

性能特点

- 频率范围: 13 ~ 16 GHz
- 小信号增益: 27 dB
- P_{1dB} 输出功率: 34.7 dBm
- P_{sat} 输出功率: 35.3 dBm
- OIP₃(at 19 dBm Pout/Tone): 40.5 dBm
- Bias: V_d = 6 V , I_d = 1370 mA
- 芯片尺寸: 5.0mm×5.0mm× 0.75mm

产品简介

ZRA1291 是一款 Ku 波段功率放大器，采用 GaAs 工艺制造。其工作频率覆盖范围 13~16GHz，小信号增益为 27dB，OIP₃ 典型值为 40.5dBm(at 19 dBm Pout/Tone)，饱和输出功率 35.3dBm。

应用领域

- 点对点无线电
- Ku 频段 VSAT

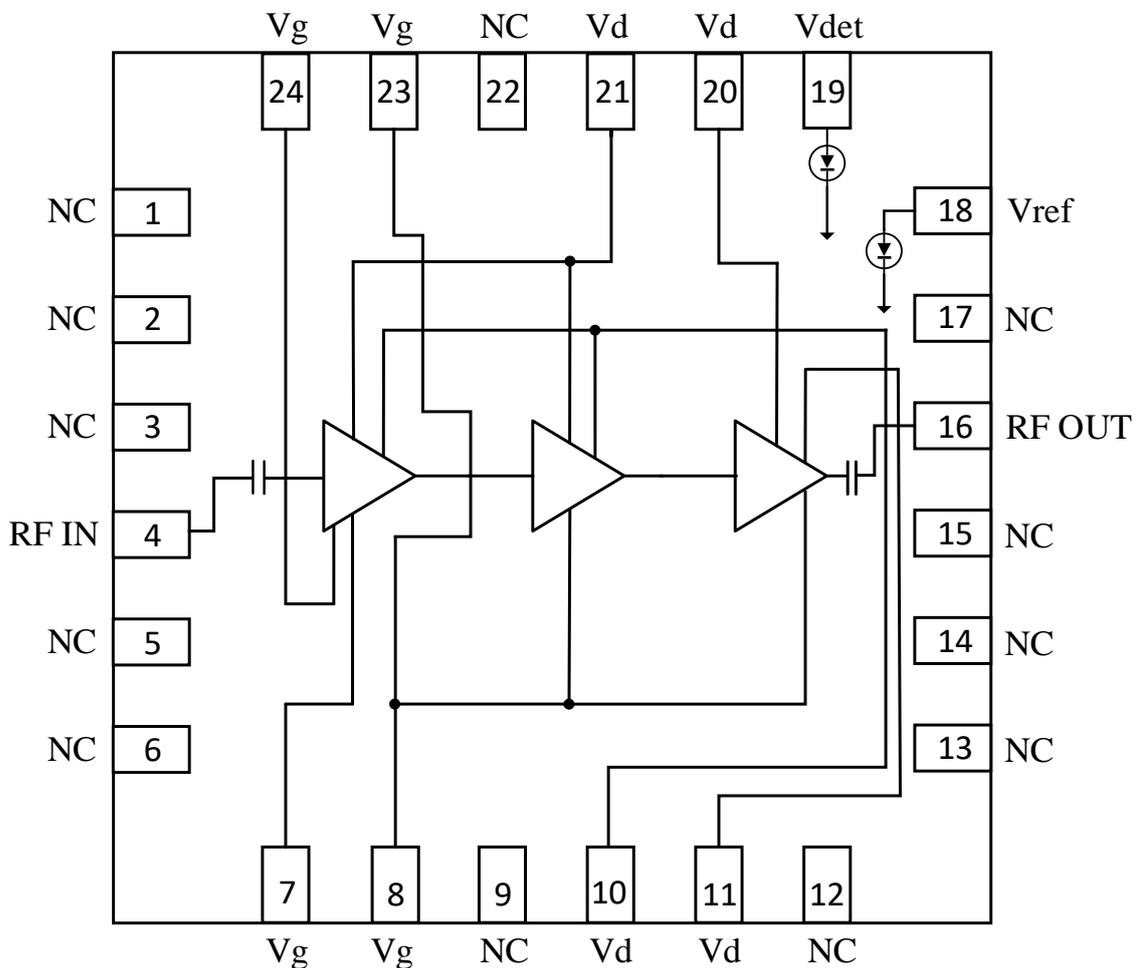


Figure 1. Functional Block Diagram

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1. 性能参数

1.1. 电参数

除非状态特殊说明，所有参数均在 $V_d = 6V$, $I_d = 1370mA$, $T_A = 25^\circ C$ 条件下测试得出。

参数名称	最小值	典型值	最大值	单位
Frequency Range	13		16	GHz
Gain	25.5	26.8	27.5	dB
Input Return Loss	12	13		dB
Output Return Loss	15	20		dB
Output P1dB	34.6	34.7	34.9	dBm
Saturated Output Power(P_{sat})	35.2	35.3	35.3	dBm
OIP3(POUT/Tone= 19 dBm, 10 MHz tonespacing)	40.4	40.5	40.7	dBm
Gain Temperature Coefficient		-0.03		dB/ $^\circ C$
Power Temperature Coefficient		-0.006		dB/ $^\circ C$

1.2. 允许最大参数范围

参数名称	参数值 / 范围	单位
Drain Voltage (V_d)	+8.5	V
Gate Voltage Range (V_g)	-4 to 0	V
Drain Current (I_d)	2200	mA
Power Dissipation (PDISS)	18	W
RF Input Power, CW, 50 Ω , T = 25 $^\circ C$	27	dBm
Junction Temperature	170	$^\circ C$
Soldering Temperature (30s, max.)	260	$^\circ C$
Storage Temperature	-65 to 150	$^\circ C$

以上参数仅表示应力范围，并不意味在这些条件下的功能操作。芯片在以上所列参数范围外工作可能造成芯片永久性损坏。

1.3. ESD 等级

参数名称	参数值	等级
Human Body Model (HBM)	$\pm 250V$	Class-1A

1.4. 推荐工作条件

$V_d(V)$	$I_d(mA)$
+5	1300
+6	1370
+7	1430
+8	1480

2. 典型性能特点

除非状态特殊说明, 所有参数均在 $V_d = 6V$, $I_d = 1370mA$, $T_A = 25^\circ C$ 条件下测试得出。

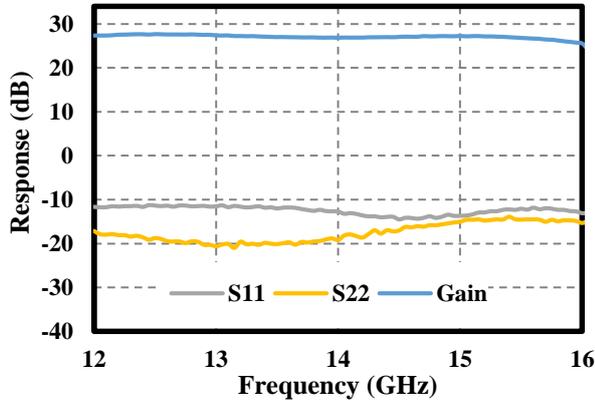


Figure 2. Gain & Return Loss

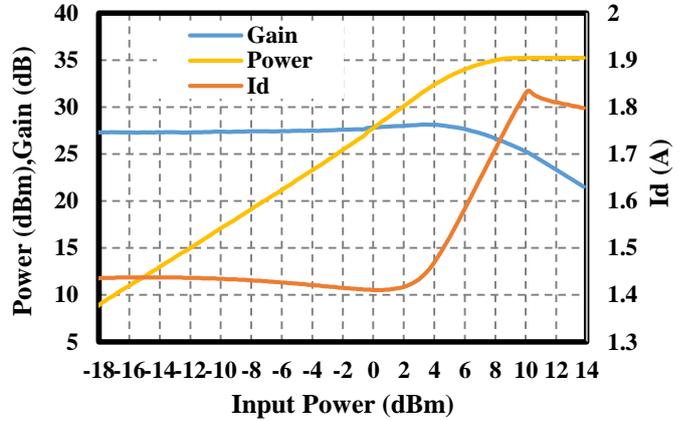


Figure 3. Power, Gain, Id vs. Input Power @ 14GHz

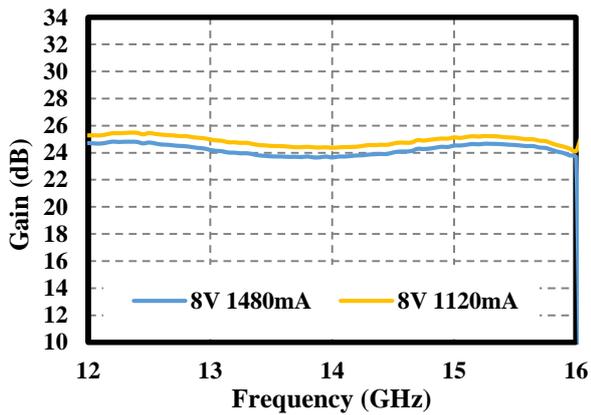


Figure 4. Gain vs. Id

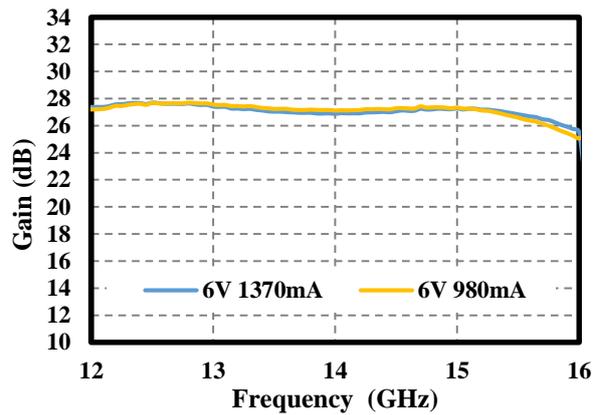


Figure 5. Gain vs. Id

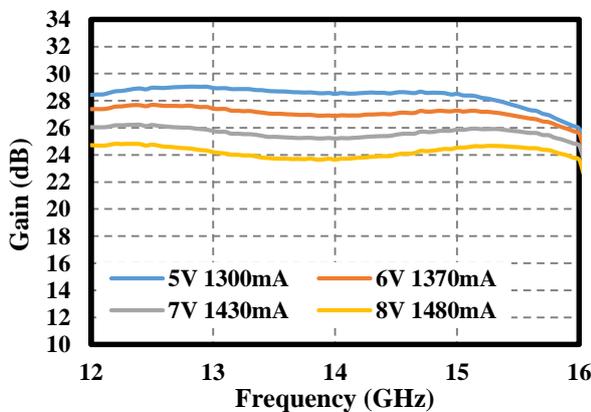


Figure 6. Gain vs. Vd

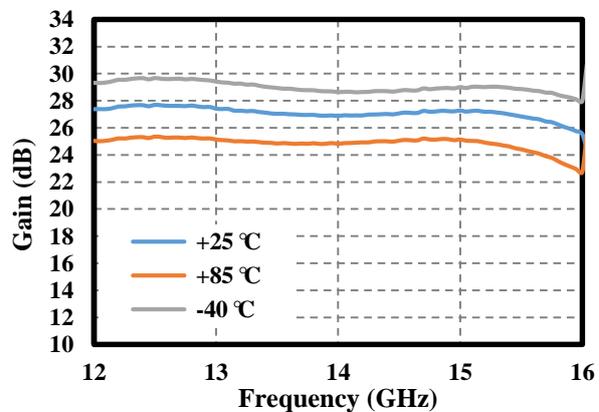


Figure 7. Gain vs. Temp

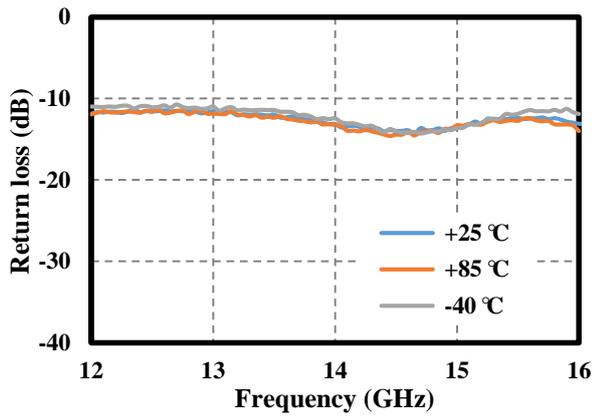


Figure 8. Input Return loss

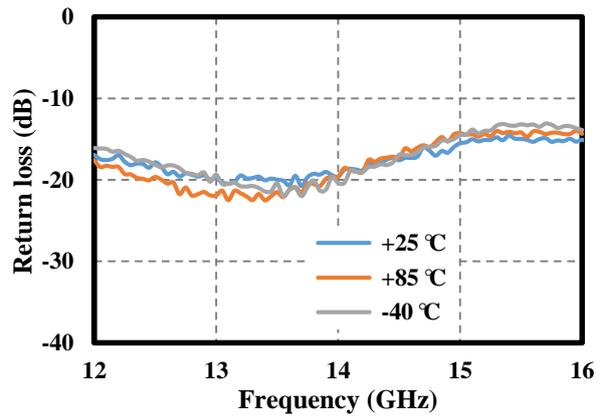


Figure 9. Output Return loss

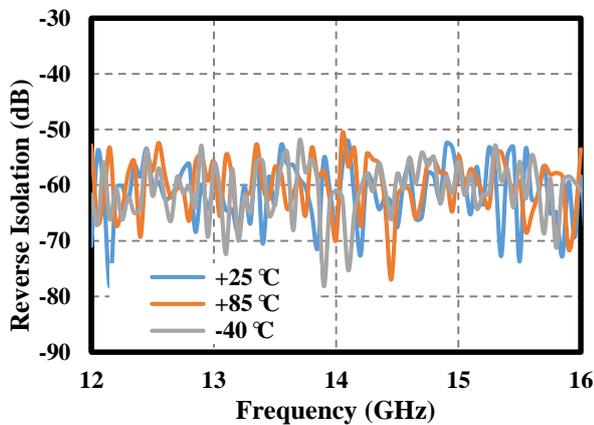


Figure 10. Reverse Isolation

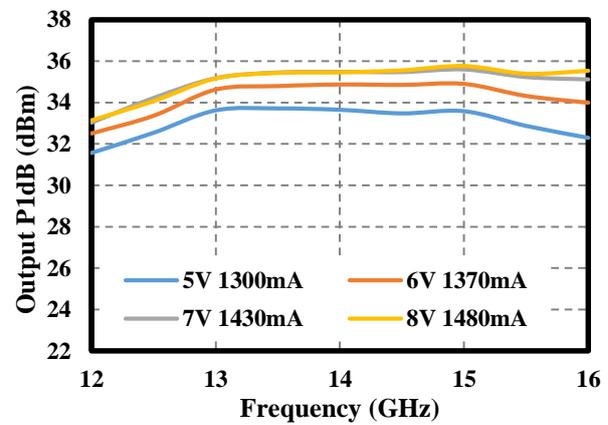


Figure 11. P1dB vs. Vd

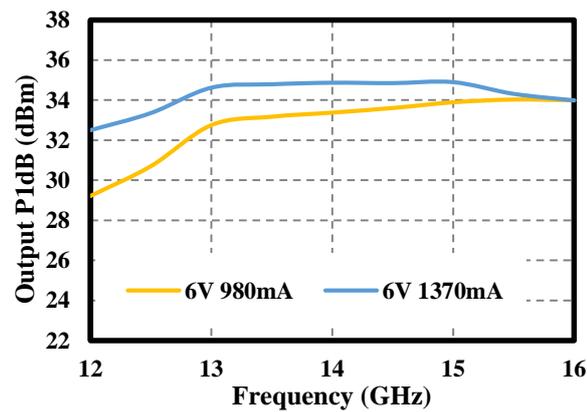


Figure 12. P1dB vs. Id

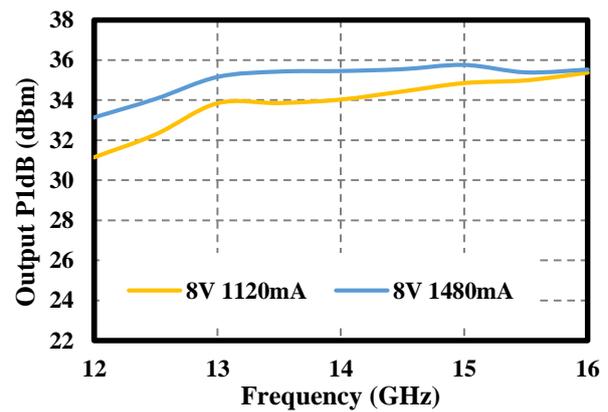


Figure 13. P1dB vs. Vd

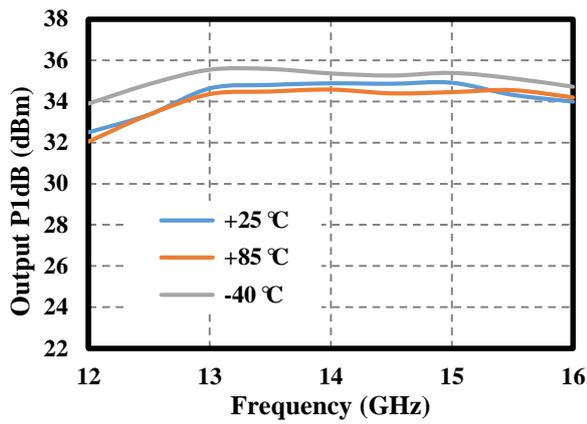


Figure 14. P1dB vs. Temp

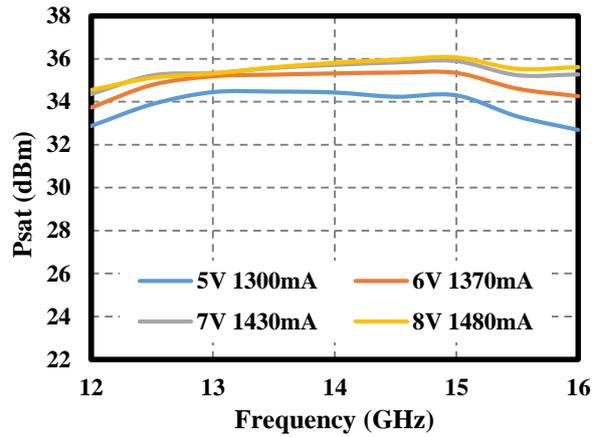


Figure 15. Psat vs. Vd

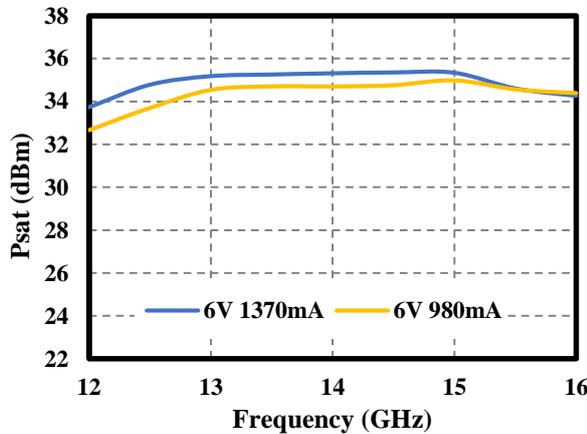


Figure 16. Psat vs. Id

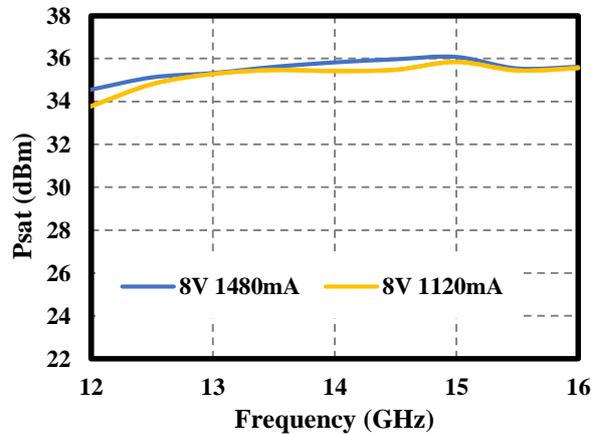


Figure 17. Psat vs. Id

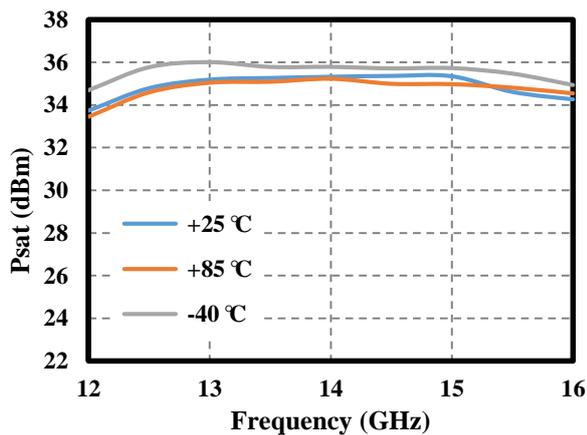


Figure 18. Psat vs. Temp

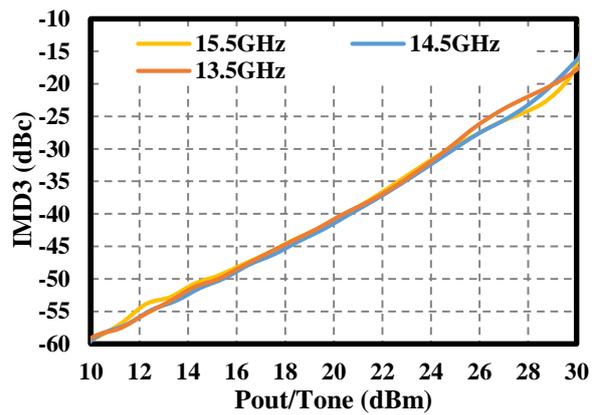


Figure 19. IMD3 vs. Pout/Tone

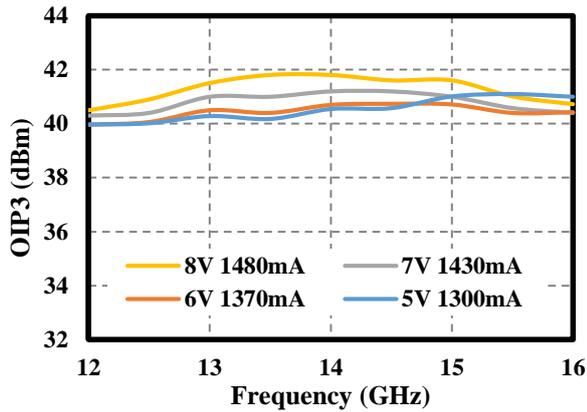


Figure 20. OIP3 vs. Vd
(Pout/Tone = 19dBm)

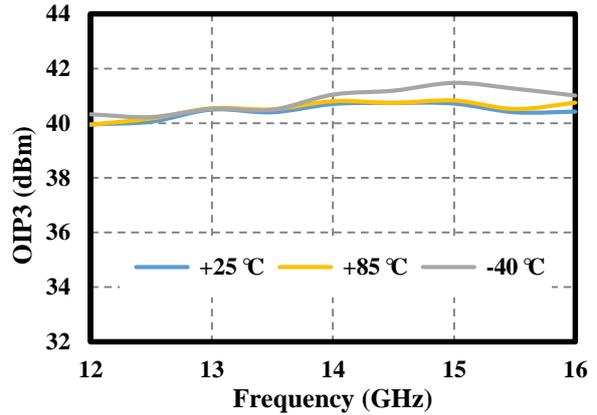


Figure 21. OIP3 vs. Temp
(Pout/Tone = 19dBm)

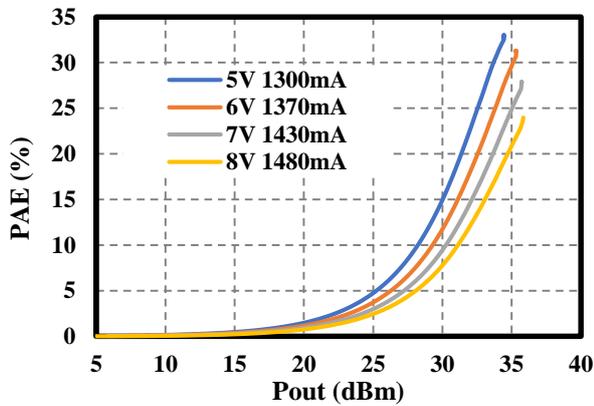


Figure 22. PAE vs. Pout @ 14GHz

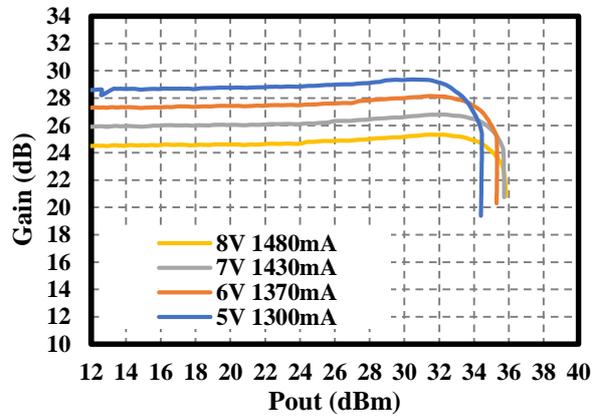


Figure 23. Gain vs. Pout @ 14GHz

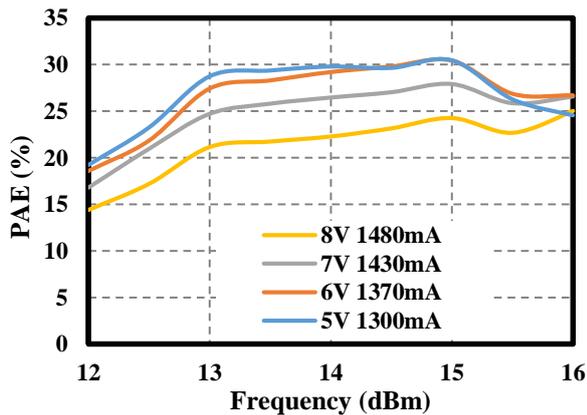


Figure 24. PAE vs. Vd

3. 管脚信息

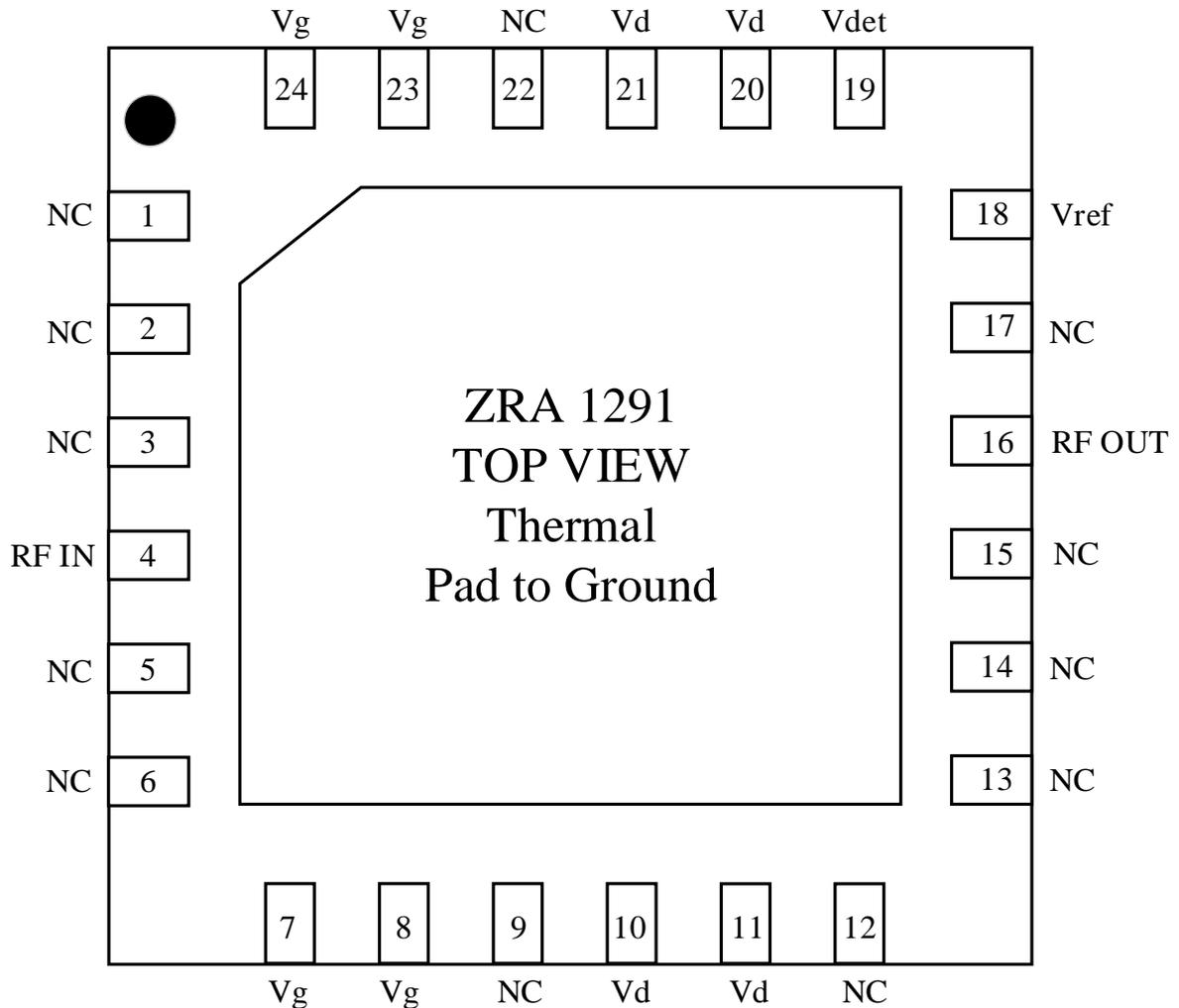


Figure 25. 管脚信息

Table 1. 管脚描述

管脚号	管脚名	描述
4	RFIN	射频信号输入端口
16	RFOUT	射频信号输出端口
7,8,23,24	Vg	放大器的栅极电源输入
10,11,20,21	Vd	放大器的漏极电源输入
1,2,3,5,6,13,14,15,17,22	NC	没有内部连接, 必须在 PCB 上接地
9,12	NC	没有内部连接, 悬空或接地
18	Vref	二极管参考输出电压
19	Vdet	检波器输出电压。随 RF 输出功率变化

4. 典型应用电路

Vg 双边供电电路:

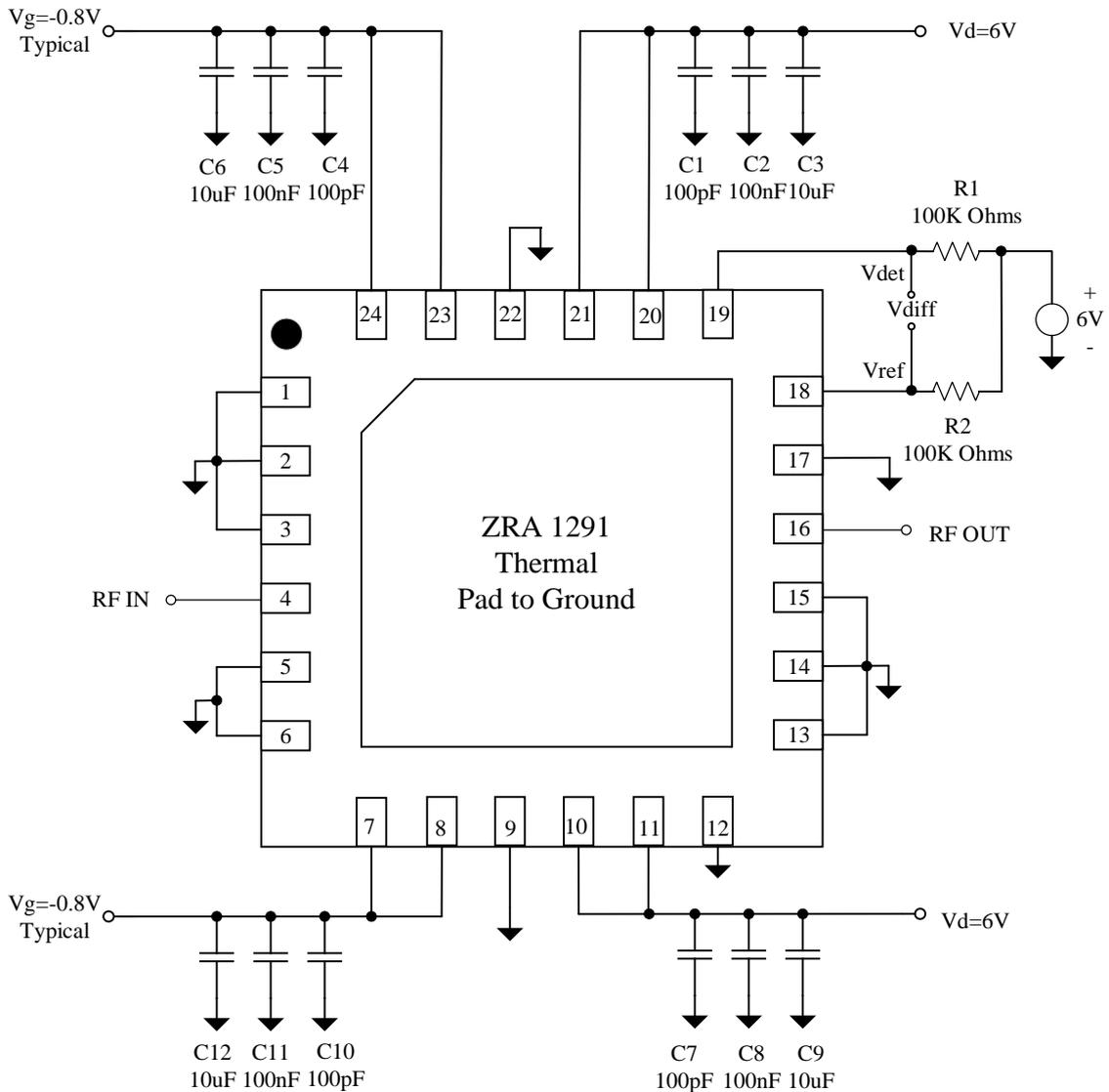


Figure 26. Vg 双边供电应用电路图

注意: Vg 和 Vd 电源上的 10uF 电容必须放置, 并且尽量靠近芯片。

Table 2. 物料清单

Component	P/N	Supplier	Value	Size
C1,C4,C7,C10	CC0402JRNPO9BN101	YAGEO	100pF	0402C
C2,C5,C8,C11	CC0402KRX7R7BB104	YAGEO	100nF	0402C
C3,C6,C9,C12	CC0603KRX5R6BB106	YAGEO	10uF	0603C
R1,R2	CC0402KRX7R7BB104	YAGEO	100k	0603R

Vg 单边供电电路:

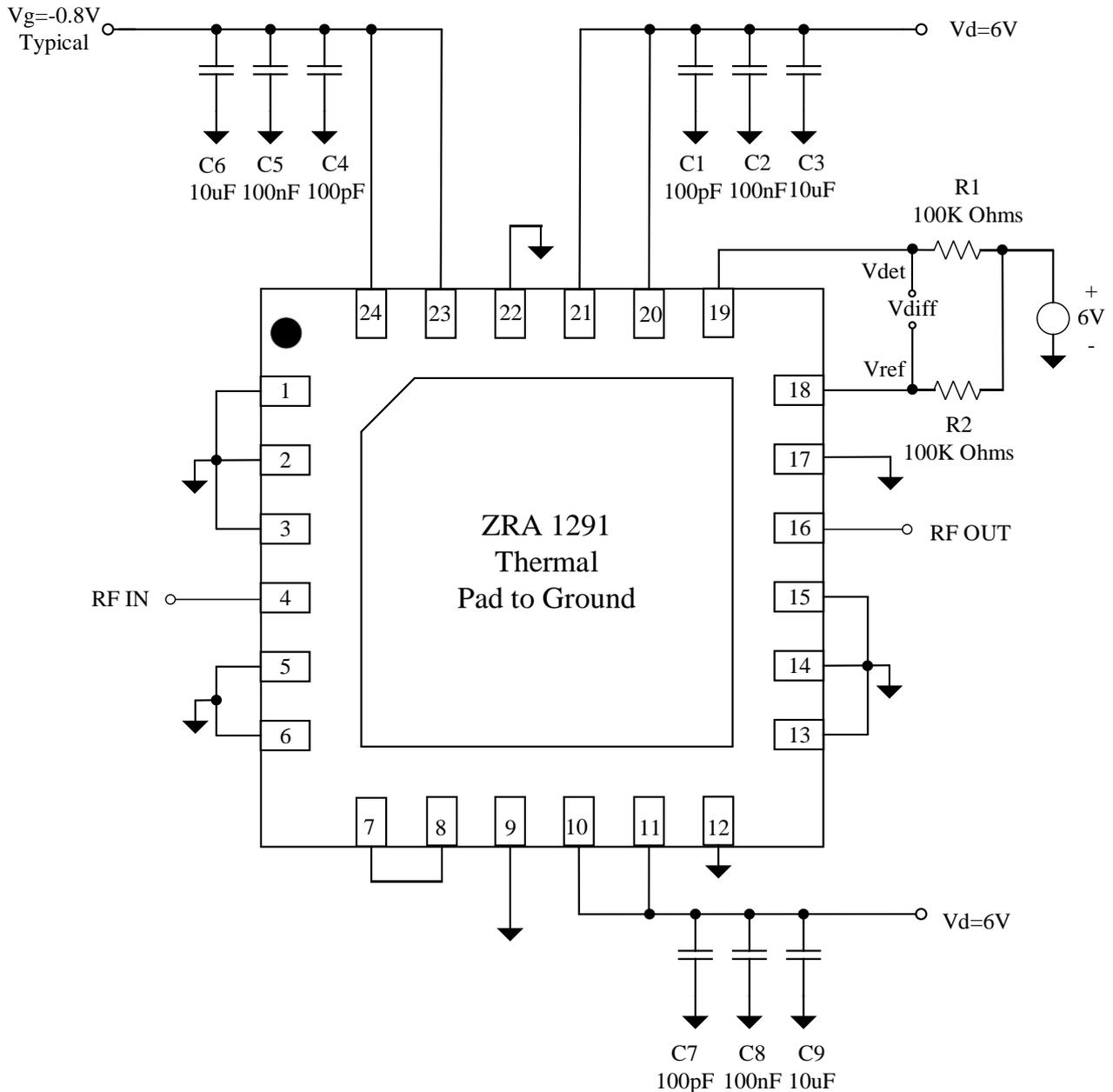


Figure 27. Vg 双边供电应用电路图

注意：如上图所示，在使用 Vg 单边供电时，另一侧的两个 Vg 管脚需要互相连接。也可以给 Pin7、8 供电，Pin23、24 则需要相互连接。

Table 3. 物料清单

Component	P/N	Supplier	Value	Size
C1,C4,C7	CC0402JRNPO9BN101	YAGEO	100pF	0402C
C2,C5,C8	CC0402KRX7R7BB104	YAGEO	100nF	0402C
C3,C6,C9	CC0603KRX5R6BB106	YAGEO	10uF	0603C
R1,R2	CC0402KRX7R7BB104	YAGEO	100k	0603R

5. 丝印图解



第一行:知融科技公司标识
第二行:芯片型号
第三行:公司内部编码

Figure 28. 芯片丝印描述

6. 外形尺寸

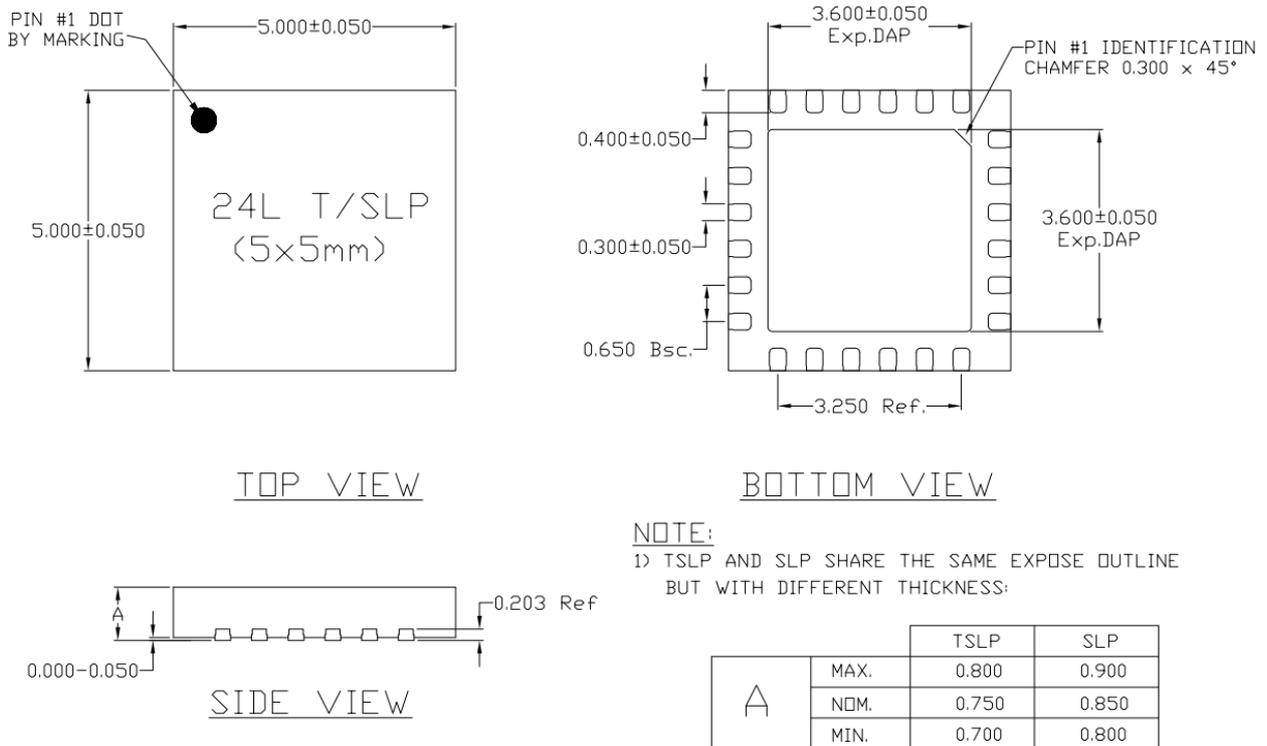


Figure 29. 外形尺寸

7. 评估板照片

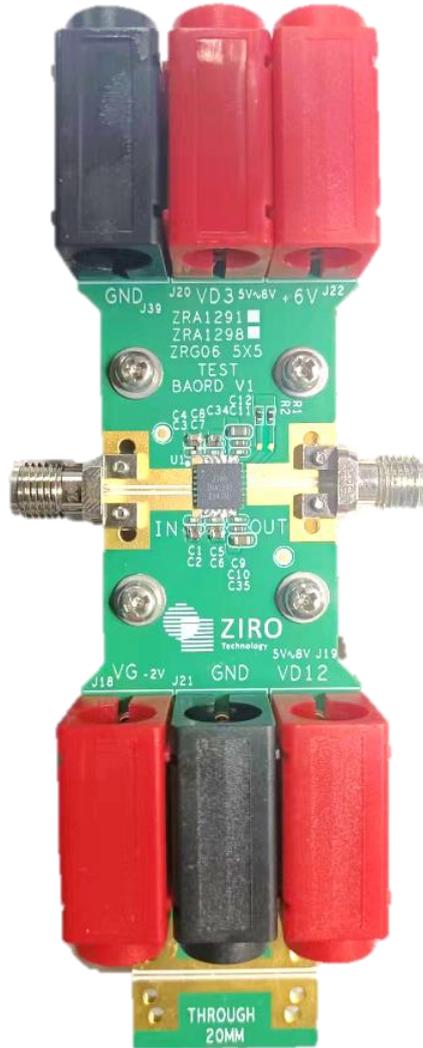


Figure 30. Evaluation Board

Table 4. Suggested Stacking

TOP	Copper	0.035mm
Dielectric	RO4350B	0.168mm
GND	Copper	0.018mm
Dielectric	pp	0.1mm
SIG	Copper	0.018mm
Dielectric	FR4	1.25mm
BOTTOM	Copper	0.035mm

8. 历史版本

Revision	Description	Modifier	Date
Rev.0.1	初始发布	YT	2023.12.08
Rev.0.2	测试数据添加	YDS	2023.12.25
Rev.0.3	修改典型应用电路	YT	2023.01.02
Rev.0.4	修改芯片功能框图,删除了焊接曲线, 新增了单边供电电路	DX1	2024.09.26