SAC3945

GaAs MMIC Driver Amplifier
18～45GHz 23dBm

Rev1.0

Features

- Frequency: 18~45GHz
- Gain: 15dB
- Output P-1dB: 25dBm Typ. 23dBm Min.
- Output IM3: -23dBc Typ.
- Supply Voltage: +5V/-Vg
- Balanced Amplifier
- Full Passivation for Enhanced Reliability
- Die Size: 2.3mm×1.24mm×0.1mm

Typical Applications

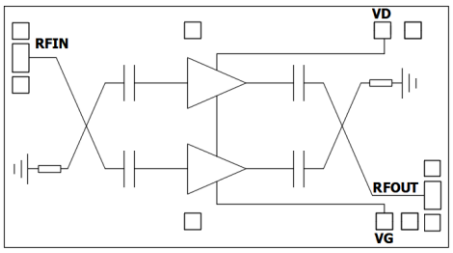
- Point-to-Point Radios
- SATCOM
- Military and Space
- Test and Measurement
- Radar

General Description

The SAC3945 is a balanced GaAs MMIC driver amplifier, which operates between in 18~45GHz. The SAC3945 provides 15dB of small signal gain, and 25dBm of output P_{-1}dB while requiring 450mA from a +5V supply voltage.

The chip offers full passivation for increased reliability and moisture protection.

Functional Diagram



Electrical Performance

TA=25℃,VD=+5V,ID=450mA,Z0=50Ω

Parameter	Min.	Typ.	Max.	Units
Frequency Range		18~45		GHz
Small Signal Gain	12	15	23	dB
Small Signal Gain Flatness	—	±1.5	±2	dB
Reverse Isolation	—	-35	—	dB
Input/ Output VSWR	—	1.35	2.0	:1
Noise Figure	—	10	—	dB
Output Power for 1 dB Compression (OP_{-1}dB)	23	25	—	dBm
Output IM_3	—	-23*	—	dBc
Supply Current(I_D)	—	450**	550	mA
Drain Voltage(V_D)	5	—	6	V
Thermal Resistance		22		℃/W

* Pout/Tone=20dBm, Fc=30GHz, Δf=10MHz

** Adjust Vg between -1V to -0.4V to achieve I_D= 450 mA typical.

Absolute Maximum Ratings

Maximum Input Power	+13dBm，CW 1min	Operating Temperature	-55℃~+85℃
Channel Temperature	+150℃	Storage Temperature	-55℃~+150℃
Maximum V_D	6.5V		

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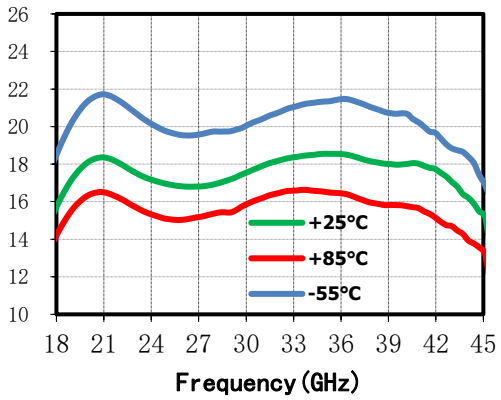
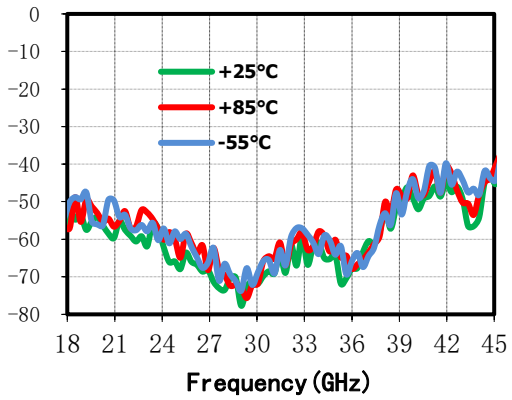
Typical Small Signal Performance Curve

V_D=+5V,I_{DQ}=450mA, The following curves are taken from SAC3945 evaluation board.

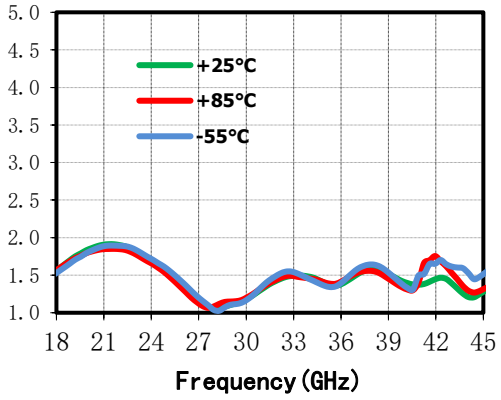
Small Signal Gain(dB) vs.Temperature



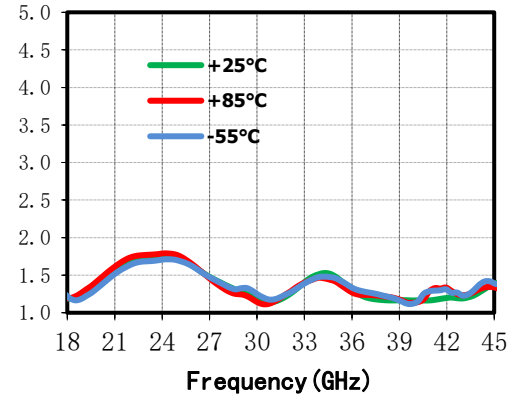
Isolation(dB) vs.Temperature



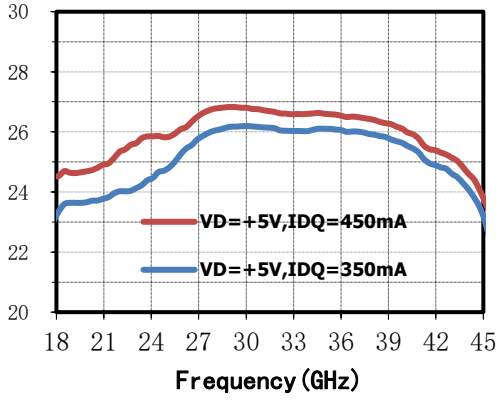
Input VSWR(:1) vs.Temperature



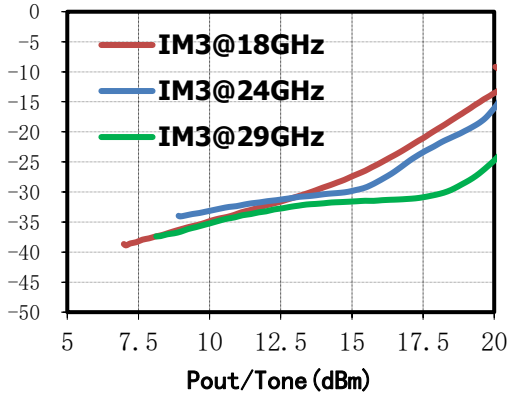
Output VSWR(:1) vs.Temperature



OP-1dB (dBm) vs. Bias



IM3 (dBc) vs. Pout/Tone



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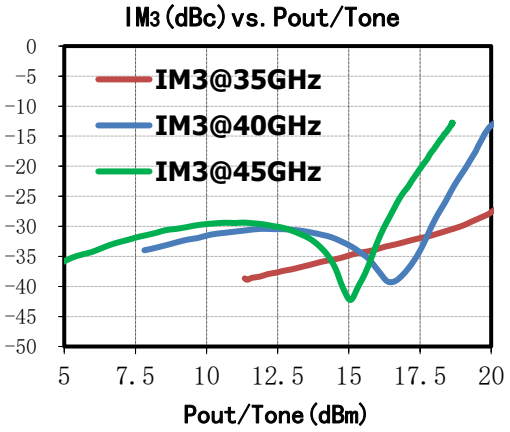
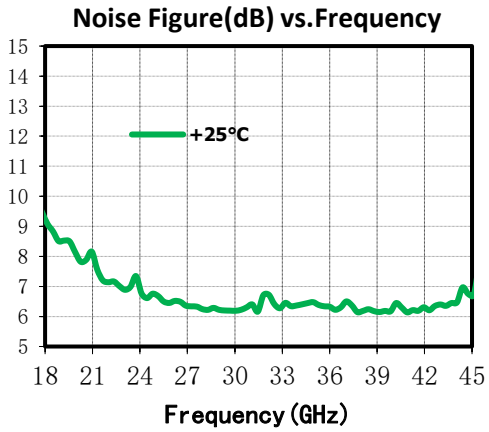
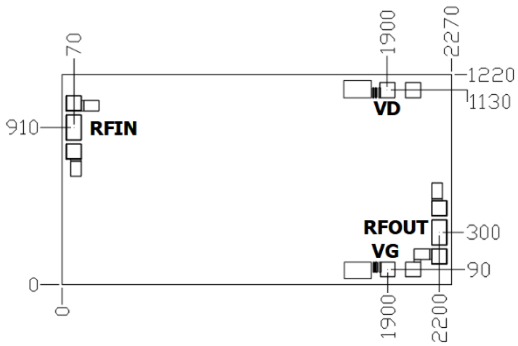




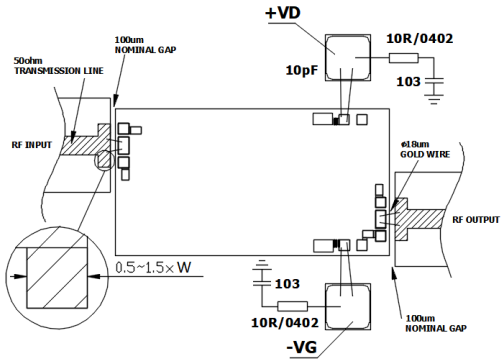
Die Outline(μm)



RFIN,RFOUT pads size:140x80

VG/VD pads size:100x100

Assembly Diagram



Notes

1. The SAC3945 is biased with a positive drain supply and negative gate supply. The recommended gate voltage is set to -0.4 to -1V when the drain voltage is set to 5V.
2. The back of chip is RF ground.
3. 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.
4. Bypass SLCs should be placed as close as possible to the chip.
5. GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.

Revision History

Serial Number	Time	Revised Content
1	February 2021	First Release