

一种快速瞬态响应的无片外电容 LDO 稳压器设计

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摘 要: 基于 LDO 稳压器的的工作原理, 设计了一种快速瞬态响应的无片外电容 LDO 稳压器电路. LDO 稳压器主要包括无运放带隙基准源、误差放大器、瞬态响应增强模块、功率调整管及 NMOS 管反馈网络. 提出一种新结构的瞬态响应增强电路, 加快功率调整管栅极的充放电速度, 实现了快速瞬态响应. 电路采用 TSMC 0.18 μm 标准 CMOS 工艺实现, 版图尺寸为 $190\ \mu\text{m} \times 210\ \mu\text{m}$, 后仿真结果表明: 在输入电压为 3.3 V 时, 输出电压为 2.15 V, 轻载与满载之间跳变的建立时间最大为 0.6 μs , 低频时 PSRR 为 -63 dB, 压差为 50 mV.

关键词: 无片外电容; 快速瞬态响应; NMOS 管反馈; LDO 稳压器

Design of a Fast Transient Response and

Capacitor-Free LDO Regulator

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Abstract: Based on the working principle of LDO regulator, a fast transient response and capacitor-free LDO regulator was designed. LDO regulator includes bandgap reference without amplifier, EA, transient response enhancement module, power regulator and NMOS transistor feedback network. A new structure of the transient response enhancement circuit is proposed to speed up the power adjustment transistor gate charge and discharge, and realize the fast transient response. The circuit is fabricated with TSMC 0.18 μm CMOS process and has the layout size of $190\ \mu\text{m} \times 210\ \mu\text{m}$. The simulation results show that when the input voltage is 3.3 V, the output voltage is 2.15 V. Between light load and full load establishment of the maximum time for the 0.6 μs . PSRR is -63 dB at low frequency, voltage difference is 50 mV.

Key words: capacitor-free; fast transient response; NMOS transistor feedback; LDO regulator

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