GaAs monolithic integrated power amplifier

27.5GHz~32GHz 35.5dBm

Key indicator

- Frequency range: 27.5GHz~32GHz
- Gain: 27dB
- Output P_{-1} dB：35.5dBm
- Supply voltage: +6V
- PAE： 18%
- Chip size: 3.55mm×3.85mm×0.1mm
- Package form: bare chip

Typical application

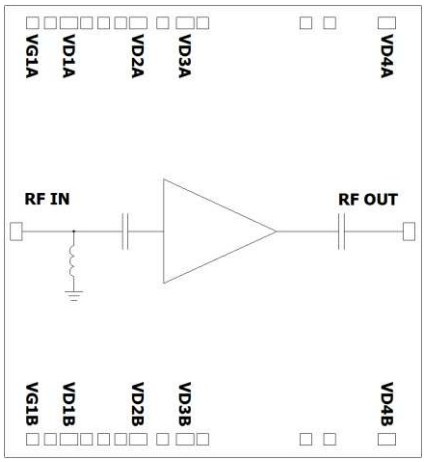
- Point-to-point wireless communication
- Satellite communications
- Radar

Product Introduction

AY1993 is a Ka-band GaAs MMIC power amplifier, operating frequency 27.5GHz~32GHz, small signal gain 27dB, output P-1dB 35.5dBm, PAE 18%, power supply voltage +6V.

The surface of AY1993 is protected by a dielectric layer, which has good environmental adaptability and electrical parameter stability. The back of the chip is metallized, which is suitable for eutectic sintering or conductive adhesive bonding process.

Functional block diagram



Electrical performance parameter table

TA=25℃,VD=+6V,ID Q=2A,Z0=50Ω,CW

Index	Minimum	Typical value	Max	Unit
Frequency		27.5 ~ 32		GHz
Small signal gain	23	27	-	dB
Small signal gain flatness	-	± 2	-	dB
Reverse isolation	-	-55	-	dB
Input return loss	-	-10	-	dB
PAE	-	18	-	%
Output PdB	35	35.5	-	dBm
Output IP3	-	39	-	dBm
Drain voltage (V_D)	-	6	6.3	V
Gate current (I_G)	-	five	28	mA
Supply current (I_D)	-	3.2	3.7	A
Thermal resistance	-	4.1	-	℃ / W

Test conditions: Pout / Tone = 18 dBm, fc= 30GHz, Δf=10MHz

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Absolute maximum ratings

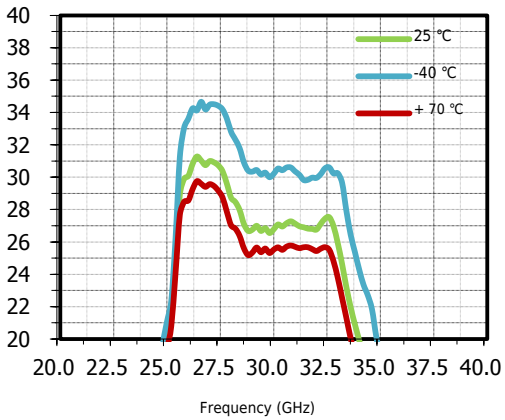
Maximum input power	+14dBm	Operating temperature	-40 ℃ ~ + 70 ℃
Channel temperature	150 ℃	Storage temperature	-65 ℃ ~ + 150 ℃
Max V_D	+6.5V	Max V_G	-1.2V

Typical test curve

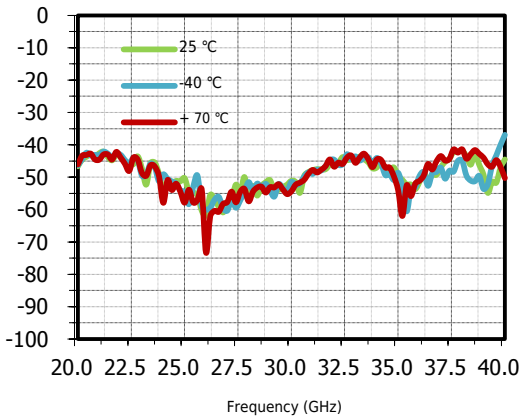
The following data is the result of using AY1993 fixture test

V_D=+6V I_D=2A CW

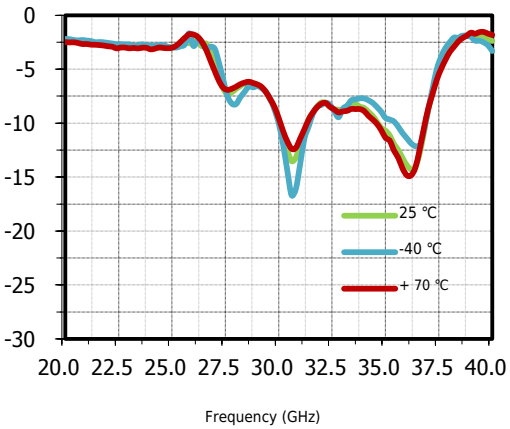
Small signal gain (dB) vs. temperature



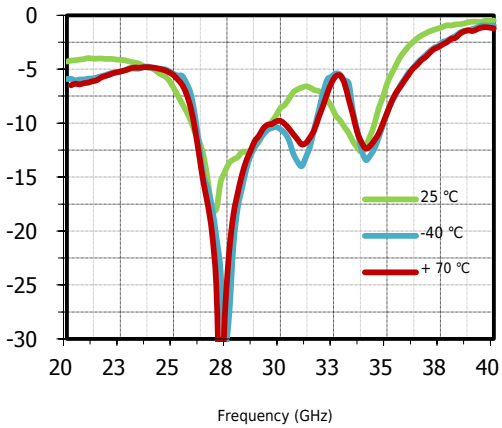
Reverse isolation (dB) vs. temperature



Input return loss (dB) vs. temperature



Output return loss (dB) vs. temperature



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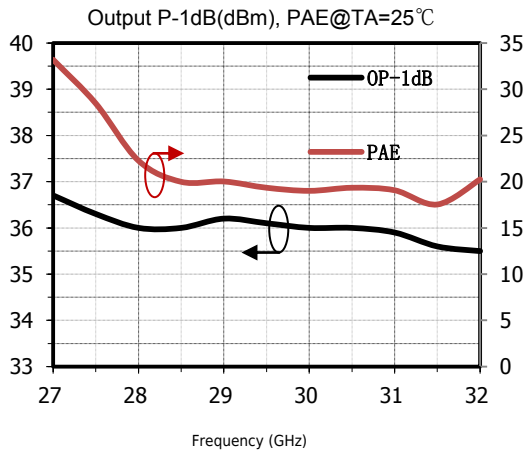
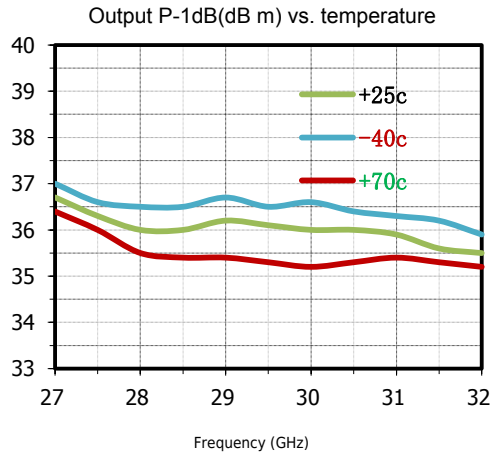
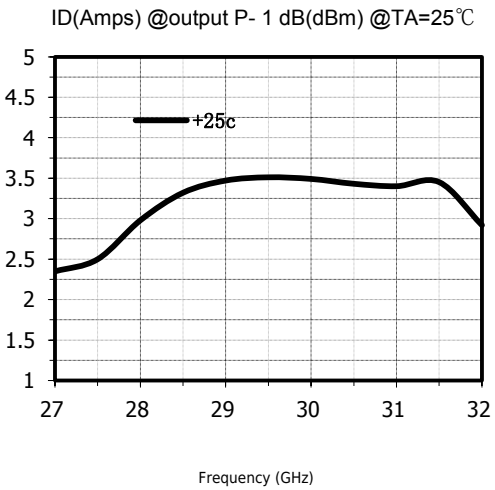
Output power and PAE test curve

The following data is the result of using AY1993 fixture test and then de-embedding fixture parameters







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OIP_3 , IM3 performance

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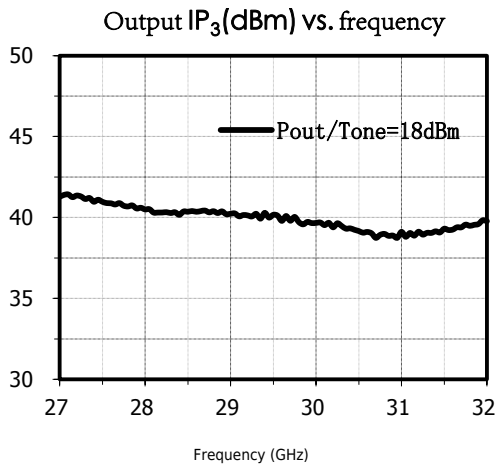

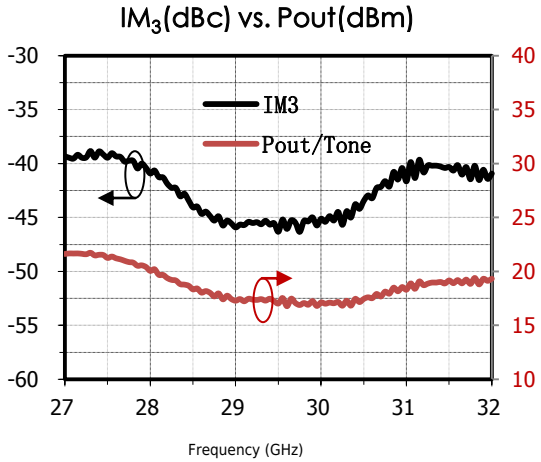

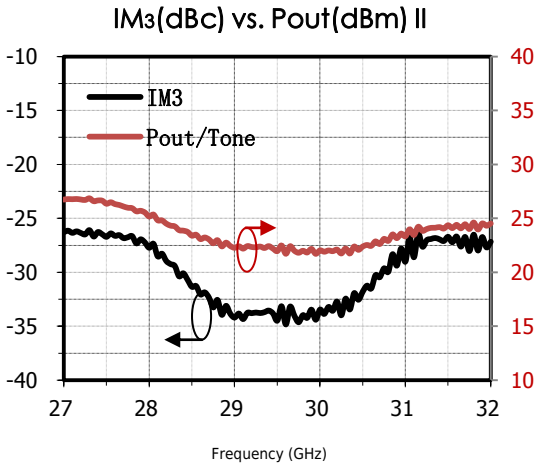

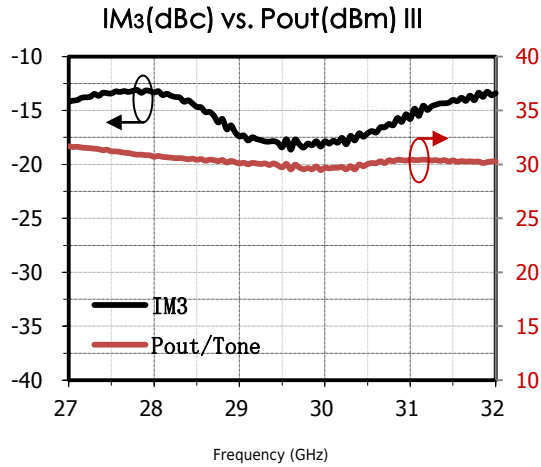

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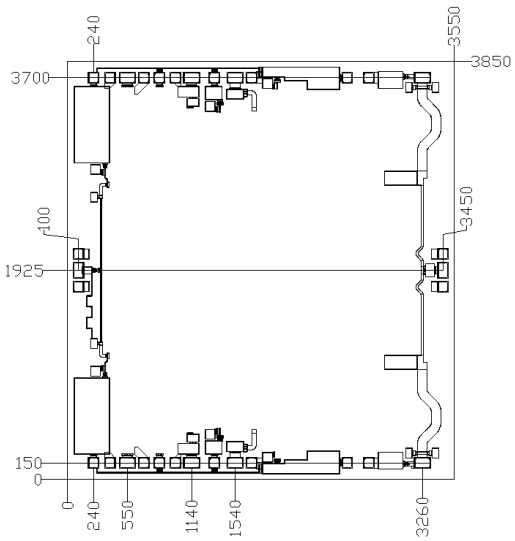
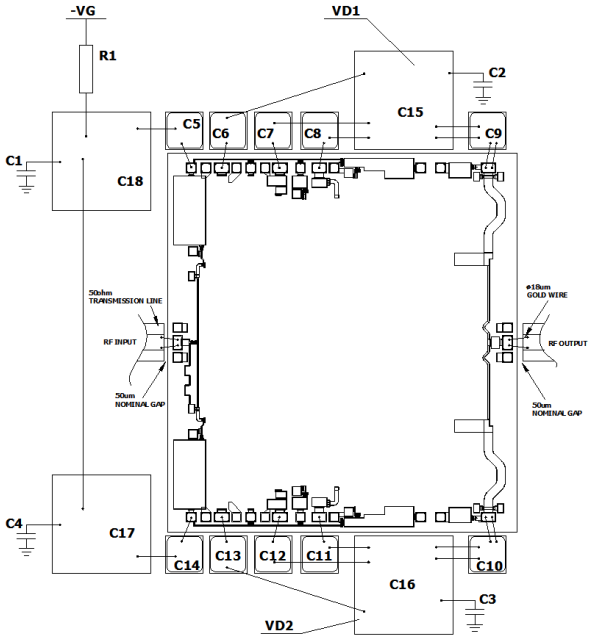
Shape and pad size (μm)



Schematic diagram of assembly drawing



Pad size:

150x100um VD1A～VD4A、VD1B～VD4B、RF IN、RFOUT pads

100x100um VG1A、VG1B pads

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
R1 *	20Ω	-	ANY	0603

*The value of R1 is related to the internal resistance of the gate bias circuit. When the internal resistance of the gate bias circuit is less than 2Ω, R1=10~20Ω

Note intended to do items

1.AY1993 requires positive drain voltage and negative gate voltage bias, the recommended gate voltage is set to -0.7~-0.9V;

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 UNIMEC H9890-6A can also be used for bonding;

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