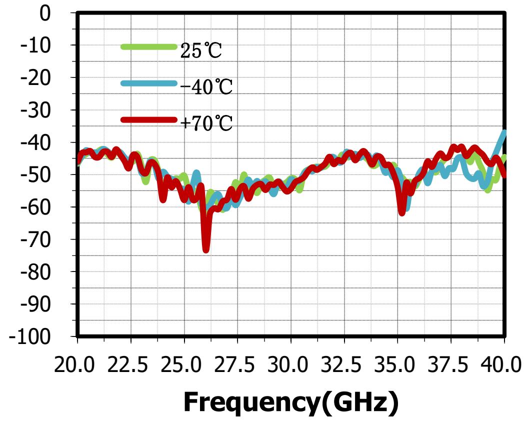
The results captured in the test-jig environment within connector plan

V_D=+6v I_D=2A CW

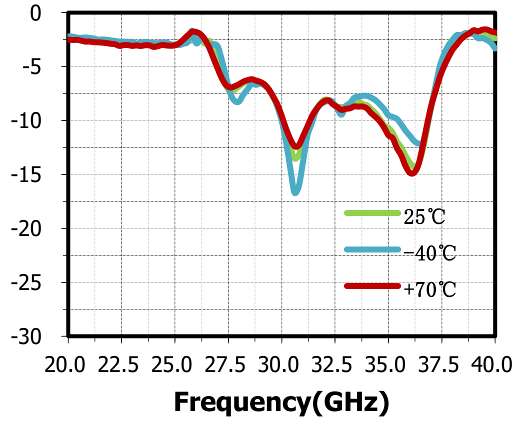
Small Signal Gain(dB) vs.Temperature



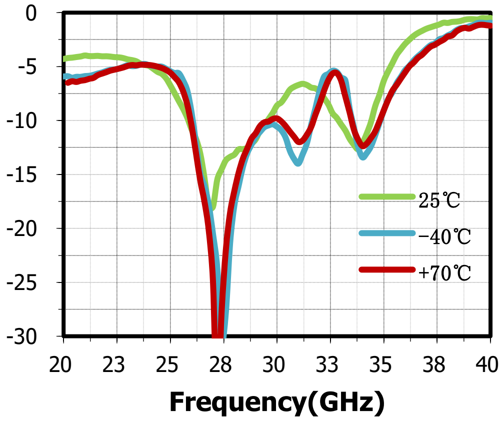
Reverse Isolation(dB) vs.Temperature



Input Return Loss(dB) vs.Temperature



Output Return Loss(dB) vs.Temperature



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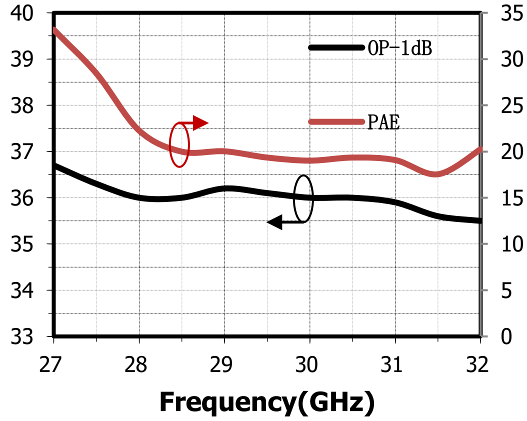
Power and PAE Performance Curve

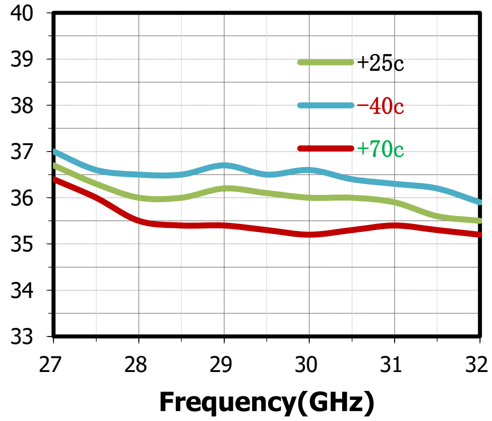
The results captured in the test-jig environment within connector plan, then de-embedded the housing an come back in the die plan

V_D=+6V I_D=2A CW

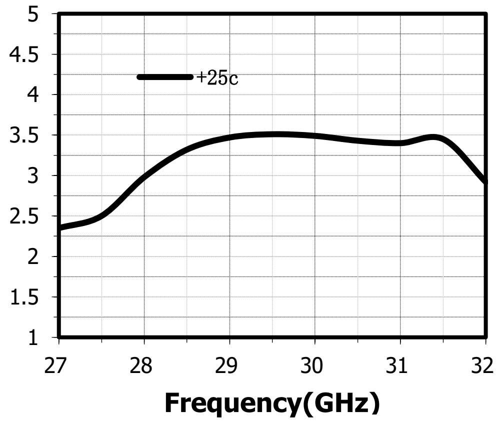
OP-1dB(dBm)、PAE@T_A=25°C



OP-1dB(dBm) vs.Temperature

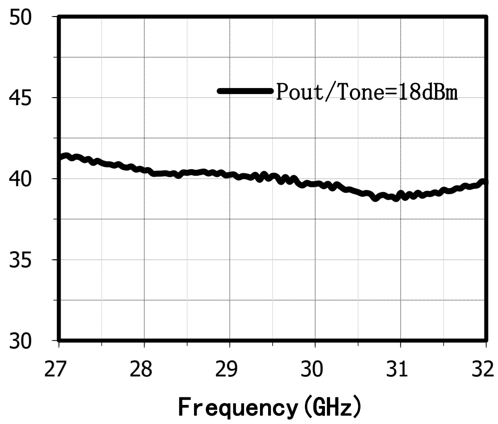


I_D(Amps) @ OP-1dB T_A=25°C

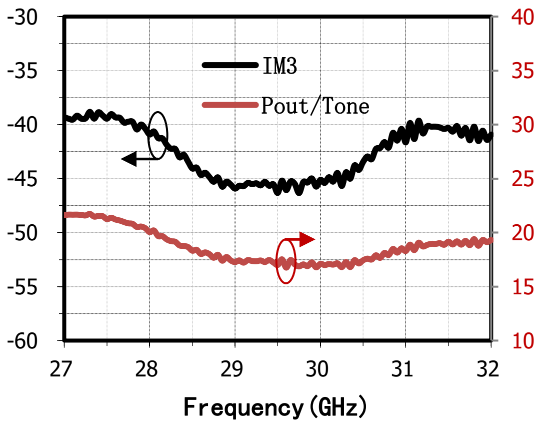


OIP3 、IM3 Performance Curve

OIP3(dBm) vs. Frequency



IM3(dBc) vs. Pout(dBm) I



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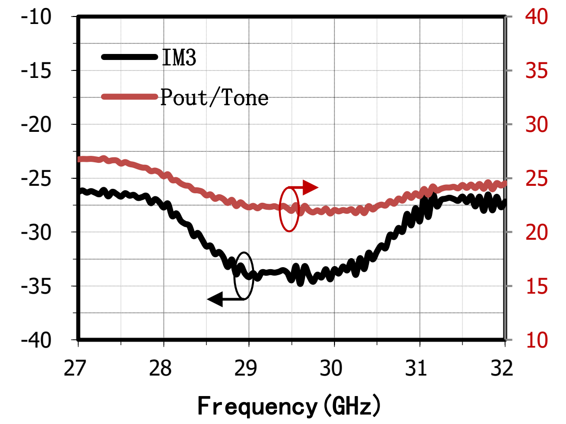
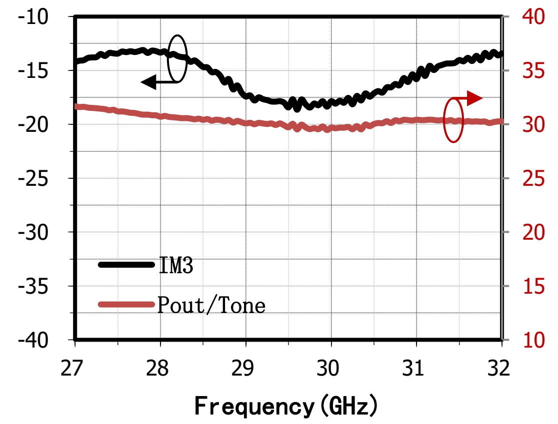
IM3(dBc) vs. Pout(dBm) II

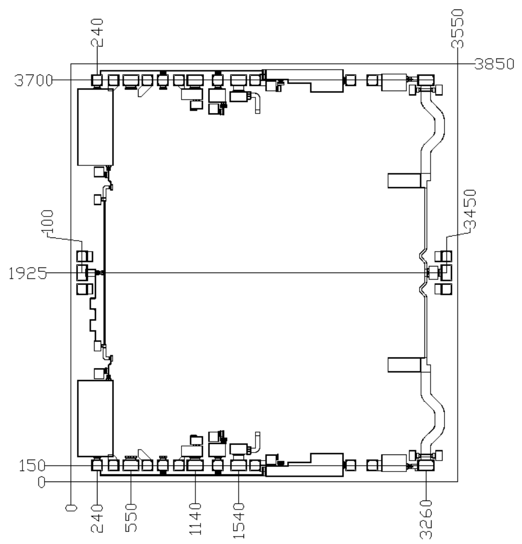


IM3(dBc) vs. Pout(dBm) III

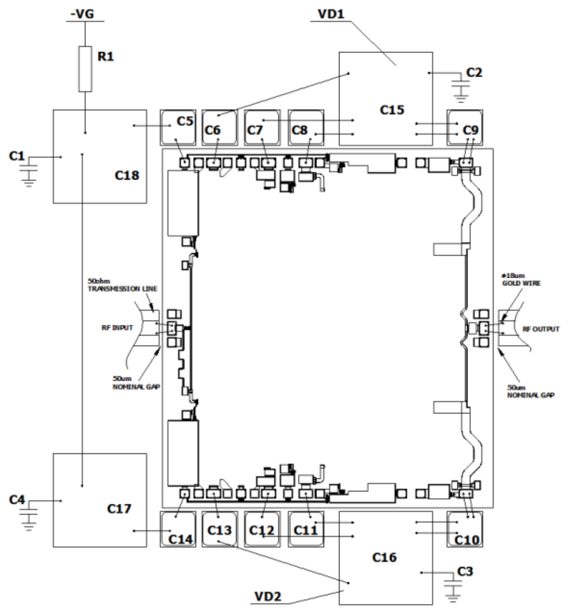


Die Outline

(All dimensions in µm)



Assembly Diagram



Bonding pad size:

150x100um VD1A~VD4A、VD1B~VD4B、RF IN、RFOUT pads

100x100um VG1A、VG1B pads

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Components List

Reference Des.	Value	Part Number	Manuf.	Size
C1～C4	2.2uF	GRM155R61A225KE15D	Murata	0402
C5～C14	300pF	—	ANY	SLC
C15～C18	1000pF	—	ANY	SLC
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 20 ohm is suitable.

Notes

1. SAC3118 is biased with a positive drain supply and negative gate supply. The recommended gate voltage is set to -0.7~-0.9 V.
2. RF connections should be made as short as possible to reduce the inductive effect of the bond wire. Use of a 0.8 mil thermosonic wedge bonding is highly recommended as the loop height will be minimized. The RF input and output require a double bond wire as shown.
3. The backside of SAC3118 is RF ground. Eutectic mounting is preferred, If using conductive epoxy, recommended epoxies is UNIMEC H9890-6A cured per the manufacturer's cure schedule. Epoxy should be applied in accordance with the manufacturer's specifications and should avoid contact with the top surface of the die. An epoxy fillet should be visible around the total die periphery.
4. Bypass caps C1~C4 should be placed no farther than 1.5mm from the amplifier.

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