

# 基于 GaAs 工艺的超宽带混合集成功率放大器

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**摘要:** 基于 0.15  $\mu\text{m}$  GaAs PHEMT 工艺, 设计了一款可以应用于超高频 (VHF) 和甚高频 (UHF) 的超宽带功率放大器. 该功放工作在 AB 类, 由上下两条对称支路构成. 输出电路采用 T 型结合成技术, 在片外使用罗杰斯 4350B 高速印刷电路板 (PCB) 制作. 最后在先进设计系统软件 (ADS) 里进行芯片和 PCB 板的联合仿真. 仿真结果显示: 此款功放的工作带宽是 30 MHz~3 GHz, 带宽超过 6 个倍频程. 在整个频带内, 小信号增益在 21 dB $\pm$ 0.3 dB 之间, 输入输出回路损耗基本在 -10 dB 以下. 连续波测量下, 饱和输出功率在 30.9 dBm $\pm$ 0.5 dB 之间, 功率附加效率 (PAE) 在 17.7%~14.0% 之间.

**关键词:** 超宽带; 功率放大器; 混合集成; GaAs

## Ultra-High Bandwidth Hybrid Integrated Power Amplifier Based on GaAs Technology

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**Abstract :** An ultra-high bandwidth power amplifier (PA) was designed for very-high-frequency (VHF) and ultra-high frequency (UHF) applications based on 0.15  $\mu\text{m}$  GaAs PHEMT technology. The PA works in class AB, which consists of two symmetrical branches from top to bottom. The output circuit uses T-junction technology which uses the Rogers 4350B high-speed printed circuit board (PCB) in the off-chip. Finally, the chip and PCB have co-simulated in Advanced Design System (ADS). The simulation results show that the PA achieves an operating bandwidth of 30 MHz to 3 GHz whose bandwidth is more than 6 octaves. The small signal gain is over 21 dB $\pm$ 0.3 dB the whole bandwidth and the input and output return loss is generally less than -10 dB. Under continuous wave measurement, the saturated output power is 30.9 dBm $\pm$ 0.5 dB and the power added efficiency (PAE) is 17.7%—14.0%.

**Key words:** ultra-high bandwidth; power amplifier; hybrid integrated; GaAs

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