

SAC3946Q5



GaAs MMIC Driver Amplifier
30KHz~40GHz

Rev 1.0

Features

- Frequency: 30KHz~40GHz
- Gain: 12dB
- Output P_{1dB}:15dBm@40GHz
- Supply: +6V@130mA/-Vg
- Package: QFN5x5

Typical Applications

- Instrument

General Description

SAC3946Q5 is a surface mount packaged broadband PHEMT GaAs MMIC driver amplifier designed for medium output power and high gain over the full 30KHz to 40 GHz frequency range.

Electrical Performance

(T_A=25°C, V_D= +6V, I_D= 120mA, Z₀=50Ω)

Parameter	Min.	Typ.	Max.	Units
Frequency Range	0.00003~40			GHz
Small Signal Gain	—	12	—	dB
Gain Flatness	—	±1.5	—	dB
RF Input/Output VSWR	—	1.6	3	: 1
Noise Figure	—	7	—	dB
Reverse Isolation	—	40	15	dB
Output P _{1dB}	10	15	—	dBm
Supply Current (I _D)	—	120	150	mA
Thermal Resistance		15.2		°C/W

Absolute Maximum Ratings

Maximum Input Power	+17dBm 10min CW	Operating Temperature	-55°C~+85°C
Channel Temperature	+150°C	Storage Temperature	-55°C~+150°C
Maximum V _D	+8V	ESD Human Body Model	Class 0

SuperApex, LLC

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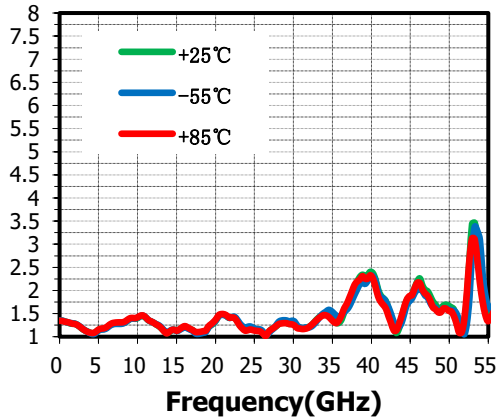
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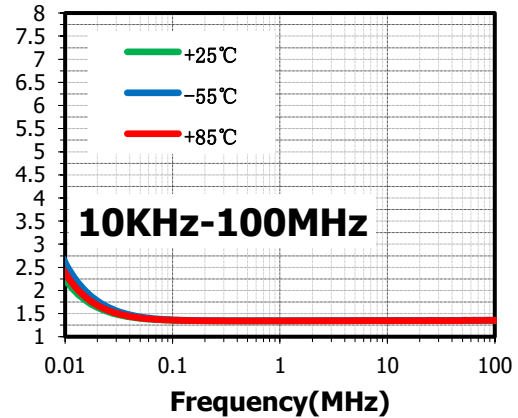
Typical Performance Curve

$V_D = +6V$, $I_{DQ} = 120mA$, On Fixture, De-embed, VNA Bias

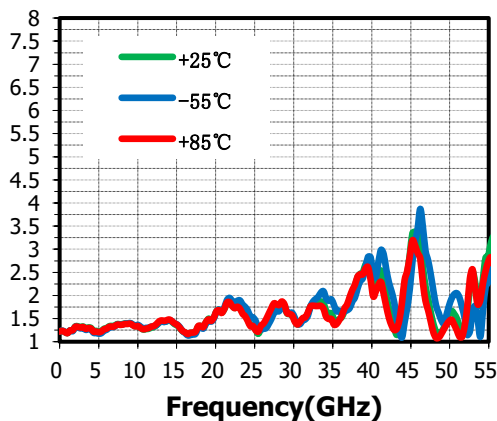
Input VSWR(:1) vs. Temperature



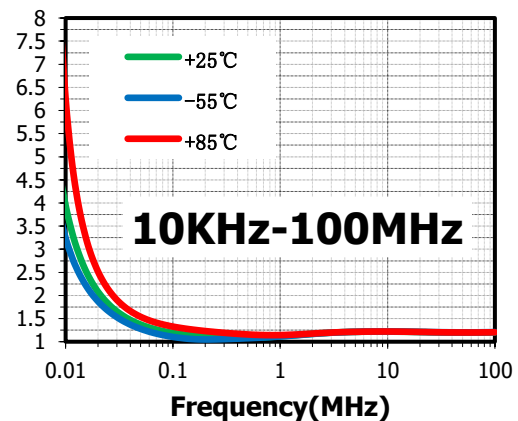
Input VSWR(:1) vs. Temperature



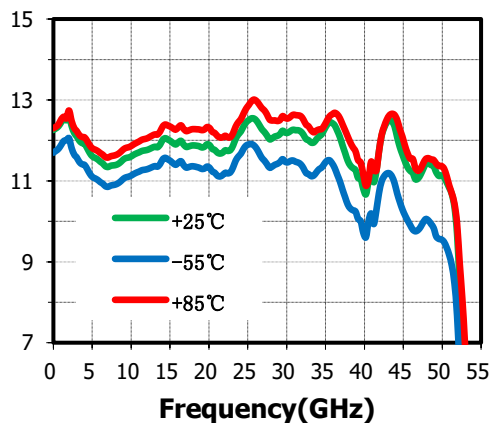
Output VSWR(:1) vs. Temperature



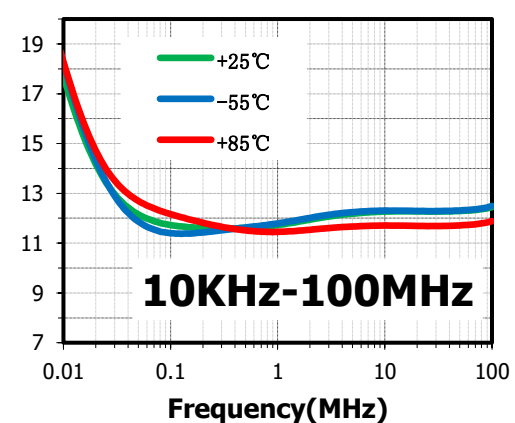
Output VSWR(:1) vs. Temperature



Small Signal Gain(dB) vs. Temperature



Small Signal Gain(dB) vs. Temperature



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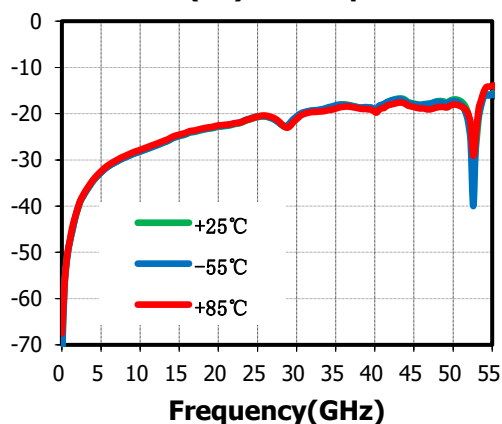
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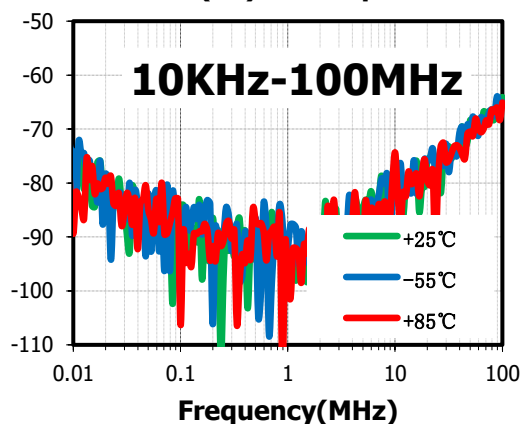
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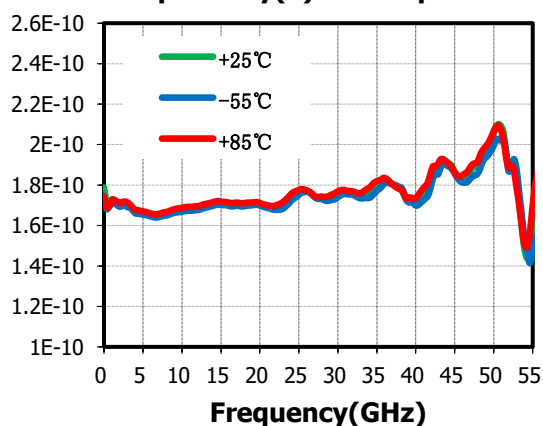
Isolation(dB) vs.Temperature



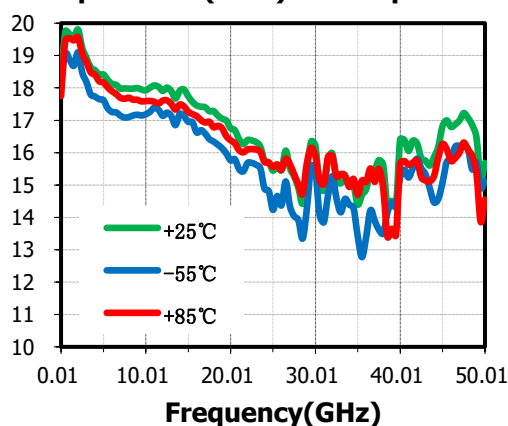
Isolation(dB) vs.Temperature



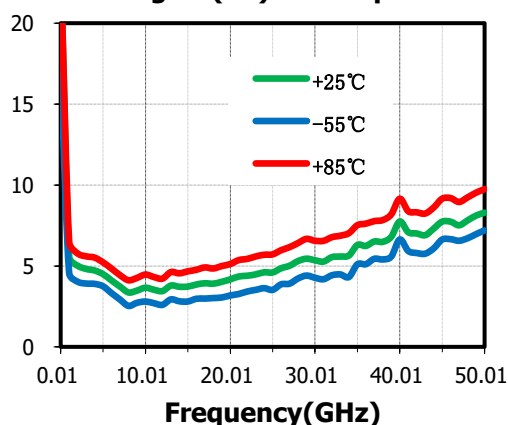
Groupe Delay(S) vs.Temperature



Output P-1dB(dBm) vs.Temperature



Noise Figure(dB) vs.Temperature



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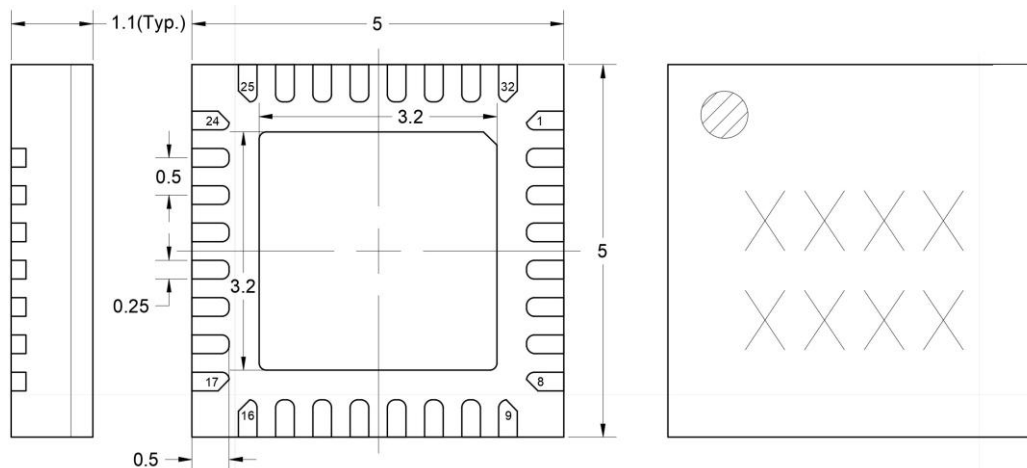
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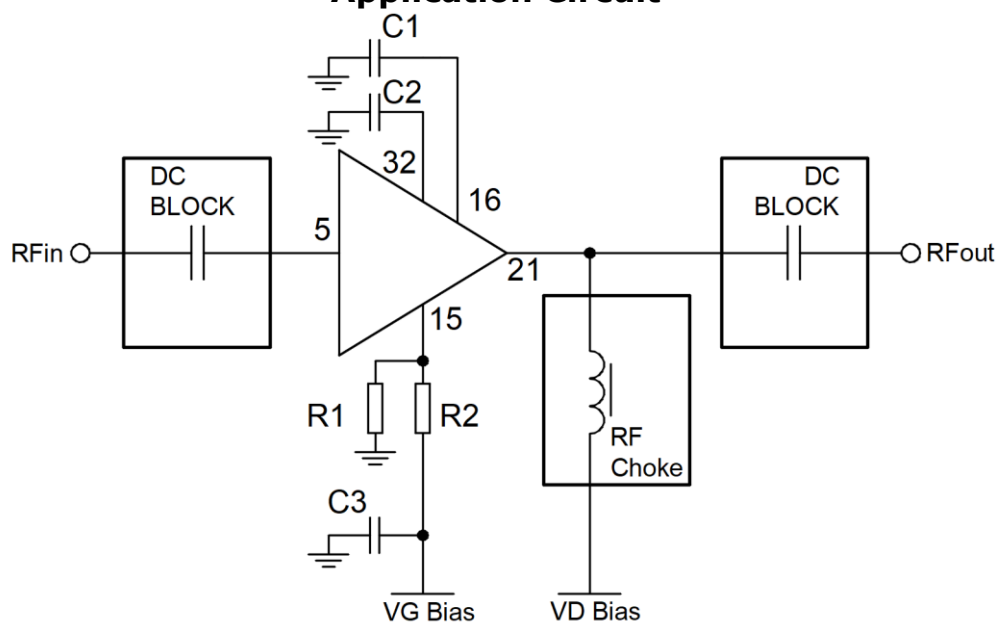
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Outline Drawing (mm)



Application Circuit



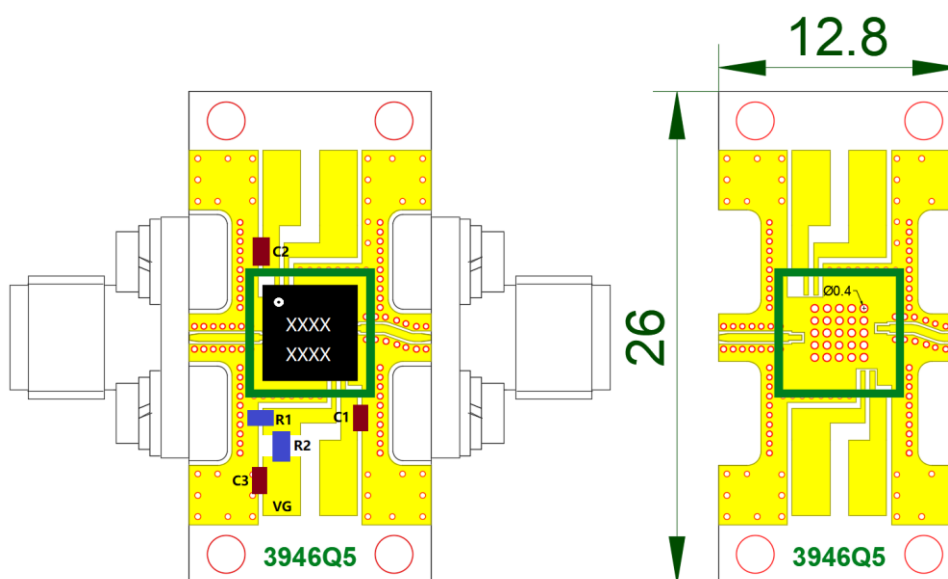
BOM

No.	Value	P/N	M
R2	1000Ω	TFPT0603L1001FV	VISHAY
R1	91Ω	-	-
C1~C3	0.47 μF	LWK105BJ474MP	Taiyo Yuden

Pin Descriptions

No.	Func.	No.	Func.	No.	Func.	No.	Func.
1	Connect to GND	11	Connect to GND	21	RFOUT/VD Bias	31	Connect to GND
2	Connect to GND	12	Connect to GND	22	Connect to GND	32	ACD
3	Connect to GND	13	Connect to GND	23	Connect to GND		
4	Connect to GND	14	Connect to GND	24	Connect to GND		
5	RFIN (DC Coupled)	15	VG Bias	25	Connect to GND		
6	Connect to GND	16	ACG	26	Connect to GND		
7	Connect to GND	17	Connect to GND	27	Connect to GND		
8	Connect to GND	18	Connect to GND	28	Connect to GND		
9	Connect to GND	19	Connect to GND	29	Connect to GND		
10	Connect to GND	20	Connect to GND	30	Connect to GND		

Evaluation Board



The Evaluation board is a 2-layer board fabricated using Rogers 4350b $t=0.254$ and using best practices for high frequency RF design. The RF input and RF output traces have a $50\ \Omega$ characteristic impedance.

Attention:

1. The RF input and output are DC coupled;
2. The moisture resistance level of the packaged product is 2a, the storage environment is less than or equal to $30\ ^\circ\text{C}/60\% \text{RH}$, and the lifespan of the surrounding workshop;
3. When using packaged products, try to use thin RF boards and increase the number of groundings vias at the bottom of the device to reduce grounding inductance;
4. Remove the vacuum packaging and bake in a $125\pm 5\ ^\circ\text{C}$ environment for 6 hours before soldering.

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Revision	Date	Comment
1.0	Oct 13, 2024	First Release

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