XT3939Q4

仙童科技

GaAs 单片集成驱动放大器
0.03GHz~6GHz　27dBm

Rev 1.0

关键指标

- 频率范围：0.03~6GHz
- 小信号增益：16dB
- 输出 P_{-1}dB：27dBm typ. ,26dBm min.
- 供电电压：+12V/-Vg
- 封装尺寸：4mm×4mm×0.75mm
- 裸芯片尺寸:1.25 mm x1.25 mm x0.1mm

典型应用

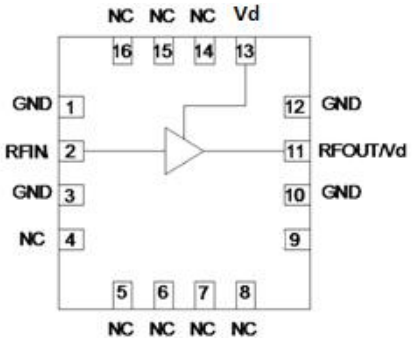
- 中频放大器
- 驱动放大器

产品简介

XT3939Q4 是采用方形扁平无引脚封装壳体(QFN)的 GaAs MMIC 驱动放大器，内部采用 XT3939 裸片，裸芯片表面有钝化层覆盖具有良好的环境适应性

该放大器工作于 0.03~6GHz 频段该放大器的小信号增益为 16dB 输出 P_{-1}dB 27dBm typ.

功能框图



电性能特性

T_A=25℃, V_D=+12V, I_{DQ}=0.16A, Z_0=50Ω, CW**

指标		最小值	典型值	最大值	单位
频率		0.03	—	6	GHz
小信号增益		14	16	—	dB
小信号增益平坦度		—	±1	±2	dB
反向隔离度		—	-24	—	dB
射频输入端口驻波比		—	1.5	3	:1
输出 P_{-1}dB	f=0.1GHz	28	29	—	dBm
	f=3GHz	27	28	—	
	f=6GHz	25	27	—	
供电电流(I_D)		—	—	0.3	A
供电电压(V_D)		12	—	12.5	V
热阻			18 *		℃/W

*器件焊接在 Ro4350b(t=0.254) 板材上后再烧结至 1.5mm 厚度紫铜垫板上后测量得到

**调节 Vg 电压（-1~-0.2V）使 I_{DQ}大约为 0.16A，典型的 Vg 电压为-0.6V

绝对最大额定值

最大输入功率	+20dBm	工作温度(管壳底面温度)	-55℃~+85℃
沟道温度	165℃ ***	贮存温度	-55℃~+150℃
最大 V_D	+13.5V		

***按预期 Median lifetime=1.5x10^6 计算得到

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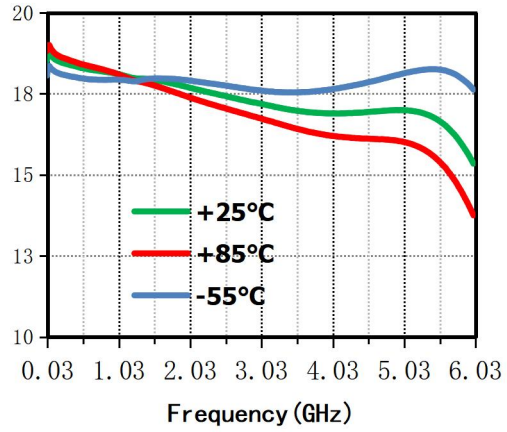
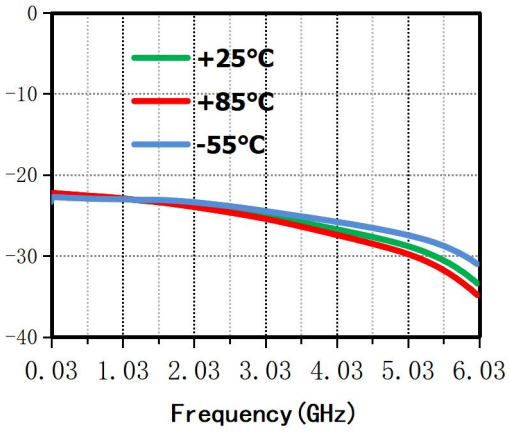
典型性能测试曲线

以下数据使用 XT3939Q4 评估板测试得到，V_D=+12V, I_{DQ}=0.16A，T_A=+25℃

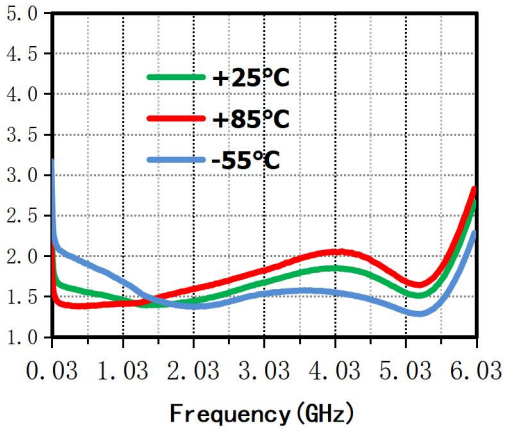
Small Signal Gain(dB) vs.Temperature



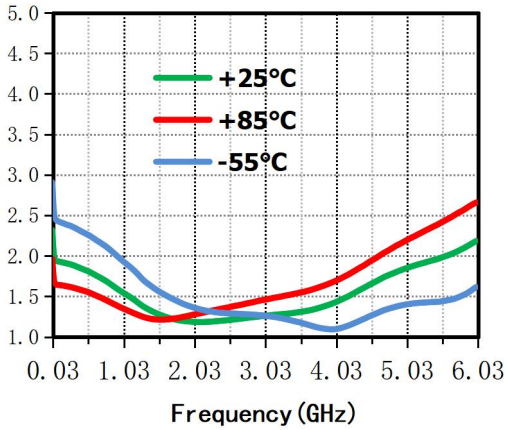
Isolation(dB) vs.Temperature



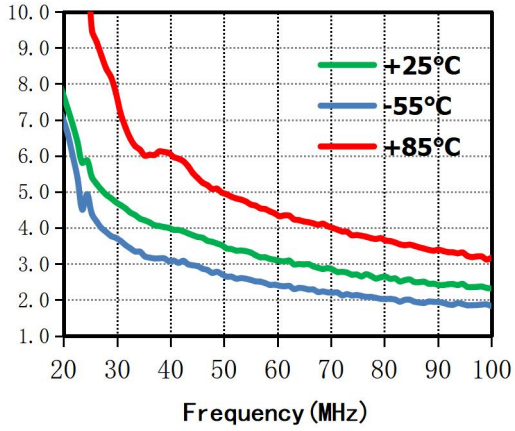
Input VSWR(:1) vs.Temperature



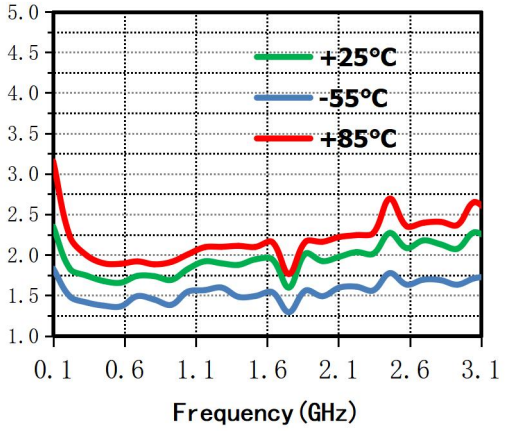
Output VSWR(:1) vs.Temperature



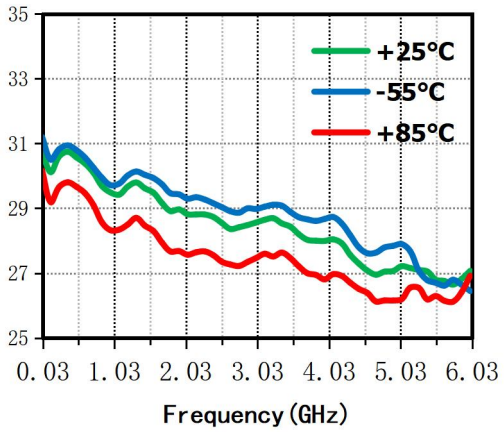
Noise Figure I (dB) vs.Frequency



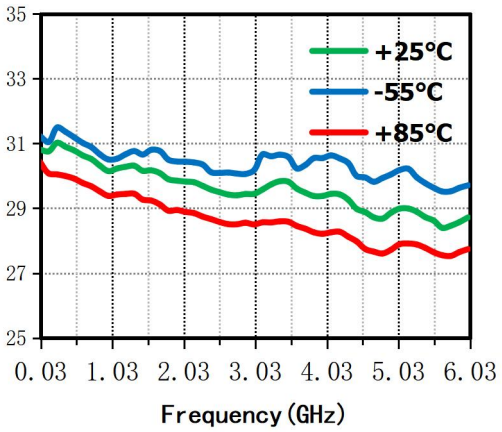
Noise Figure II (dB) vs.Frequency



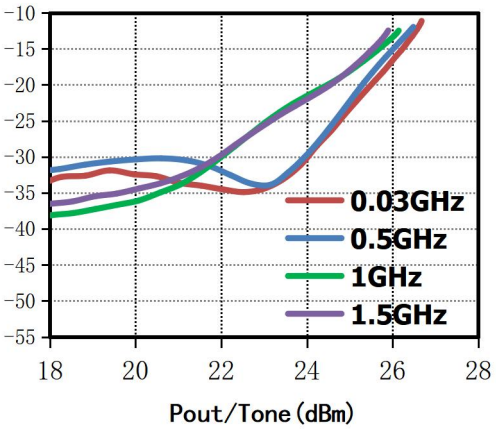
Output P_{-1}dB(dBm) vs.Temperature



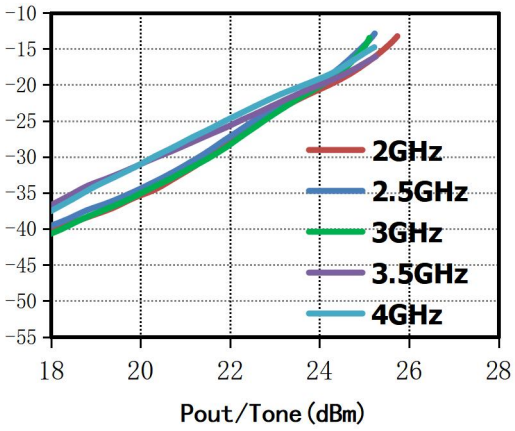
Output P_{-3}dB(dBm) vs.Temperature



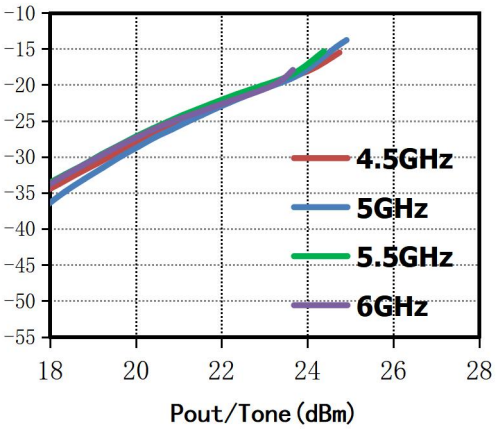
IM3 (dBc) vs. Pout/Tone



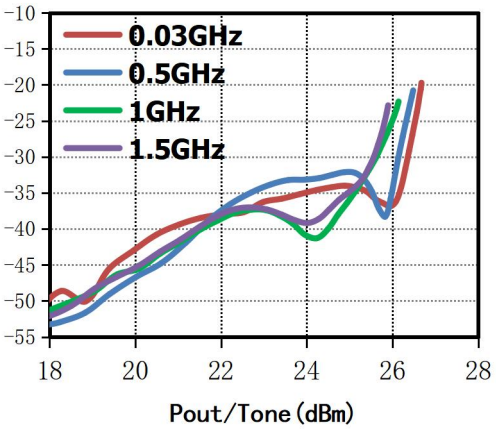
IM3 (dBc) vs. Pout/Tone



IM3 (dBc) vs. Pout/Tone



IM5 (dBc) vs. Pout/Tone



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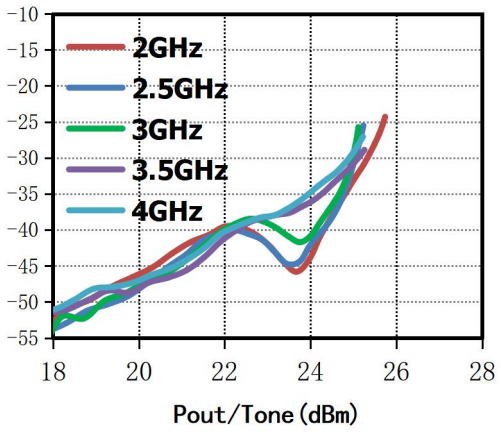
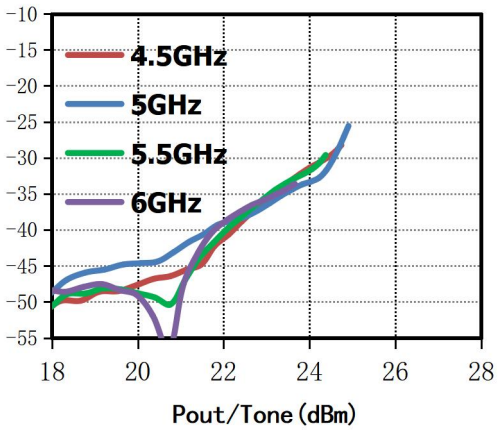
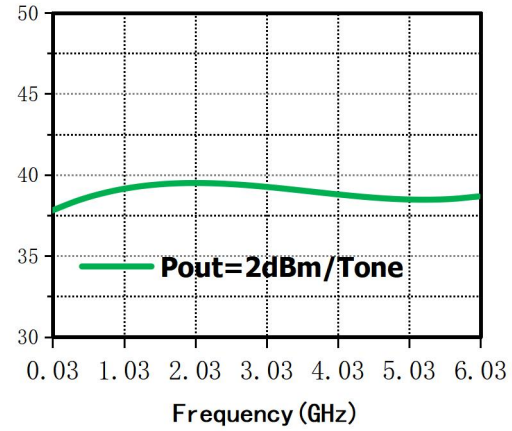
IM5 (dBc) vs. Pout/Tone



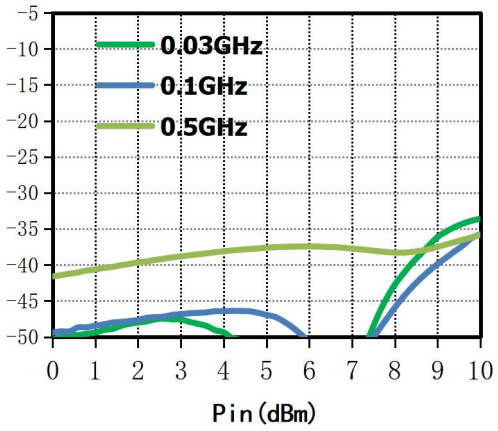
IM5 (dBc) vs. Pout/Tone



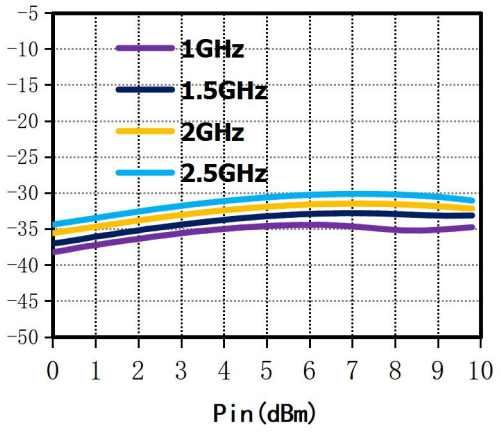
Output IP3 (dBm) vs. Frequency



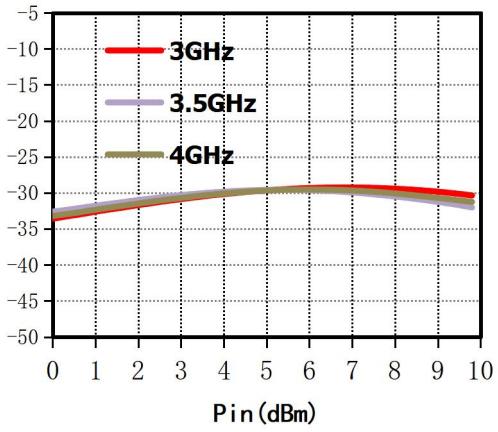
2ndHarmonic(dBc) vs.Pin



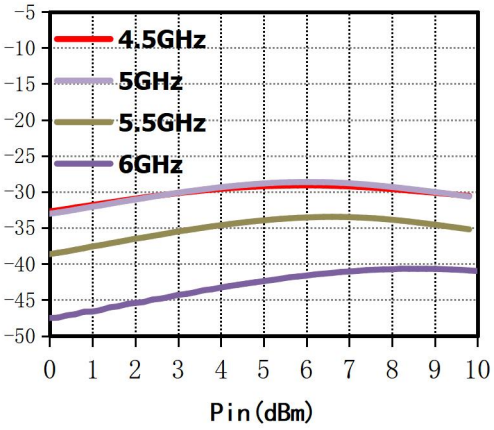
2ndHarmonic(dBc) vs.Pin



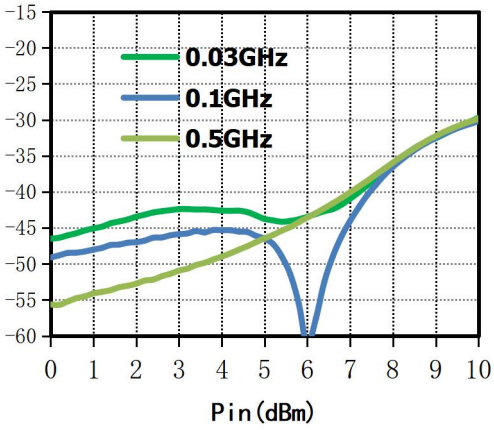
2ndHarmonic(dBc) vs.Pin



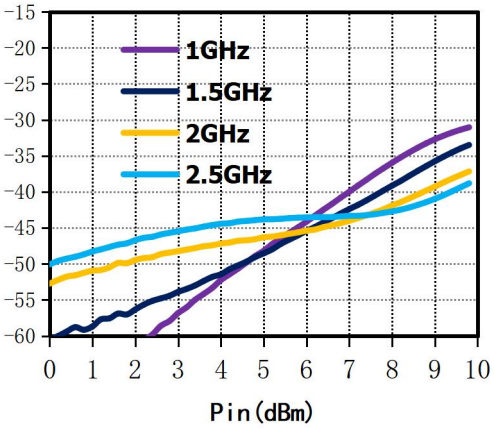
2ndHarmonic(dBc) vs.Pin



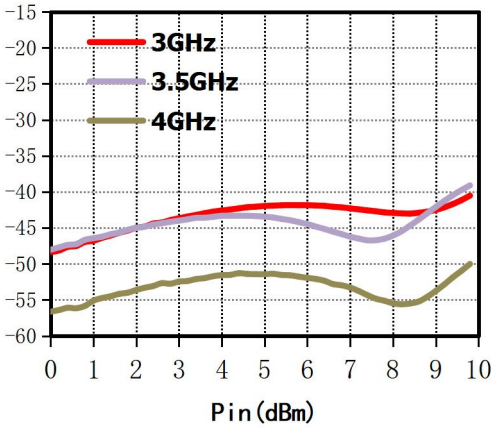
3rdHarmonic(dBc) vs.Pin



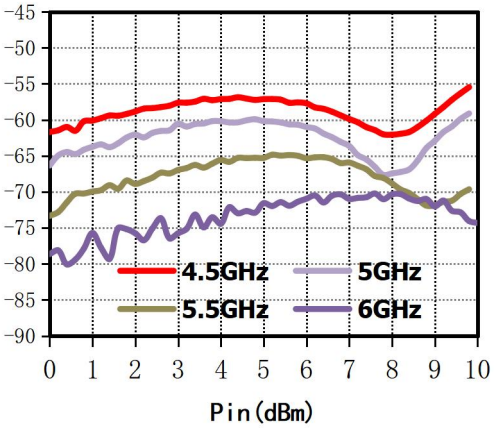
3rdHarmonic(dBc) vs.Pin



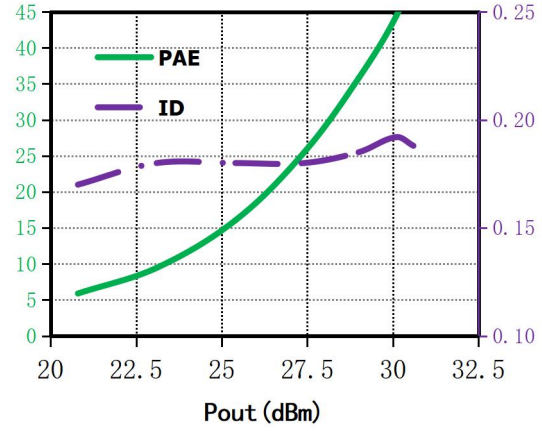
3rdHarmonic(dBc) vs.Pin



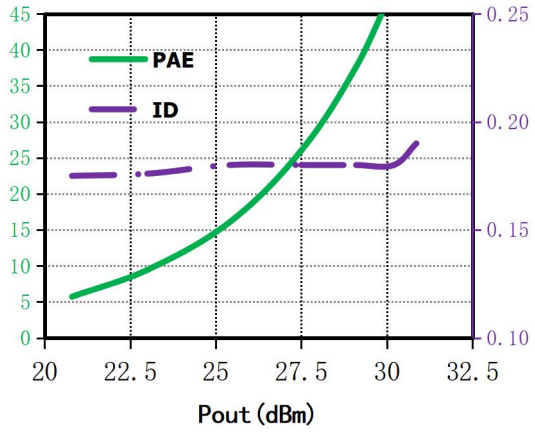
3rdHarmonic(dBc) vs.Pin



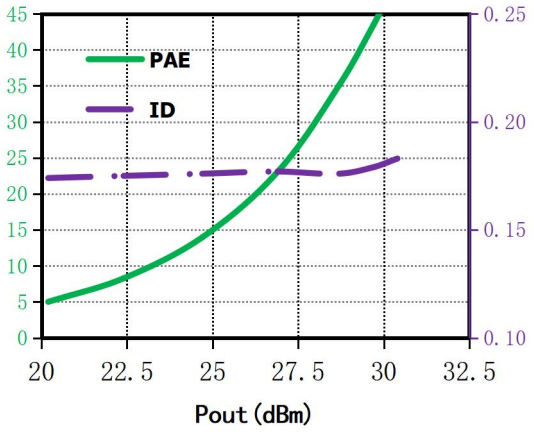
I_D(A)、PAE(%) vs. Pout,f=0.03GHz



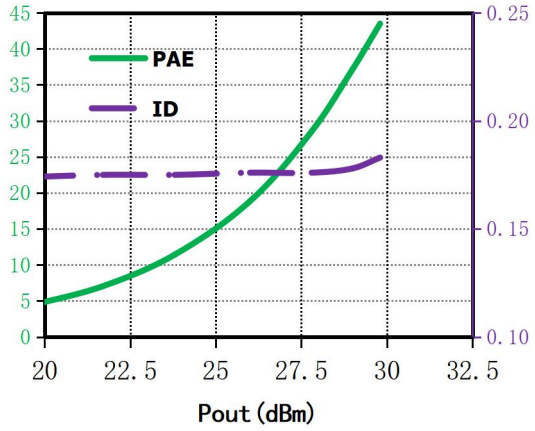
I_D(A)、PAE(%) vs. Pout,f=0.1GHz



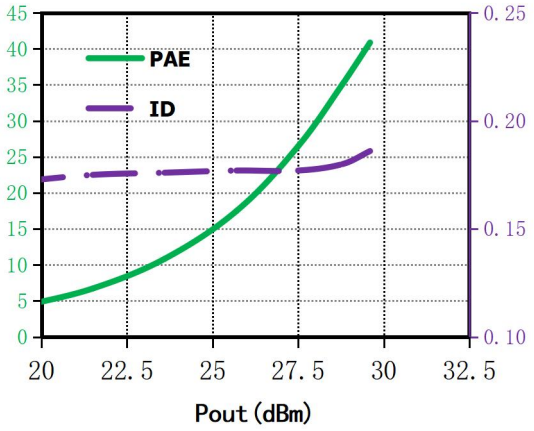
I_D(A)、PAE(%) vs. Pout,f=0.5GHz



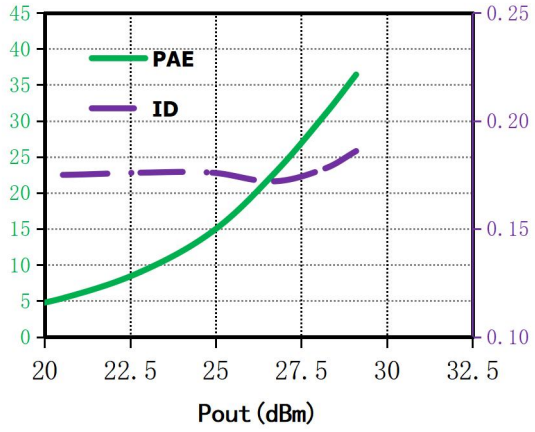
I_D(A)、PAE(%) vs. Pout,f=1GHz



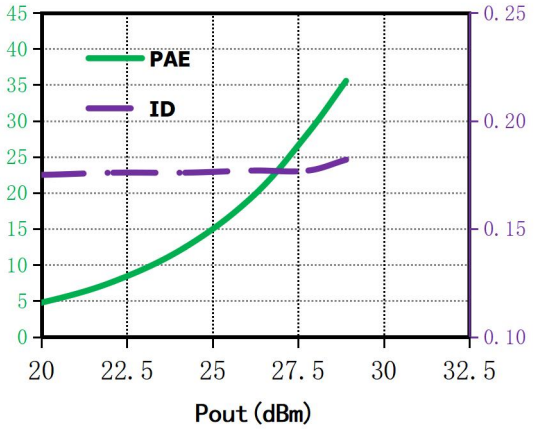
I_D(A)、PAE(%) vs. Pout,f=1.5GHz



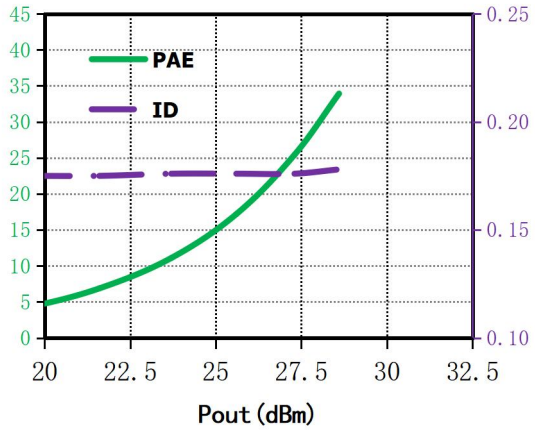
I_D(A)、PAE(%) vs. Pout,f=2GHz



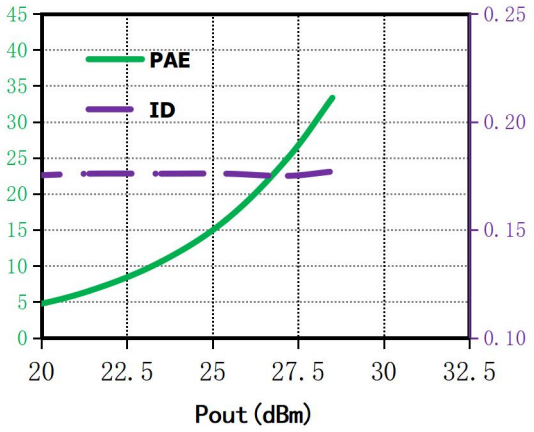
I_D(A)、PAE(%) vs. Pout,f=2.5GHz



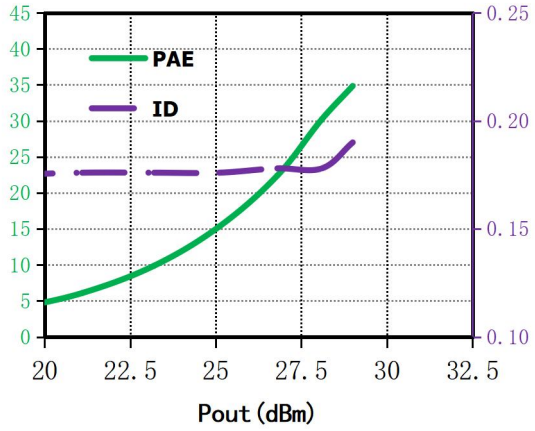
I_D(A)、PAE(%) vs. Pout,f=3GHz



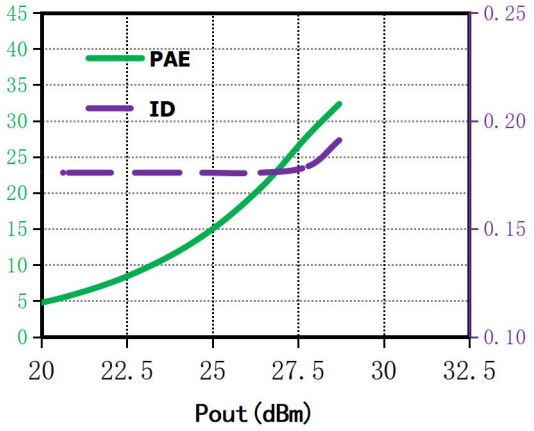
I_D(A)、PAE(%) vs. Pout,f=3.5GHz



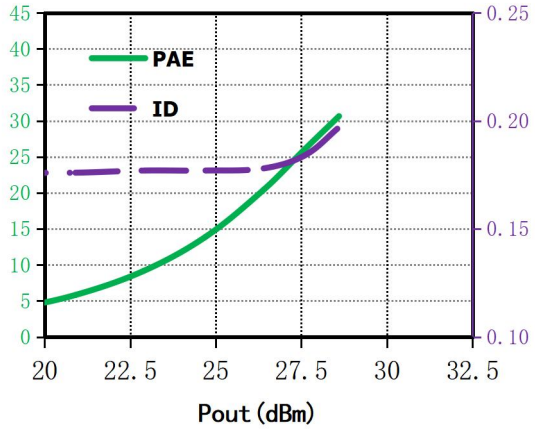
I_D(A)、PAE(%) vs. Pout,f=4GHz



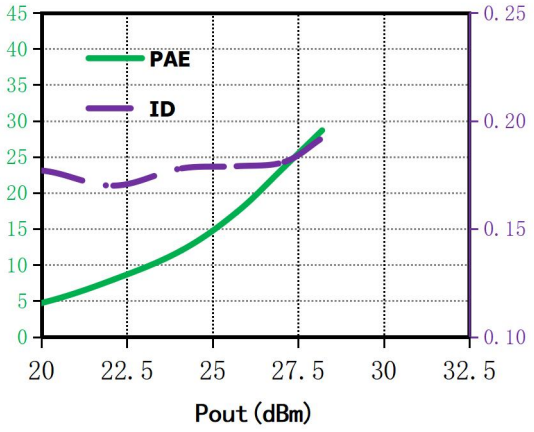
I_D(A)、PAE(%) vs. Pout,f=4.5GHz

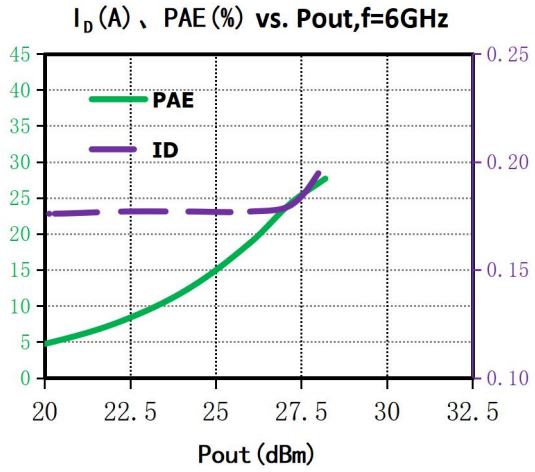


I_D(A)、PAE(%) vs. Pout,f=5GHz

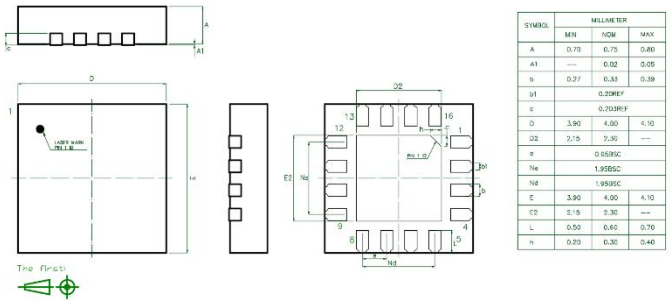


I_D(A)、PAE(%) vs. Pout,f=5.5GHz

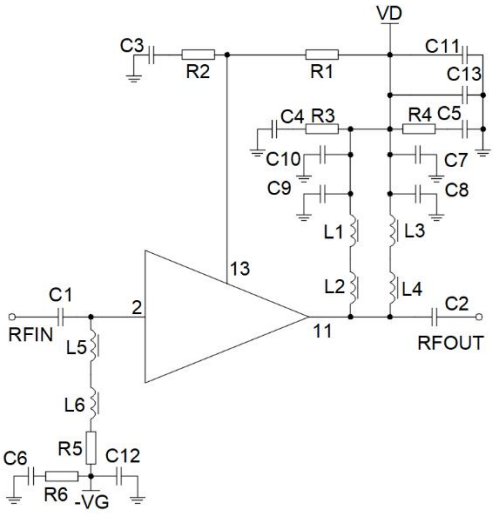




外形尺寸图(mm)



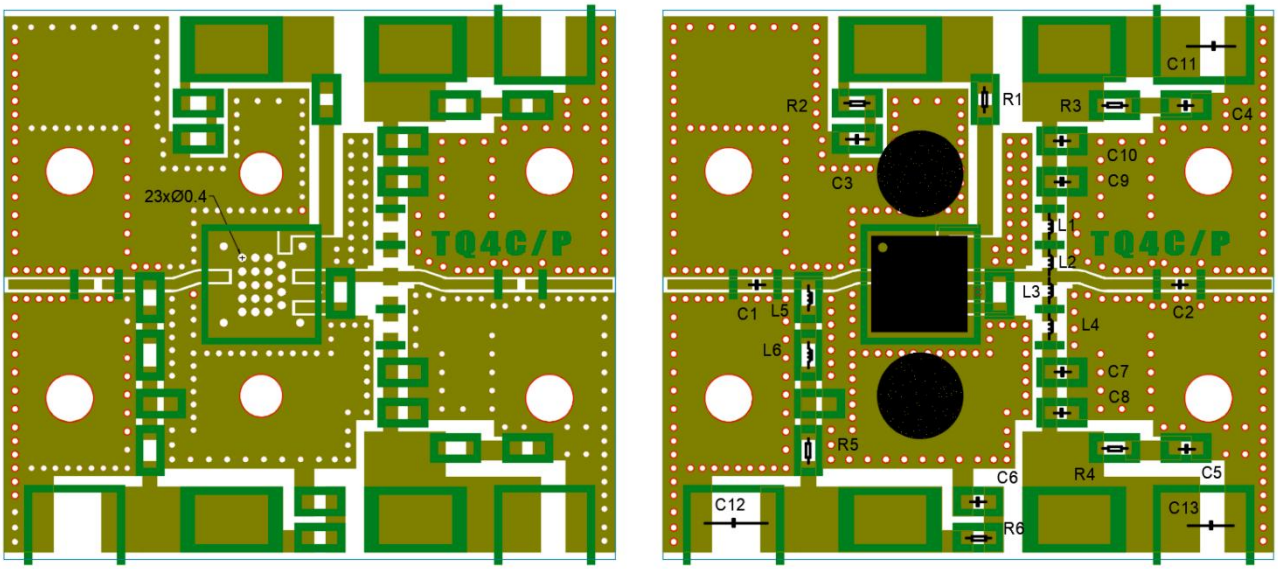
应用电路图



元件清单

编号	数值	型号	制造商	封装
C1、C2	510pF	—	—	0402
C3~C6	0.1μF	—	—	0402
C7~C10	0.01μF	—	—	0402
C11、C13	10μF	—	—	1210
C12	47μF	—	—	1210
R1	5.1Ω			0402
R5	100Ω			0402
R2~R4	10 Ω			0402
L1~L6	—	MMZ1005A222		0402

XT3939Q4 评估板



板材 Ro4350b, 介质厚度 0.254mm, 输入与输出传输线设计阻抗为 50Ω

XT3939Q4 封装底面中心焊盘为射频接地和散热用途。推荐该焊盘区域的过孔使用填铜工艺制造以便使热量能够顺利的传导至冷面

如上图所示位于芯片周围的 2 颗螺钉和铜箔为辅助散热用途，尽可能使用导热优异的薄基片。中心焊盘下方过孔数量不足、直径过小（<0.4mm）、孔内壁镀铜过薄（<0.05mm）或焊锡填充不充分均会显著影响器件散热过程进而降低性能甚至损坏

注意事项：

1. 封装产品防潮等级为 2a 级，存放环境小于或等于 30° C/60% RH，四周车间寿命；
2. 撤除真空包装，上回流焊前需在 125+/-5° 环境中烘焙 6 小时，方可焊接；
3. 如使用裸芯片则应将其放在干燥、氮气环境中存储，在超净环境使用；
4. 裸芯片由 GaAs 材料制成其较脆因此不能触碰芯片表面，使用时必须小心；
5. 裸芯片可用高导热率导电胶或合金烧结（合金温度不能超过 300℃，时间不能超过 30 秒），使之充分接地；
6. 芯片对静电敏感，在储存和使用过程中注意防静电。

版本历史

版本号	日期	说明
1.0	2021-11-29	第 1 次发布