GaAs monolithic integrated power amplifier

13.5GHz~14.75GHz 40 dBm

Key indicator

- Frequency range: 13.5GHz～14.75GHz
- Gain: 24dB
- Output P_{-1}dB：40dBm
- Supply voltage: +8V
- PAE: 38%
- Chip size: 3.51mm×3.51mm×0.1mm
- Package form: bare chip

Typical application

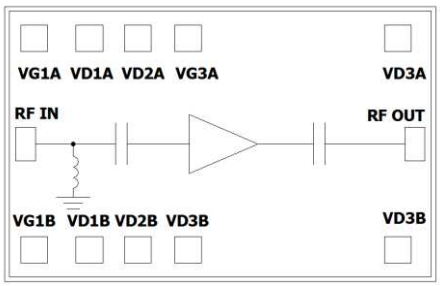
- Point-to-point wireless communication
- Satellite communications
- Military and aerospace
- Test and measure

Product Introduction

AY1992 is a Ku-band GaAs MMIC power amplifier, operating frequency 13.5GHz~14.75GHz, small signal gain 24dB, output P-1dB is 40dBm, PAE 38%, power supply voltage +8V.

The surface of AY1992 is covered with a dielectric layer protection layer, which has good environmental adaptability and stability; at the same time, the chip adopts an on-chip metallization process to ensure good grounding, and the back of the chip is metallized, which is suitable for eutectic sintering or conductive adhesive bonding process .

Functional block diagram



Electrical properties

T_A=25℃,V_D=+8V,I_D =2.5A,Z_0=50Ω,CW

Index	Minimum	Typical value	Max	Unit
Frequency		13.5~14.75		GHz
Small signal gain	20	24	—	dB
Small signal gain flatness	—	±1.5	—	dB
Reverse isolation	—	-55	—	dB
Input return loss	—	-10	—	dB
PAE	—	38	—	%
Output P_{-1}dB	39.5	40.3	—	dBm
Output IP_3*	—	44	—	dBm
Drain voltage (V_D)	—	8	8.5	V
Grid current	—	15	70	mA
Supply current (I_D)	—	3.5	4.5	A
Thermal resistance	—	4.2	—	℃/W

* Test conditions: Pout / Tone = 26dBm, fc=14GHz, Δf=10MHz

GaAs monolithic integrated power amplifier

13.5GHz~14.75GHz 40 dBm

Absolute maximum ratings

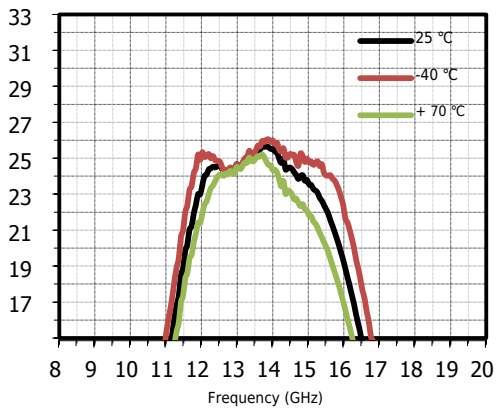
Maximum input power	+22dBm	Operating temperature	-40℃~+70℃
Channel temperature	150℃	Storage temperature	-65℃~+150℃
Max V_D	+9V	Max V_G	-1.2V

Typical test curve

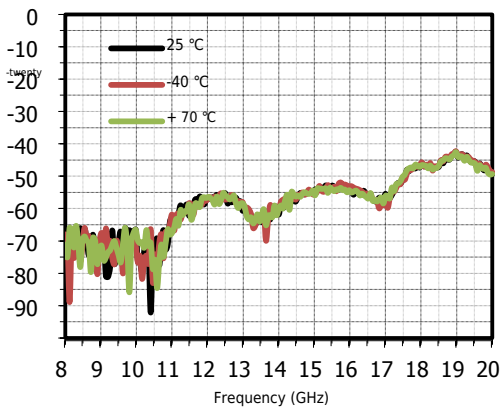
The following data is the result of using AY1992 fixture test

V_D=+8V I_D=2.5A

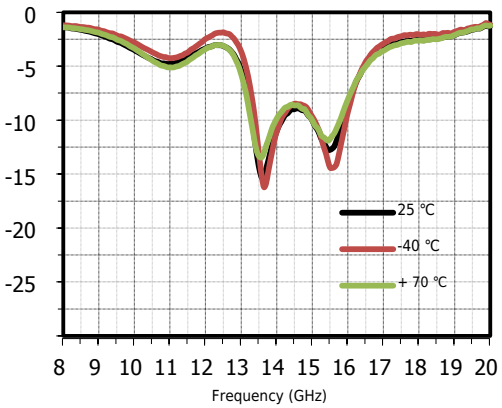
Small signal gain (dB) vs. temperature



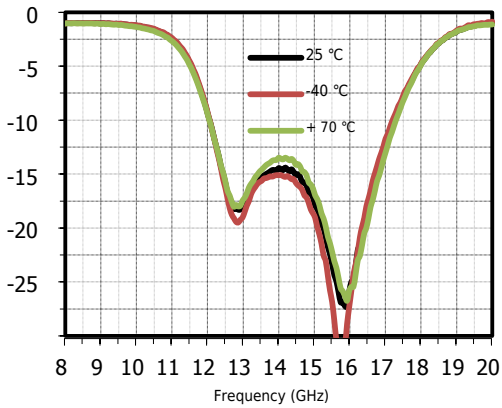
Reverse isolation (dB) vs. temperature



Input return loss (dB) vs. temperature



Output return loss (dB) vs. temperature



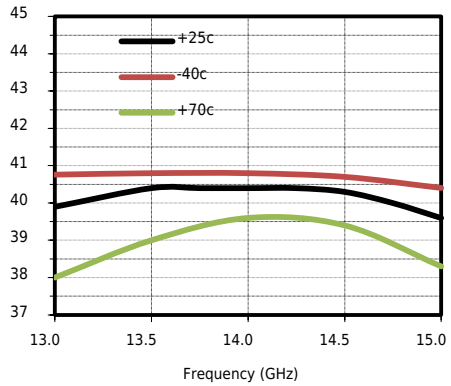
GaAs monolithic integrated power amplifier

13.5GHz~14.75GHz 40 dBm

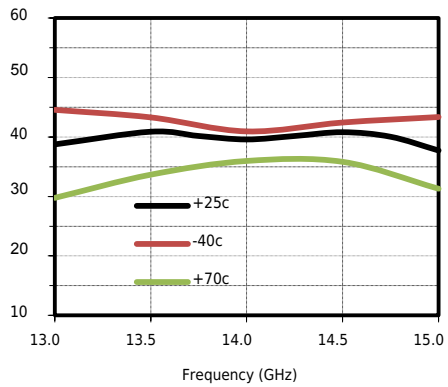
Output power and PAE test curve

The following data is the result of using AY1992 fixture test and then de-embedding fixture parameters

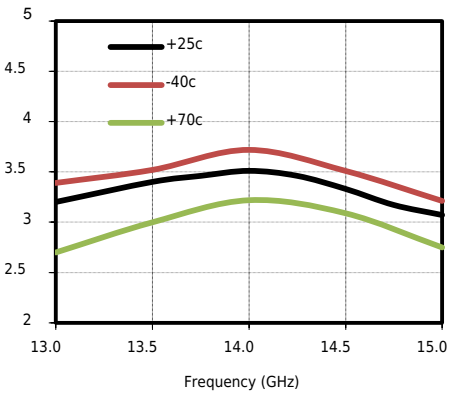
Output P_{-1}dB(dBm) vs. temperature



PAE(%) vs. temperature

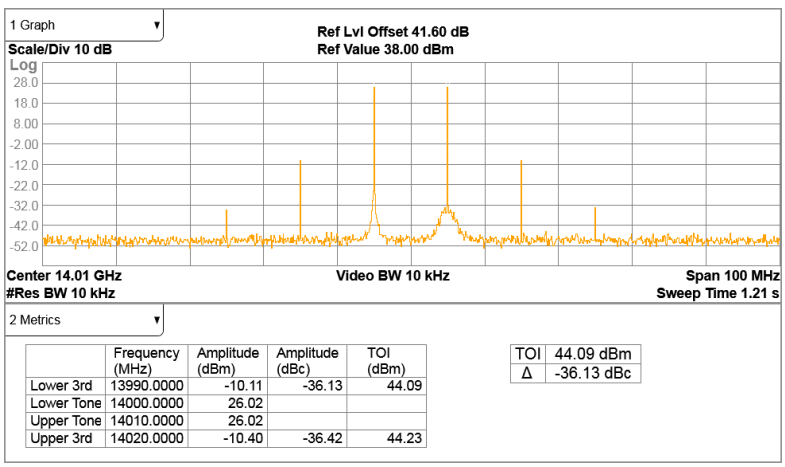


ID(Amps) output P_{-1}dB(dBm)



Output IP_3 performance curve

Fc=14GHz Pout/Tone=26dBm



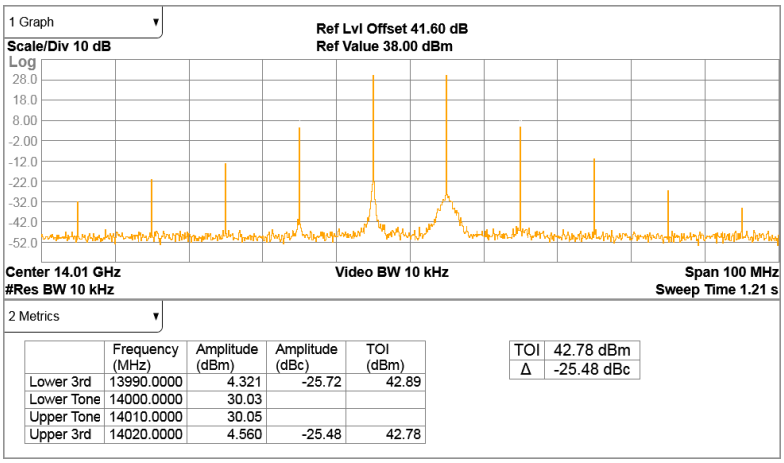
	Frequency (MHz)	Amplitude (dBm)	Amplitude (dBc)	TOI (dBm)
Lower 3rd	13990.0000	-10.11	-36.13	44.09
Lower Tone	14000.0000	26.02		
Upper Tone	14010.0000	26.02		
Upper 3rd	14020.0000	-10.40	-36.42	44.23

TOI	44.09 dBm
Δ	-36.13 dBc

GaAs monolithic integrated power amplifier

13.5GHz~14.75GHz 40 dBm

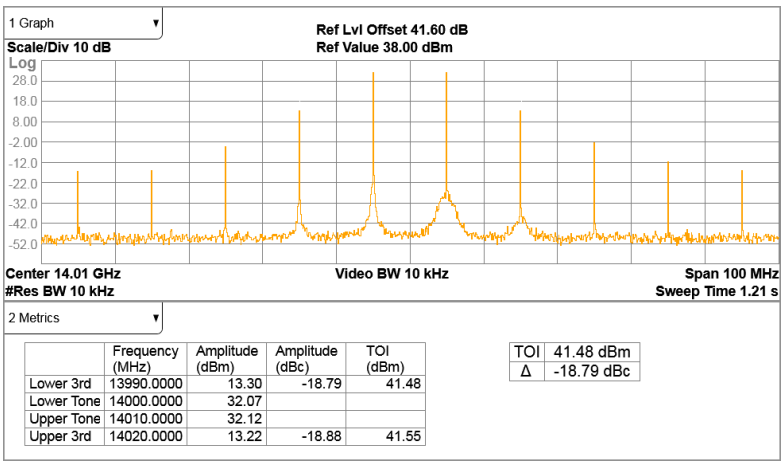
Fc=14GHz Pout/Tone=30dBm



	Frequency (MHz)	Amplitude (dBm)	Amplitude (dBc)	TOI (dBm)
Lower 3rd	13990.0000	4.321	-25.72	42.89
Lower Tone	14000.0000	30.03		
Upper Tone	14010.0000	30.05		
Upper 3rd	14020.0000	4.560	-25.48	42.78

TOI	42.78 dBm
Δ	-25.48 dBc

Fc=14GHz Pout/Tone=32dBm



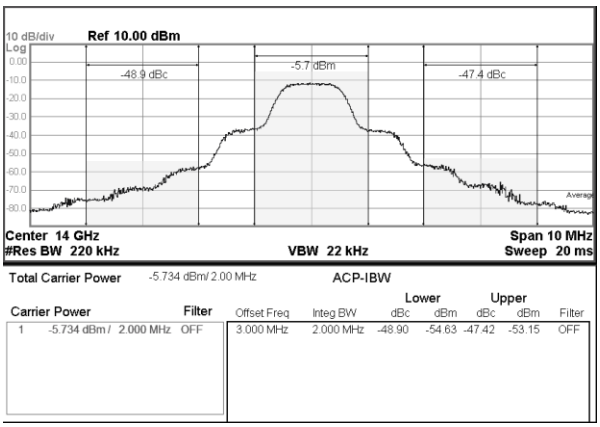
	Frequency (MHz)	Amplitude (dBm)	Amplitude (dBc)	TOI (dBm)
Lower 3rd	13990.0000	13.30	-18.79	41.48
Lower Tone	14000.0000	32.07		
Upper Tone	14010.0000	32.12		
Upper 3rd	14020.0000	13.22	-18.88	41.55

TOI	41.48 dBm
Δ	-18.79 dBc

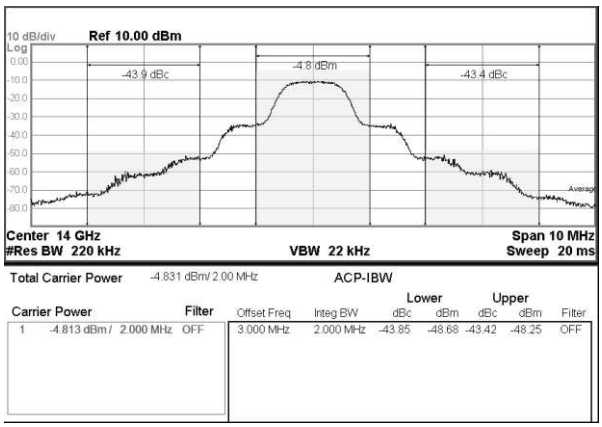
ACPR performance curve

QPSK Symbol Rate=1M Filterα=0.3

Fc=14GHz Pout=37dBm



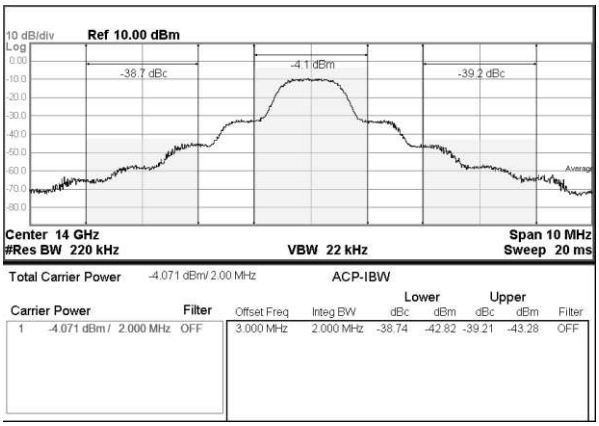
Fc=14GHz Pout=38dBm



GaAs monolithic integrated power amplifier

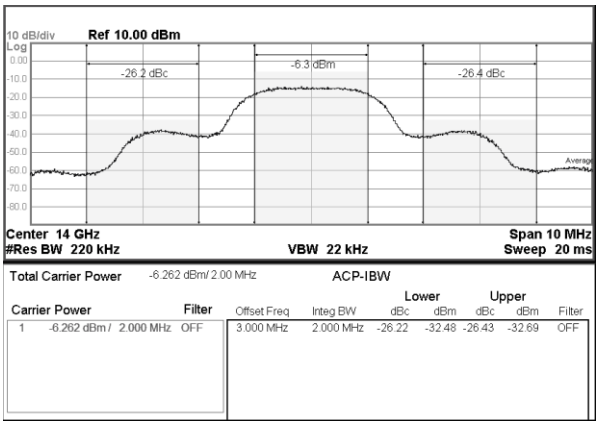
13.5GHz~14.75GHz 40 dBm

Fc=14GHz Pout=39dBm

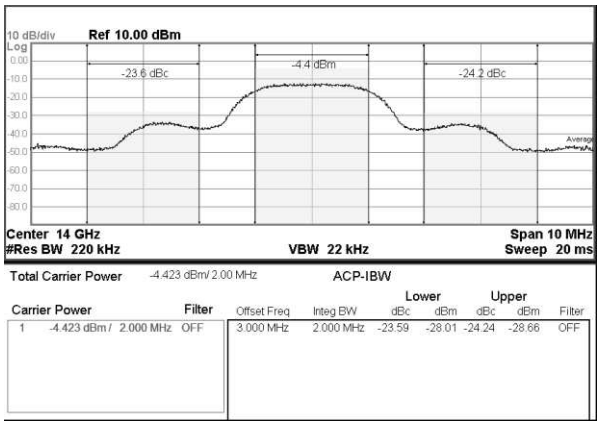


8PSK Symbol Rate=2M Filterα=0.5

Fc=14GHz Pout=37dBm



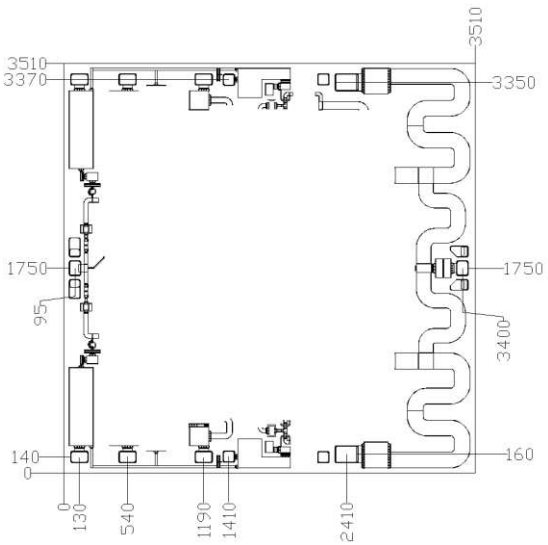
Fc=14GHz Pout=39dBm



GaAs monolithic integrated power amplifier

13.5GHz~14.75GHz 40 dBm

Shape and port size (μm)

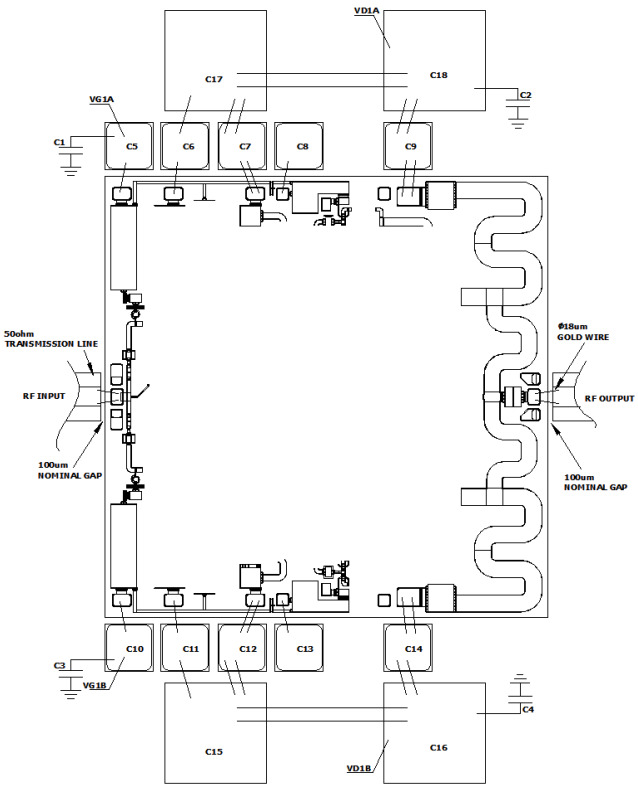


Pad size: 120x90um VG、VD1～VD2、RF IN、RFOUT pads

90x90um VG3 pads

200x140um VD3 pads

Recommended assembly drawing



Component list

Serial number	Numerical value	Model	Manufacturer	Encapsulation
C1~C4	2.2uF	GRM155R61A225KE15D	Murata	0402
C5~C14	300pF	-	ANY	SLC
Q15 ~ C18	1000pF	-	ANY	SLC

Note intended to do items

1.AY1992 requires positive drain voltage and negative gate negative voltage bias. The recommended gate voltage is set to -0.7~-0.8V;

2.The length of the RF input/output gold wire should be as short as possible. It is recommended to use 18um gold wire for bonding;

3.AuSn eutectic welding is recommended, and high thermal conductivity conductive adhesive such as EK2000 can also be used for bonding;

4.The bypass capacitors C1~C4 should not be more than 1.5mm away from the chip.