شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

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جامعة عين شمس

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قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
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HANAA ALY

AIN SHAMS UNIVERSITY

FACULTY OF ENGINEERING

Electronics Engineering and Electrical Communications

Design of Low Power Circuits for Integrated Power Management Units

A Thesis submitted in partial fulfillment for the requirements of a

Master of Science in Electrical Engineering

(Electronics Engineering and Electrical Communications)

by

Hazem Hassan Mohammed Mohammed Hammam

Master of Science in Electrical Engineering
(Electronics Engineering and Electrical Communications)
Faculty of Engineering, Ain Shams University, 2021

Supervised By

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Cairo - (2021)

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Statement

This thesis is submitted as a partial fulfillment of Master of Science in Electrical Engineering and Communications Engineering Department, Ain shams University.

The author carried out the work included in this thesis, and no part of it has been submitted for a degree or a qualification at any other scientific entity.

Student name: Hazem Hassan Hammam

Signature

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Summary

This thesis aims at studying and design low power circuits to be used for power management units such as low power low-dropout regulators (LDOs). The thesis is divided into two main parts, designing an ultra-low power high power supply rejection (PSR) LDO using adaptive loop gain control, and designing a low-power, improved inrush current, wide-load range and high PSR LDO using feed-forward load-dependent cancellation buffer (FFLCB) and pass device splitting. The thesis consists of five chapters as below,

Chapter 1

Chapter 1 gives a brief introduction to the motivation, objectives, major contributions and organization of the thesis.

Chapter 2

Chapter 2 presents a literature survey for different LDOs and discusses the prior art for improving PSR and stability. The analysis and design of prior and conventional LDOs are discussed thoroughly in this chapter.

Chapter 3

Chapter 3 shows the first proposed ultra-low-power high-PSR LDO design which mainly depends on controlling the loop gain across different frequencies using two innovative techniques of controlling. Analyses and design are described in detail.

Chapter 4

Chapter 4 shows the second proposed low-power high-PSR LDO design. Which improves the high-frequency PSR and stability across wide range of load current and load capacitor using FFLCB and pass device control techniques. Besides improving the inrush current by controlling the pass device size during start-up.

Chapter 5:

The conclusions for this work are given. Suggested future work including optimization or extra features are also shown.

Keywords: Low power, MOS analog integrated circuits, Low drop-out regulator, Feedforward cancellation, Power-supply rejection, inrush current.