GaAs monolithic integrated low noise amplifier

7～11GHz

key indicator

- Frequency range: 7～11GHz
- Gain: 23dB
- Noise figure: 1.1dB@9GHz typical value
- Output P_{-1} dB: 18.5dBm@9GHz typical value
- Chip size: 1.47mmx1.25mmx0.1mm

typical application

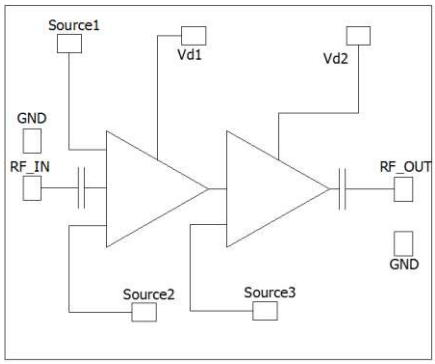
- Microwave radio frequency
- Satellite communications
- Test measurement
- Optical fiber communication

Product Introduction

AY1644 works in 7～11GHz and is made of GaAs process. Under 29mA working current, it can provide 23dB gain, 18.5dBm output P_{-1}dB, and the noise in the normal temperature band is lower than 1.1dB.

The chip uses 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 processes.

Functional block diagram



Electrical performance (T_A=25℃,V_{d1}=V_{d2}=+5V,I_{d1}=28mA,I_{d2}=29mA[5],Z_0=50Ω,)

index	Minimum	Typical value	Max	unit
Frequency Range	7 ～ 11			GHz
Gain	-	22/23 [1]	-	dB
Input return loss	-	14	-	dB
Output return loss	-	14	-	dB
Noise figure @9GHz	-	1.2 / 1.1 [2]	-	dB
Output P_{-1}dB	-	16 / 18.5 [3]	-	dBm
Gain flatness	-	1	-	dB

Absolute maximum rating

Maximum input power	+5dBm	Operating temperature	-55 ℃ ～ + 85 ℃
Channel temperature	150 ℃	Storage temperature	-65 ℃ ～ + 150 ℃

[1]LNA bias at Vd1=3V,Id1=36mA，Vd2=4V,Id2=54mA(Source 1/2/3 connect to GND are required).which gives the highest Gain

[2]LNA bias at Vd1=3V,Id1=27mA，Vd2=4V,Id2=28mA(Source 1 connect to GND are required).which gives the lowest noise figure

[3]LNA bias at Vd1=3V,Id1=15mA，Vd2=6V,Id2=58mA (Source 3 connect to GND are required).which gives the highest PdB

-one

[4]LNA bias at Vd1=3V,Id1=15mA，Vd2=4V,Id2=28mA (None of Source pad connect to GND are required

[5] LNA bias at Vd1=5V,Id1=28mA，Vd2=5V,Id2=29mA(Source 1 connect to GND are required).

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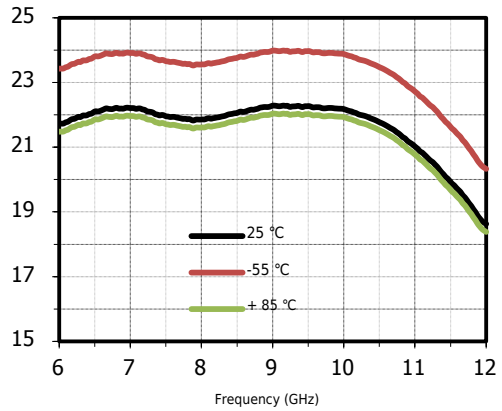
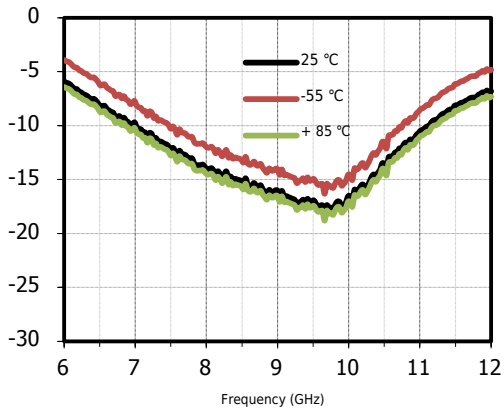
Typical test curve

(V_{d1}=5V,I_{d1}=28mA,V_{d2}=5V,I_{d2}=29mA[5])

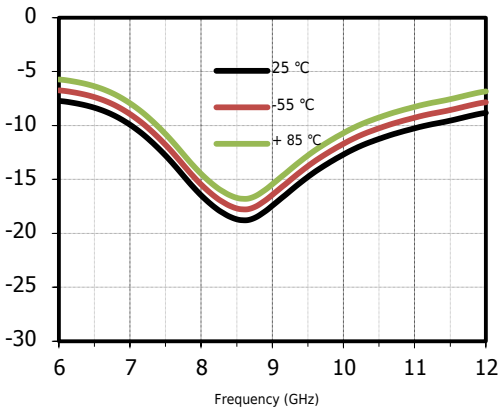
Small signal gain (dB) vs. temperature



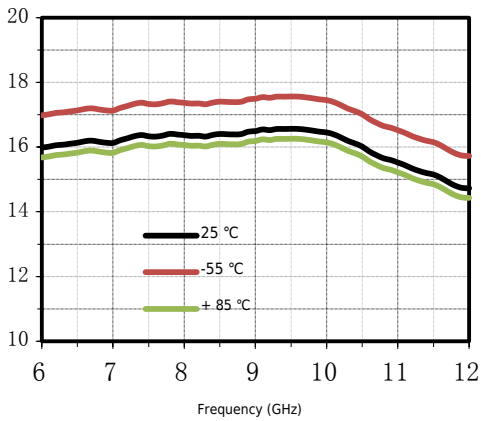
Input return loss (dB) vs. temperature



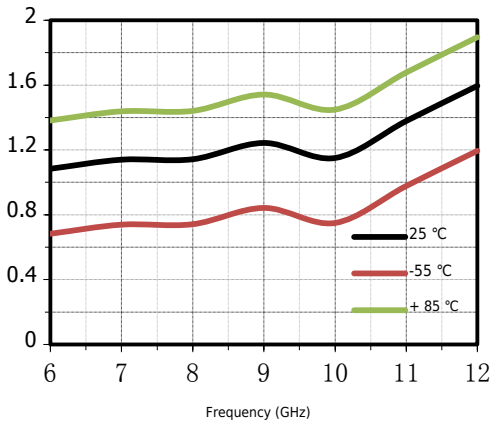
Output return loss (dB) vs. temperature



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



Noise figure (d B) vs. temperature



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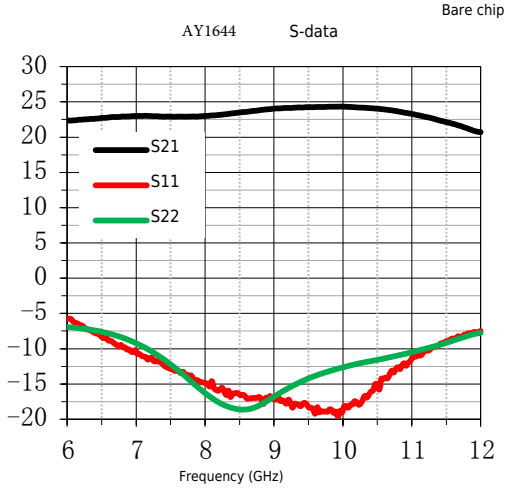
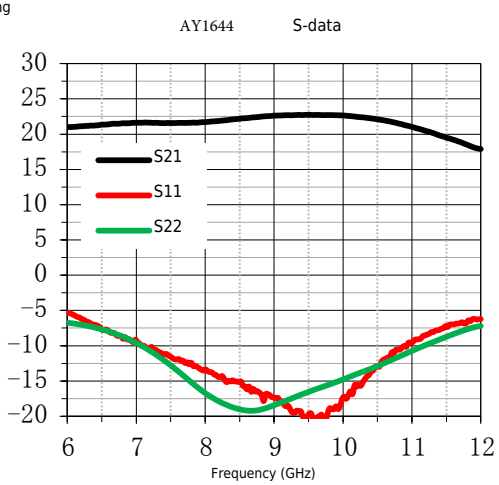
Typical test curve

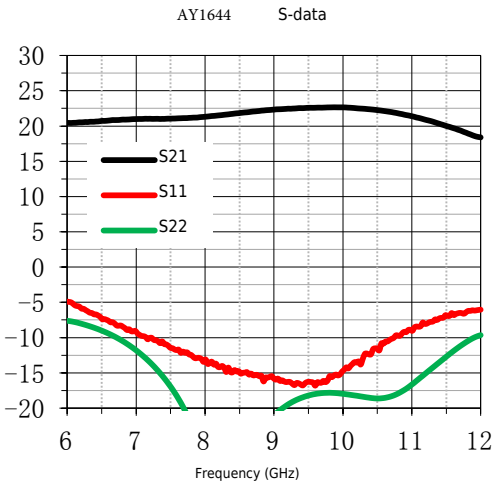
Bare chip testing



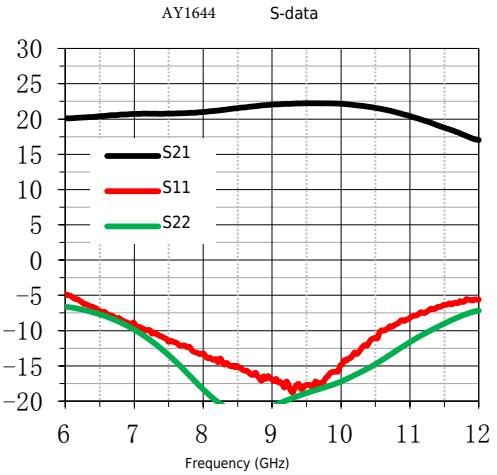
V_{d1}=3V,I_{d1}=36mA,V_{d2}=4V,I_{d2}=54mA[1]



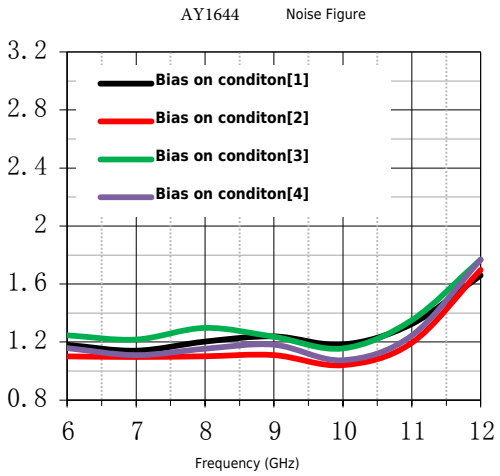
V_{d1}=3V,I_{d1}=27mA,V_{d2}=4V,I_{d2}=28mA[2]

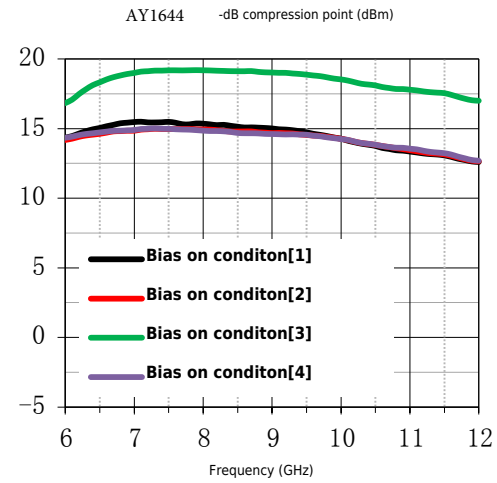


V_{d1}=3V,I_{d1}=15mA,V_{d2}=6V,I_{d2}=58mA[3]



V_{d1}=3V,I_{d1}=15mA,V_{d2}=4V,I_{d2}=28mA[4]





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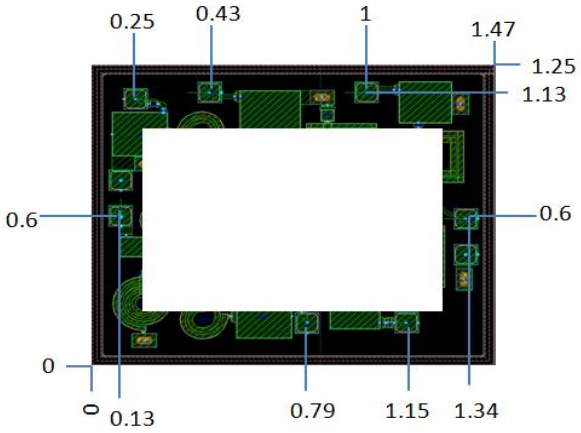
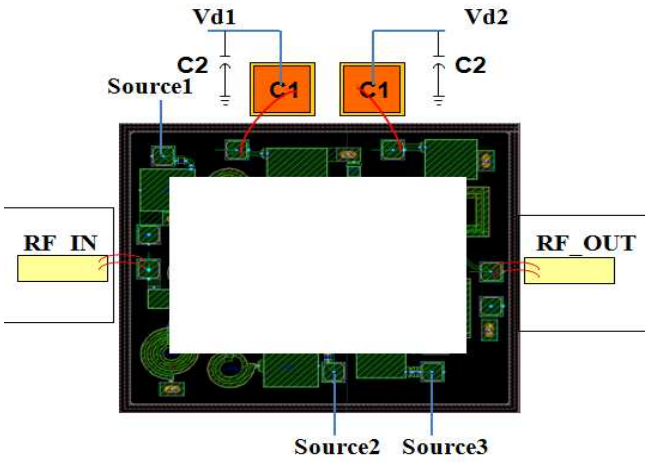
Shape and port size (mm)



Recommended assembly drawing



Assembly table

Pad	connect
V_{d1} , V_{d2}	Self-biased structure, both nodes must be connected to the power supply
Source 1/2/3	Adjustable node for adjusting noise/gain/P_{-1}dB

Component list

C1	330pF	116RM331M050TT	ATC	-
C2	10nF	GRM155R71H103KA88D	MURATA	0402

Precautions

1. The chip is stored in a dry, nitrogen environment and used in an ultra-clean environment;
2. GaAs material is relatively brittle and cannot touch the surface of the chip, so you must be careful when using it;
3. Chips are sintered with conductive glue or alloy (the alloy temperature cannot exceed 300°C, and the time cannot exceed 30 seconds) to make it fully grounded;
4. The gap between the microwave port of the chip and the substrate should not exceed 0.05mm. Use Φ25μm double gold wire for bonding. The recommended length of gold wire is 250～400μm;
5. The chip is sensitive to static electricity, so pay attention to anti-static during storage and use.