

Problem statement

This project presents layout of LDO optimized for compact area, low parasitics, and DRC/LVS compliance, making well-suited for low-power embedded SoC applications.

Objectives

- Design of high PSRR Low Dropout Regulator.
- Implement and verify both LVS and DRC of LDO.

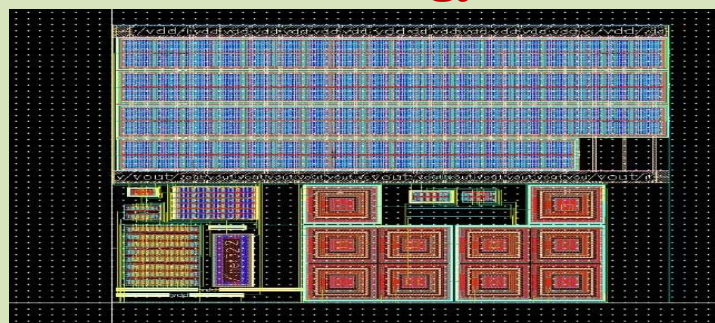
Contributions

- Full-custom layout of LDO
- Integration of error amplifier, pass transistor, and compensation network
- Post-layout simulation confirming stable output voltage.

Literature survey

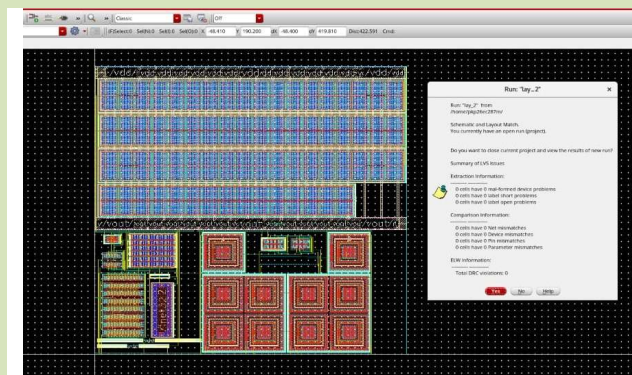
"Design of Low Dropout Voltage Regulator" for Battery Operated Devices" (2019) focuses on an LDO .

Methodology



- 1. Modular Placement:** Error amplifier, pass transistor, and compensation circuitry were placed in dedicated blocks to simplify signal routing, improve layout clarity, and enhance analog performance.
- 2. Symmetric Layout & MOS Matching:** Critical analog devices, including differential pair MOSFETs in the error amplifier, were laid out using common-centroid and techniques to minimize mismatch, offset, and systematic variations.
- 3. Power Routing:** VDD/VSS rails were employed to ensure robust power delivery, reduce IR drop .
- 4. Signal Isolation:** High-impedance analog paths and feedback lines were routed away from power and bias lines to prevent coupling and noise injection into sensitive nodes.
- 5. Verification:** Complete physical verification was performed, including DRC and LVS checks, ensuring the layout passed all design rules and achieved accurate netlist matching.

Results



Optimization details

- Matched MOSFET sizing for precise current control and improved load regulation.
- Layout symmetry applied to differential pairs ensure analog accuracy
- strategic routing to reduce parasitic capacitance and resistance, enhancing PSRR and transient response.

Conclusions

A fully integrated analog Low Dropout (LDO) regulator was successfully designed and implemented. Post-layout simulation results confirm its effectiveness for low-power embedded applications, demonstrating stable voltage regulation, high PSRR, and reliable performance across varying load conditions.