SAC3952

GaAs MMIC Driver Amplifier
26～45GHz 27dBm

Rev1.0

Features

- Frequency: 26~45GHz
- Gain: 15dB
- Output P_{-1}dB: 27dBm
- Supply Voltage: +5V/-Vg
- Balanced Amplifier
- Full Passivation for Enhanced Reliability
- Die Size: 2.6mm×2.5mm×0.1mm

Typical Applications

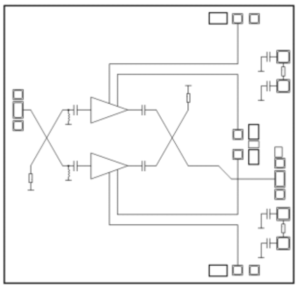
- Point-to-Point Radios
- SATCOM
- Test and Measurement

General Description

SAC3952 is a balanced GaAs MMIC driver amplifier, which operates between in 26~45GHz. SAC3952 provides 15dB of small signal gain, and 27dBm of output P_{-1}dB while requiring 800mA 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=800mA,Z0=50Ω

Parameter	Min.	Typ.	Max.	Units
Frequency Range	26~45			GHz
Small Signal Gain	13	15	-	dB
Small Signal Gain Flatness	—	±1.5	±2	dB
Reverse Isolation	—	-65	—	dB
Input/ Output VSWR	—	1.35	2.2	:1
Noise Figure	—	8	—	dB
Output Power for 1 dB Compression (OP_{-1}dB)	25	27	—	dBm
Output IM_3	—	-23*	—	dBc
Supply Current (I_D)	—	800**	1250	mA
Drain Voltage (V_D)	5	—	6	V
Thermal Resistance	12			℃/W

* Pout/Tone=20dBm, Fc=38GHz, Δf=1MHz

** Adjust Vg between -1V to -0.3V to achieve I_D= 800~900 mA

Absolute Maximum Ratings

Maximum Input Power	+18dBm，CW 1min	Operating Temperature	-55℃~+85℃
Channel Temperature	+150℃	Storage Temperature	-55℃~+150℃
Maximum V_D	6.5V	Maximum V_G	-1.5V(Pinch-off)

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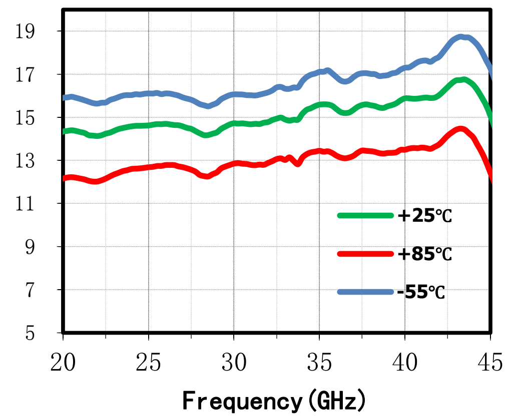
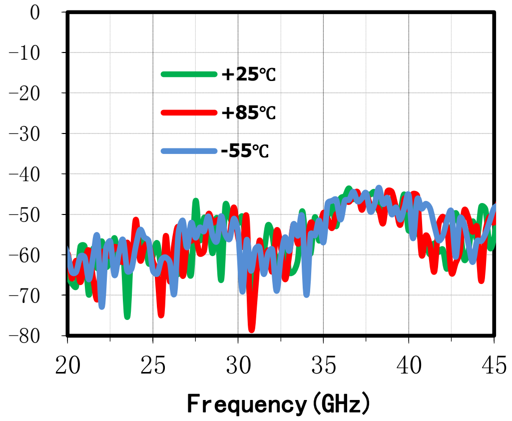
Typical Small Signal Performance Curve

V_D=+5V,I_{DQ}=800mA, The following curves are taken from SAC3952 evaluation board.

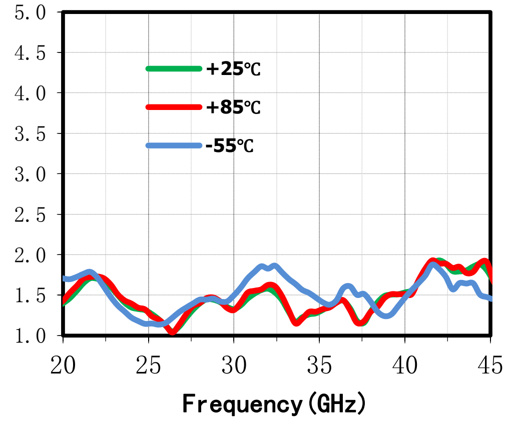
Small Signal Gain(dB) vs.Temperature



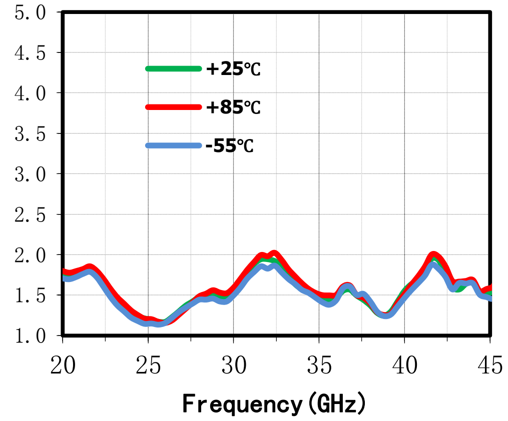
Isolation(dB) vs.Temperature



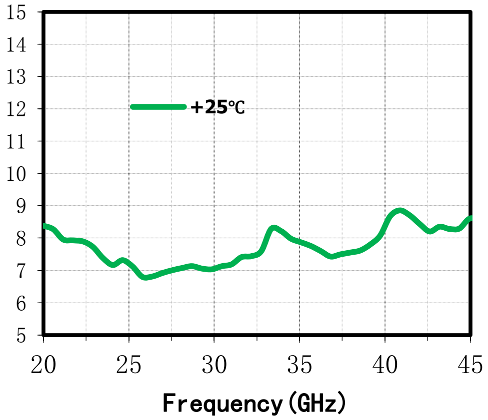
Input VSWR(:1) vs.Temperature



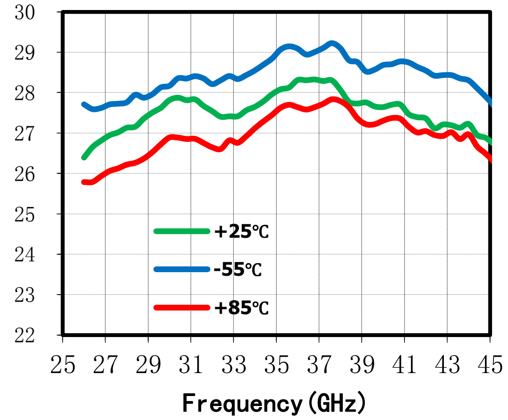
Output VSWR(:1) vs.Temperature



Noise Figure(dB) vs.Frequency



OP-1dB (dBm) vs. Temperature



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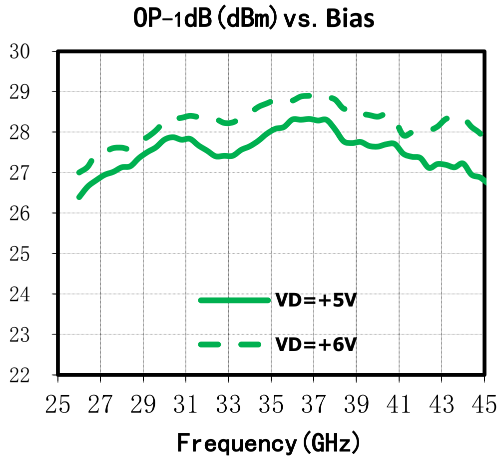

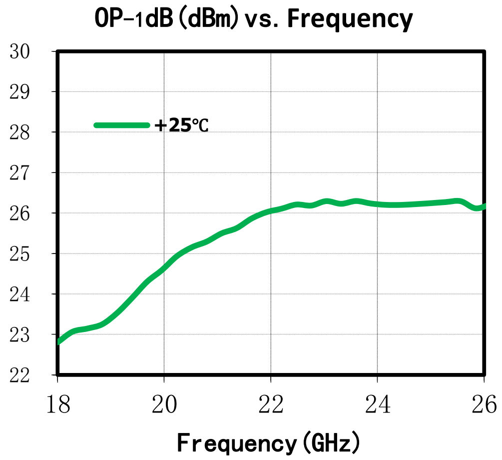

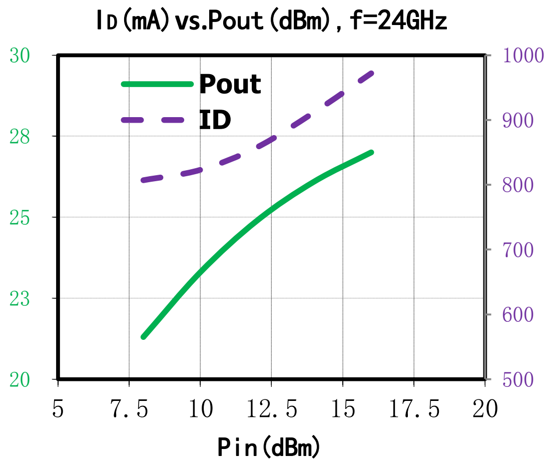

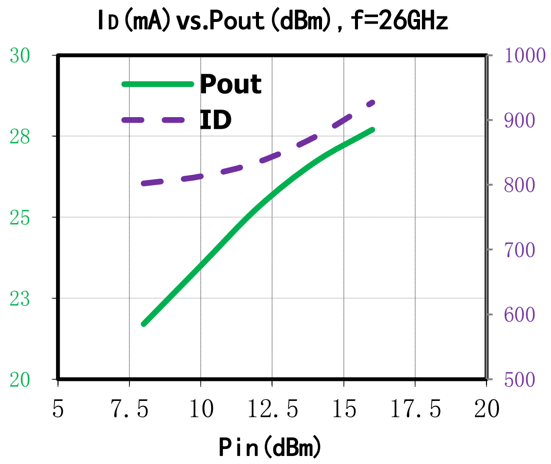

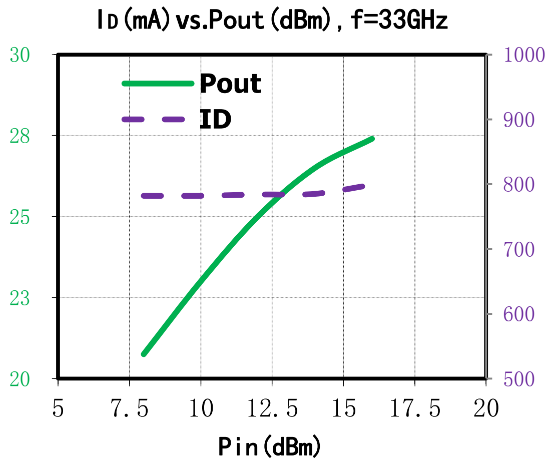

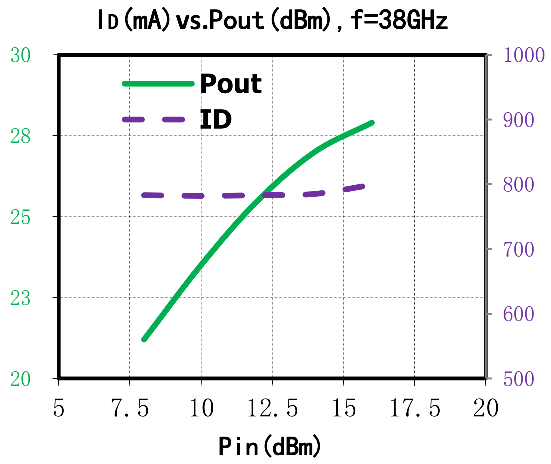

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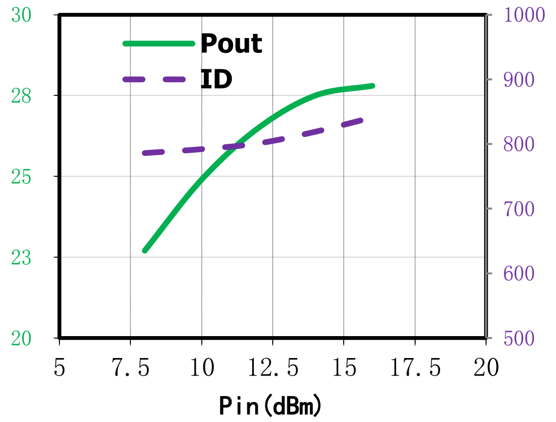
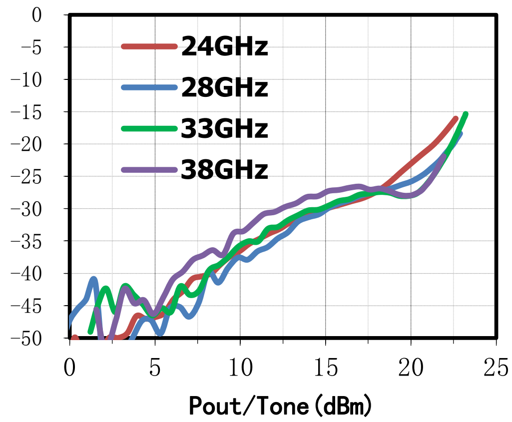
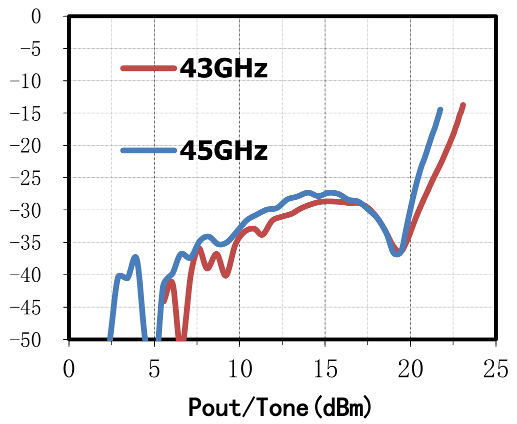
ID (mA) vs.Pout (dBm), f=40GHz



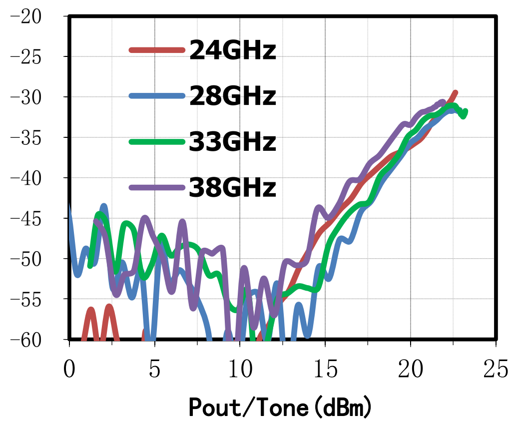
IM3 (dBc) vs. Pout/Tone



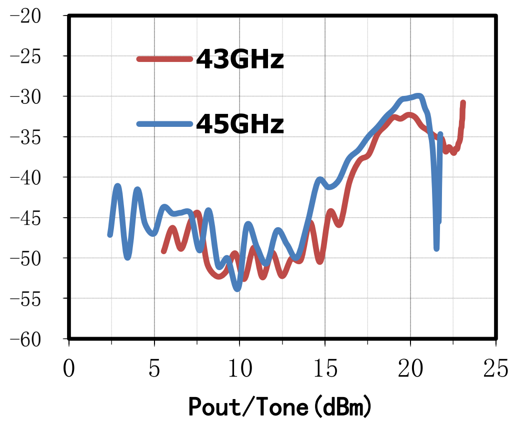
IM3 (dBc) vs. Pout/Tone



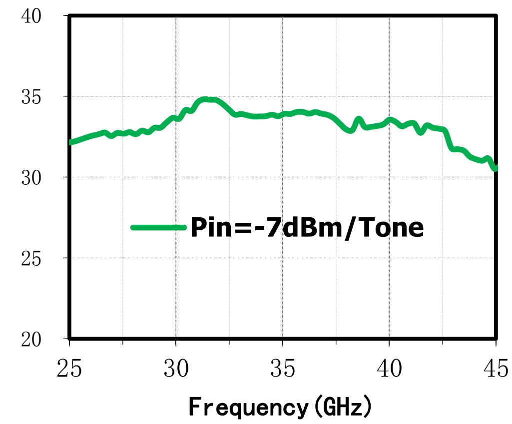
IM5 (dBc) vs. Pout/Tone



IM5 (dBc) vs. Pout/Tone



Output IP3 (dBm) vs. Frequency



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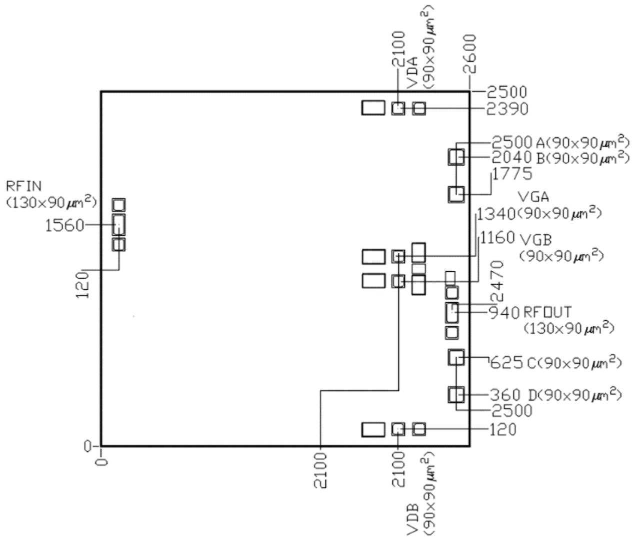
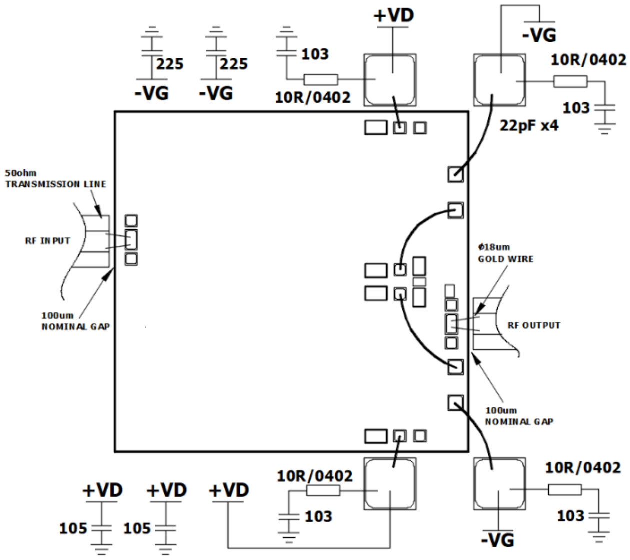
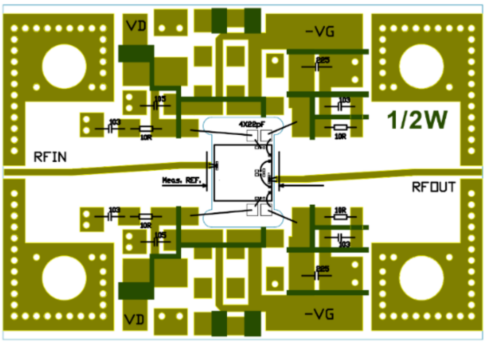
Die Outline(μm)



Assembly Diagram



SAC3952 EVB



The evaluation board is a 2-layer board fabricated using Rogers 5880 t=0.127 and using best practices for high frequency RF design. The RF input and RF output traces have a 50 Ω characteristic impedance.

Notes

1. SAC3952 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

Revision	Date	Comment
1.0	Oct. 2021	First Release

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