SAC3133B

GaAs MMIC Power Amplifier
14GHz~18GHz 38dBm

Rev 1.0

Features

- Frequency: 14GHz~18GHz
- Small Signal Gain: 20dB
- Output P_{-1}dB: 38 dBm
- PAE: 25%
- IM_3: -24dBc, 30dBm/Tone@16GHz
- Die Size: 3.4mm×3.57mm×0.1mm
- Supply Voltage: +8V/-Vg
- Packaged: Bare Die

Typical Applications

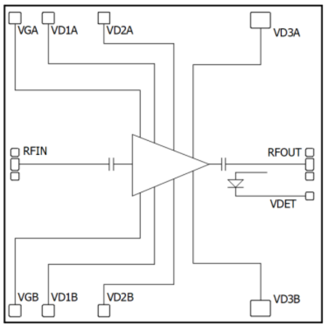
- Point-to-Point Radios
- SATCOM
- Military and Space
- Radar

General Description

SAC3133B is a Ku-band GaAs MMIC power amplifier. SAC3133B provides 20 dB of gain, and 38dBm of output power for 1 dB compression and 25% PAE from +8V supply.

The chip has surface passivation for protection and backside via holes and gold metallization to allow a conductive epoxy die attach process.

Functional Diagram



Electrical Performance

T_A=25℃, V_D=+8V, I_{DQ}=2A, Z_0=50Ω, CW

Parameter	Min.	Typ.	Max.	Units
Frequency Range	14	—	18	GHz
Small Signal Gain	16	20	—	dB
Small Signal Gain Flatness	—	±1.5	—	dB
Reverse Isolation	—	-65	—	dB
RF Input Port Return Loss	—	-8	—	dB
Power Added Efficiency	—	25	—	%
Output P_{-1}dB	37	38	—	dBm
IM_3*	—	24	—	dBc
Drain Voltage (V_D)	—	8	—	V
Gate Current	—	2	22	mA
Supply Current (I_D)***	—	—	3.55	A
Thermal Resistance**	—	3.3	—	°C/W

* Pout/Tone= 30dBm, fc = 16GHz, Δf = 4MHz
** Measurement taken at Pout = OP_{-1}dB
*** Adjust Vg between -1V to -0.6V to achieve I_{DQ}= 2A typical.

Absolute Maximum Ratings

Maximum Input Power	+23dBm	Operating Temperature (Backside)	-55℃~+85℃
Channel Temperature	165℃	Storage Temperature	-55℃~+150℃
Maximum V_D	+8.5V	V_G Range	-1.5V~-0.5V

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
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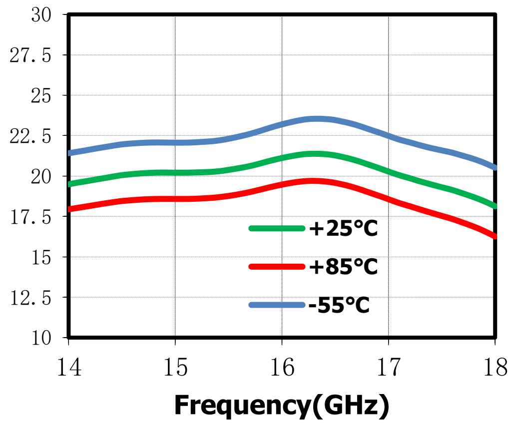
Typical Performance Curve

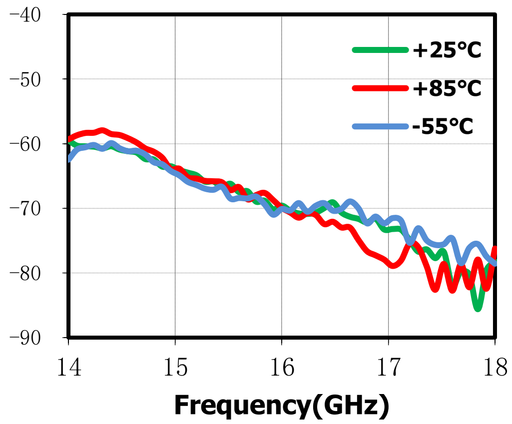
The following data are obtained by SAC3133B evaluation board

V_D = + 8V, I_{DQ} = 2A, CW, T_A = + 25℃

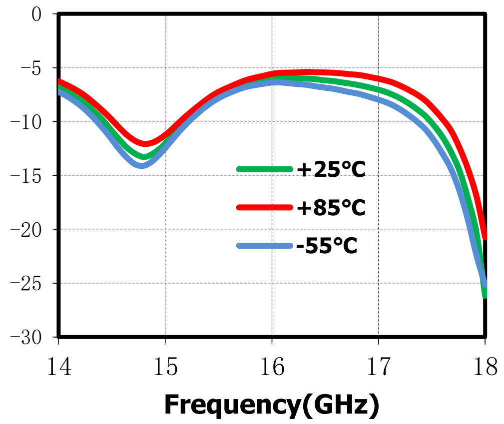
Small Signal Gain(dB) vs.Temperature



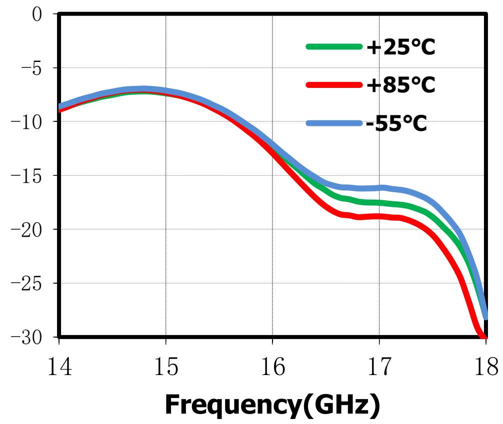
Isolation(dB) vs.Temperature



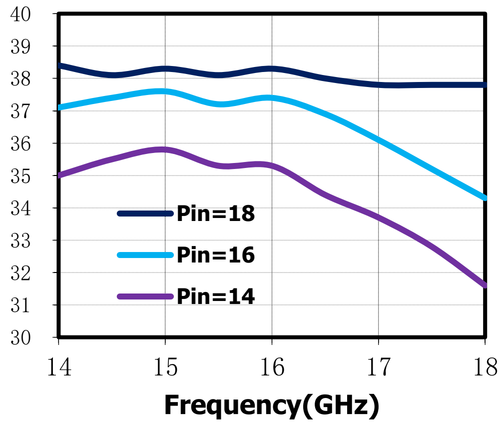
Input RL(dB) vs.Temperature



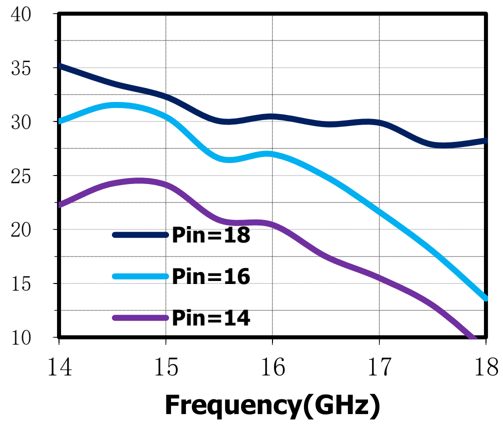
Output RL(dB) vs.Temperature



Pout(dBm) vs. Pin(dBm),T_A=+25°C



PAE(%) vs. Pin(dBm),T_A=+25°C



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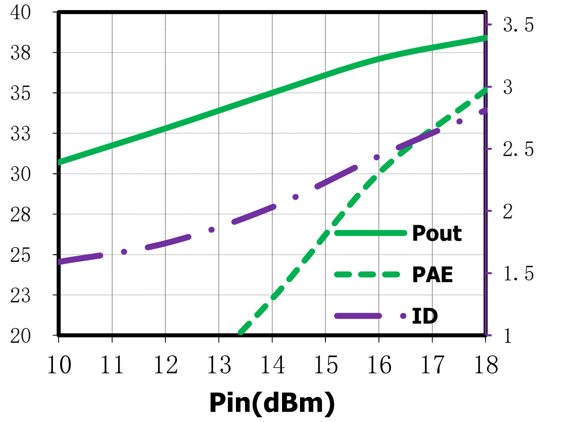
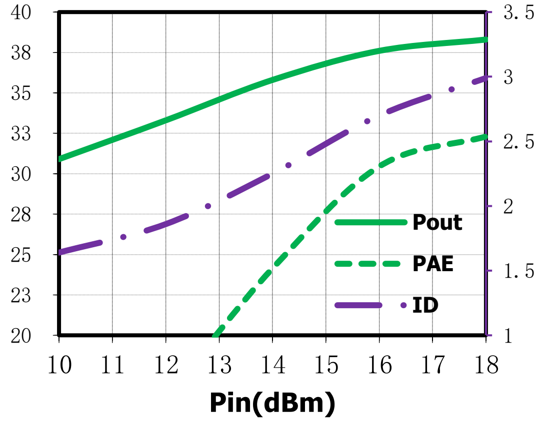
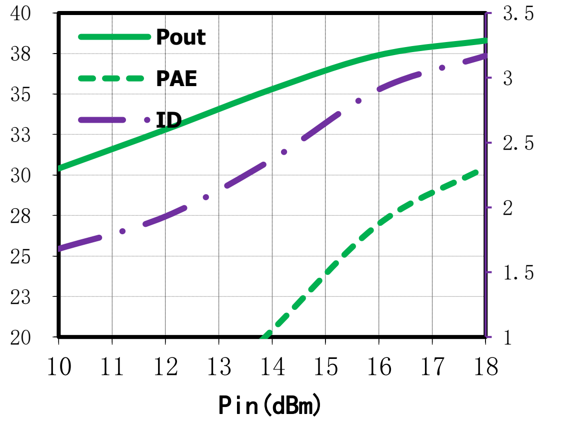
Pout(dBm)、PAE(%)、ID(A) vs. Pin,f=14GHz



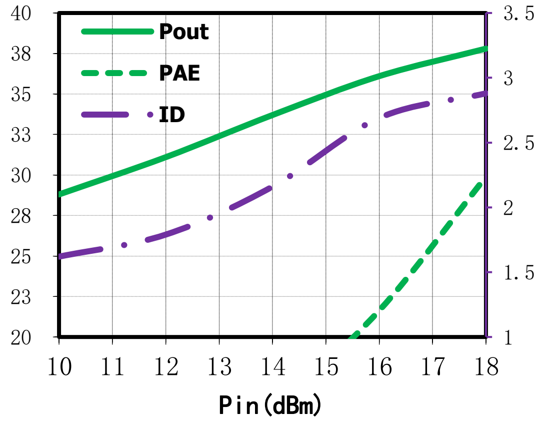
Pout(dBm)、PAE(%)、ID(A) vs. Pin,f=15GHz



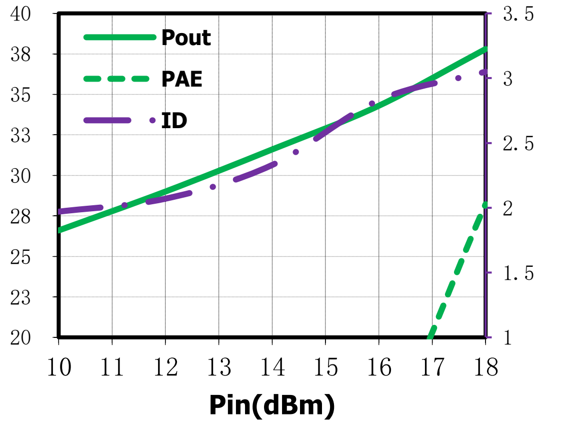
Pout(dBm)、PAE(%)、ID(A) vs. Pin,f=16GHz



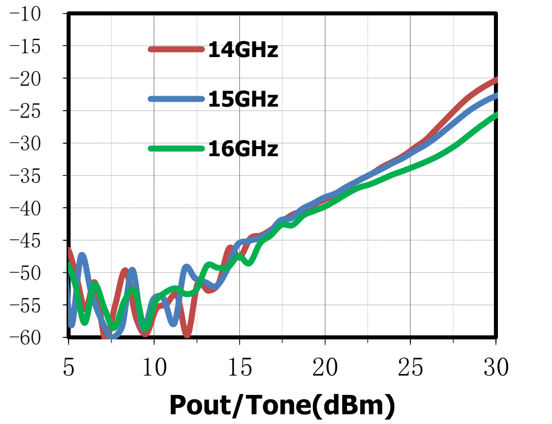
Pout(dBm)、PAE(%)、ID(A) vs. Pin,f=17GHz



Pout(dBm)、PAE(%)、ID(A) vs. Pin,f=18GHz



IM3(dBc)vs.Pout/Tone



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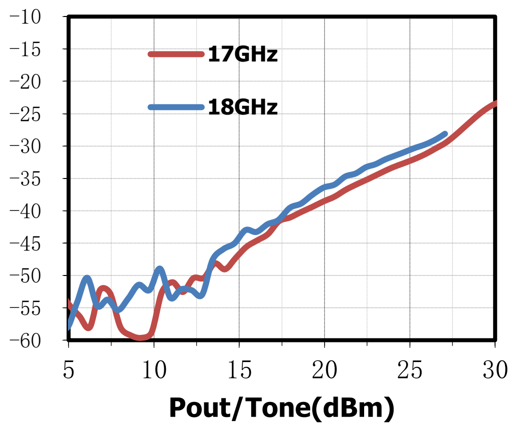
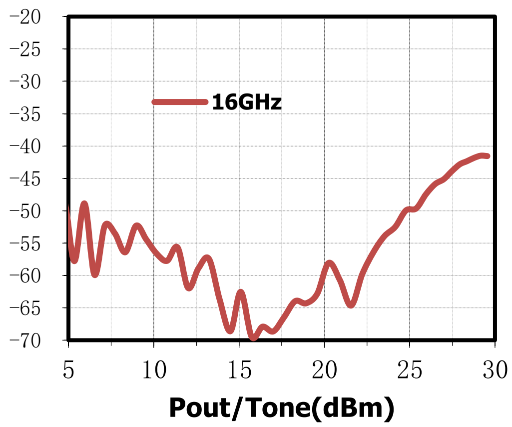
IM3(dBc)vs.Pout/Tone

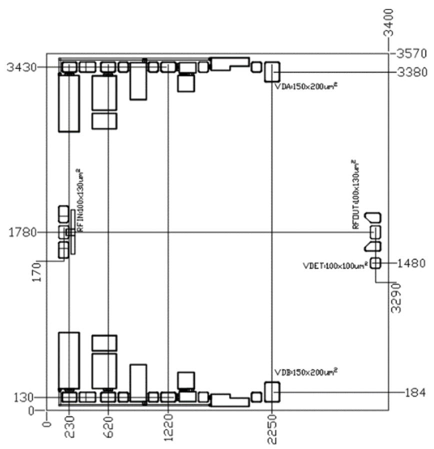


IM5(dBc)vs.Pout/Tone



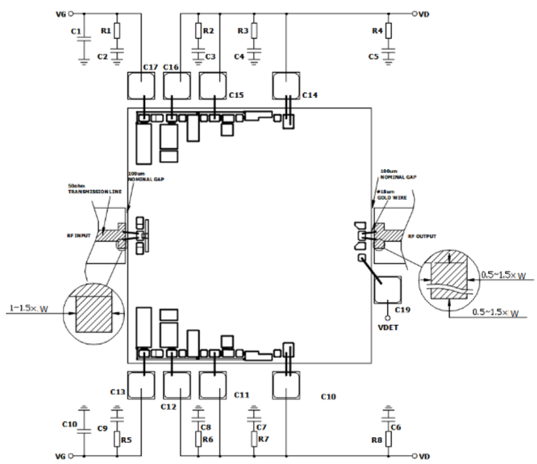
Die Outline

(All dimensions in µm)



Pads size: 100x130µm², t=100µm

Assembly Diagram



Components List

Reference Des.	Value	Part Number	Manuf.	Size
C10~C17、C19	100pF	—	—	SLC
C2~C9	0.47µF	—	—	0603
C1、C10	10µF	—	—	0805
R1~R8	1Ω	—	—	0603

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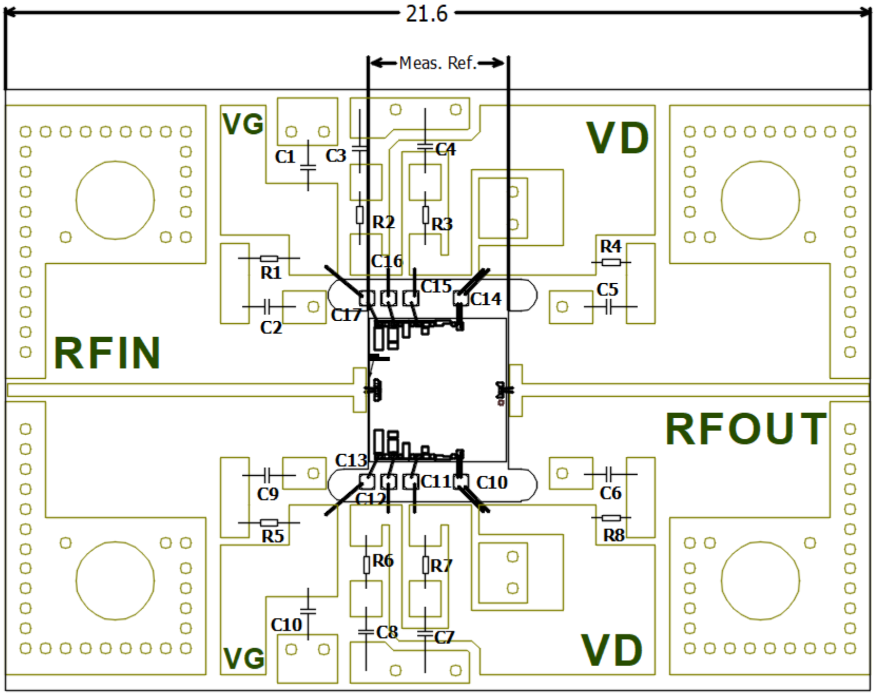
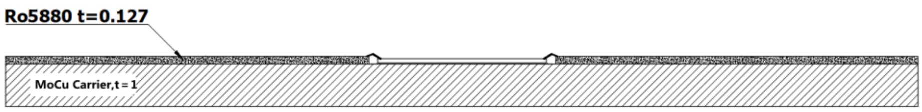
SAC3133B EVB





Attention:

1. SAC3133B is biased with a positive drain supply and negative gate supply. The recommended gate voltage is set to -0.6 to -1V when the drain voltage is set to 8V;

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;

3. Vacuum AuSn eutectic soldering is recommended;

4. The maximum spike voltage at drains (VDxx) should not exceed 8. 5v.

Revision History

Revision	Date	Comment
1.0	Apr. 15, 2022	First Release

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