SAC3133

GaAs MMIC Power Amplifier
15GHz~17GHz　38dBm

Rev 1.0

Features

- Frequency: 15GHz~17GHz
- Small Signal Gain: 20dB
- Output P_{-1}dB: 38 dBm
- PAE: 28%
- IM3: -24dBc, 30dBm/Tone@16GHz
- Die Size: 3.4mm×3.57mm×0.1mm
- Supply Voltage: +7V/-Vg
- Packaged: Bare Die

Typical Applications

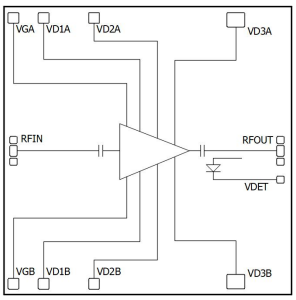
- Point-to-Point Radios
- SATCOM
- Military and Space
- Test and Measurement
- Radar

General Description

The SAC3133 is a Ku-band GaAs MMIC power amplifier. The SAC3133 provides 20 dB of gain, and 38dBm of output power for 1 dB compression and 28% PAE from +7V 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 VSAT applications.

Functional Diagram



Electrical Performance(T_A=25℃, V_D=+7V, I_{DQ}=2.5A, Z_0=50Ω, CW)

Parameter	Min.	Typ.	Max.	Units
Frequency Range	15	—	17	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	—	28	—	%
Output P_{-1}dB	37	38	—	dBm
IM_3*	—	24	—	dBc
Drain Voltage (V_D)	—	7	—	V
Gate Current	—	2	18	mA
Supply Current(I_D)***	—	—	4.75	A
Thermal Resistance**	—	3.3	—	℃/W

* Pout/Tone= 30dBm, fc = 16GHz, Δf = 4MHz

**When pout =OP_{-1}dB, the thermal resistance is 3.8℃/W when there is no RF power output (100% DC power is dissipated in the device)

***Adjust the Vg voltage （-1~-0.65V） so that the I_{DQ} is about 2.5A and the typical Vg voltage is -0.85V

Absolute Maximum Ratings

Maximum Input Power	+25dBm	Operating Temperature (Backside)	-55℃~+85℃
Channel Temperature	165℃	Storage Temperature	-55℃~+150℃
Maximum V_D	+8V	V_G Range	-1.5V~-0.5V

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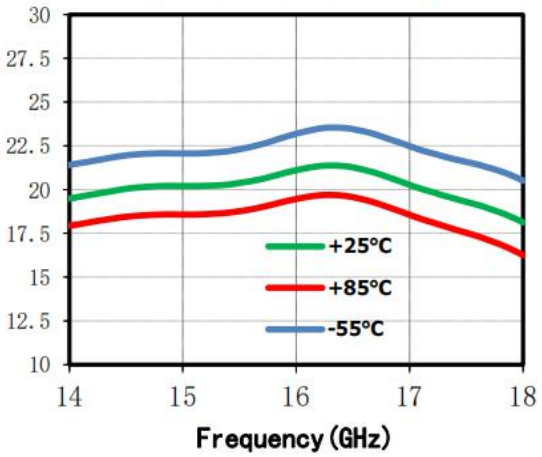
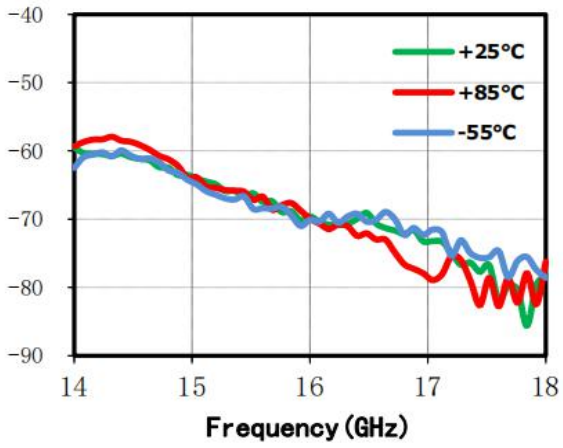
Typical Performance Curve

The following data are obtained by using SAC3133 evaluation board test, V_D = + 7V, I_{DQ} = 2.5A, working mode CW, T_A = + 25 ℃

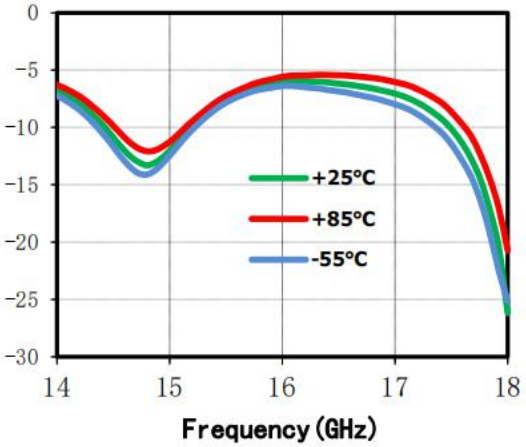
Small Signal Gain(dB) vs.Temperature



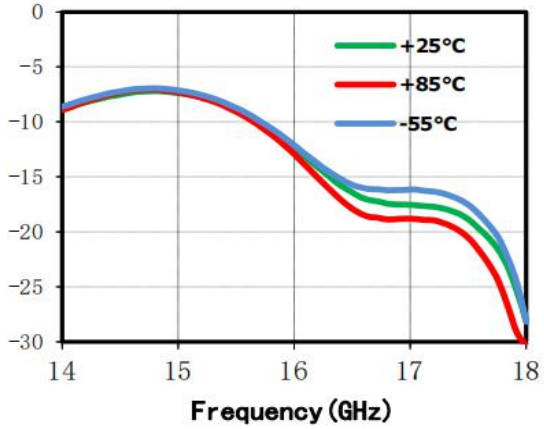
Isolation(dB) vs.Temperature



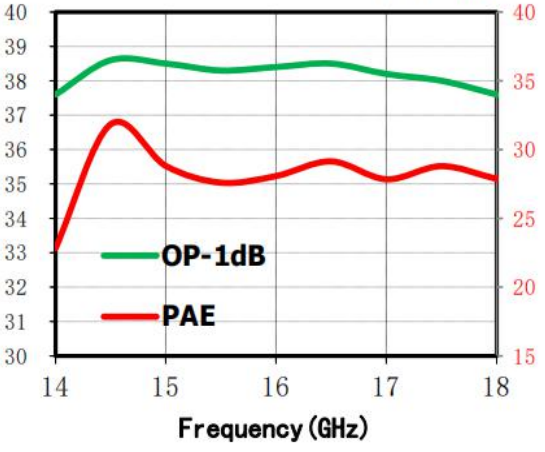
Input RL(dB) vs.Temperature



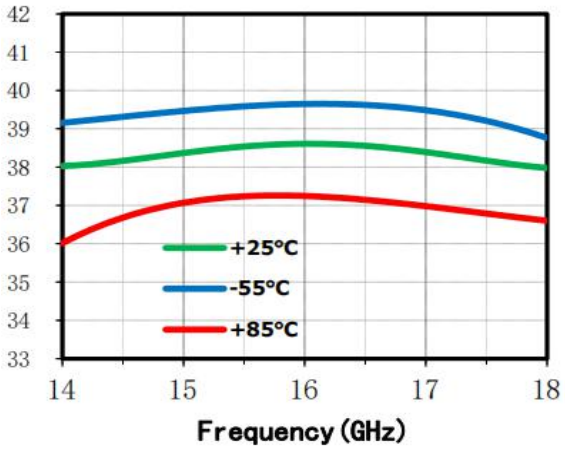
Output RL(dB) vs.Temperature



OP-1dB (dBm) , PAE (%) vs. Frequency



OP-1dB (dBm) vs. Temperature



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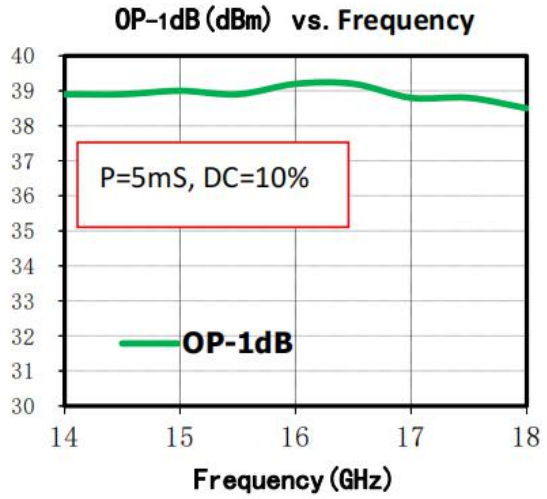
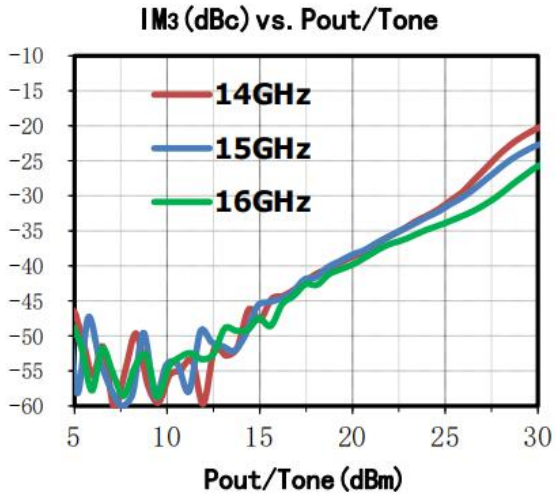
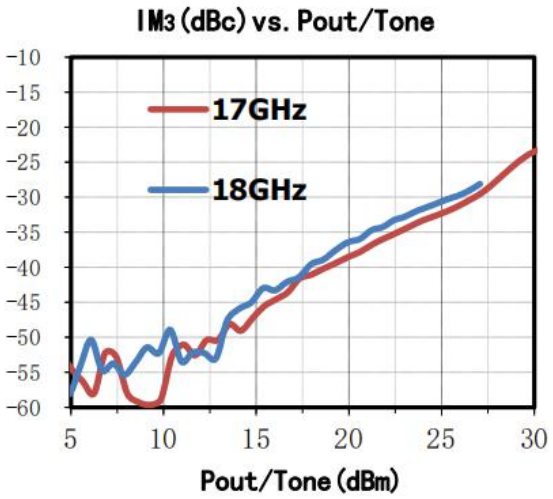
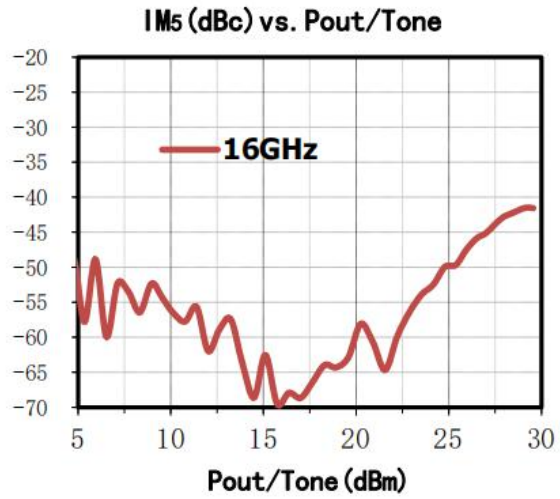
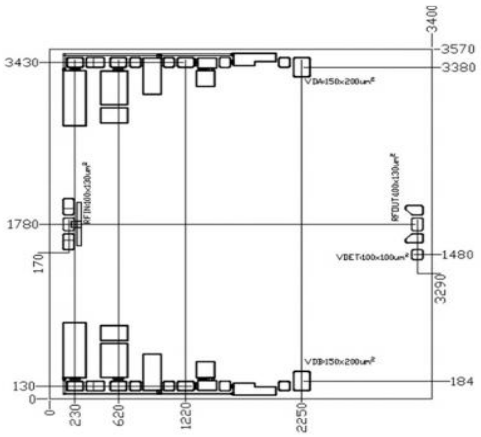






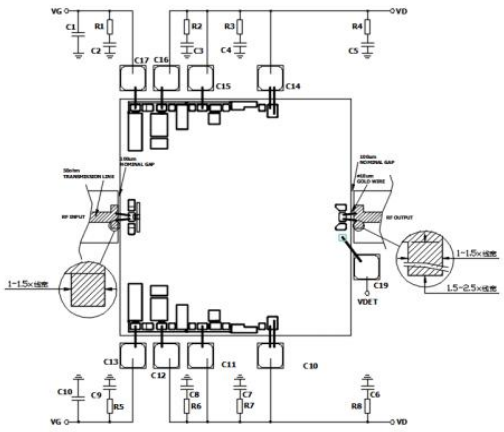


Die Outline(all dimensions in μm)



VD bonding pad size not marked：100x130μm², t=100μm

Assembly Diagram



VD_X and VGx need to be fed simultaneously on both sides

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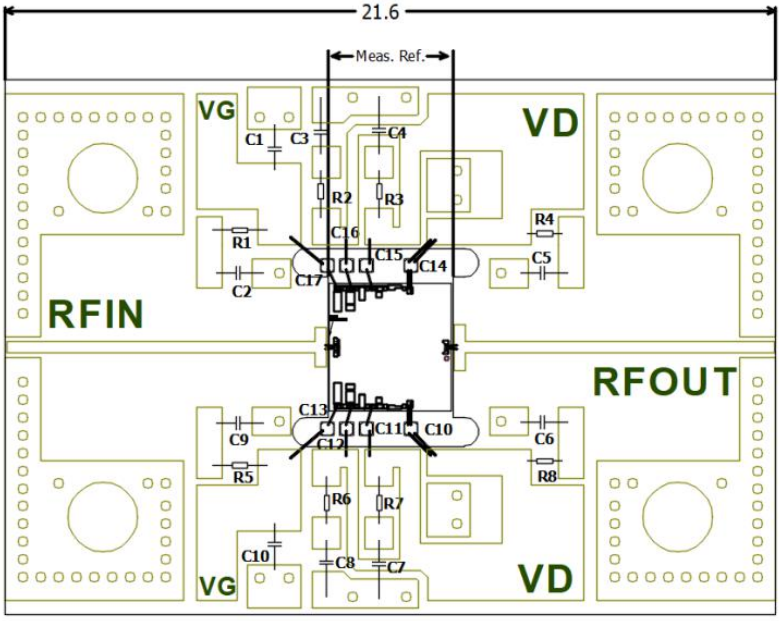
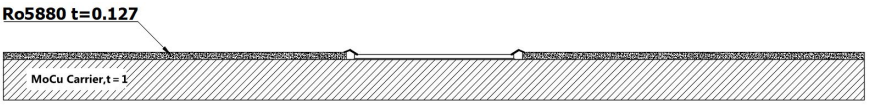
Components List

Reference Des.	Value	Part Number	Manuf.	Size
C10~C17、C19	100pF	—	—	SLC
C2~C9	0.47μF	—	—	0603
C1、C10	10μF	—	—	0805
R1~R8	2R2	—	—	0603

SAC3133 Chip Test Fixture





Attention:

1. SAC3133 requires drain positive voltage (VDx) and gate negative voltage (VGx) bias, which shall be applied before applying drain positive voltage Ensure that the grid negative voltage is applied;
2. The length of RF input / output gold wire shall be shortened as much as possible. Diameter 25 is recommended μm gold wire bonding;
3. Vacuum AuSn eutectic welding is recommended,or high thermal conductivity conductive adhesive such as CT2700R7S or EK2000 can be used for bonding;
4. **When using drain pulse voltage modulation, ensure that the maximum overshoot voltage does not exceed 8.5V.**

Revision Histor

Revision	Date	Comment
1.0	March 15, 2021	First Release