UNIVERSITY OF MINNESOTA
Driven to Discover℠

Negative Bias Temperature Instability aware digital low-dropout regulator

A negative bias temperature instability (NBTI) aware digital low-dropout regulator (DLDO) which utilizes a novel unidirectional shift register for power transistor array control.

IP Status: Utility Patent Pending

Applications

- Integration with Mobile Devices
- Integration with Microprocessors

Technology Overview

On-chip DLDOs have recently gained impetus and drawn significant attention for integration within both mobile devices and microprocessors. Although the benefits of easy integration and fast response speed surpass analog LDOs and other voltage regulator types, NBTI-induced performance degradation is typically overlooked. The conventional bidirectional shift register-based controller can even exacerbate the degradation, which has been demonstrated theoretically and through practical applications.

A negative bias temperature instability (NBTI) aware digital low-dropout regulator (DLDO) is proposed. Instead of using a conventional bidirectional shift register for the control of the power transistor array within the DLDO, the proposed NBTI-aware DLDO utilizes a novel unidirectional shift register for power transistor array control. Conventional bidirectional shift register imposes too much electrical stress on a certain portion of power transistors which is not desirable for the reliability of the DLDO. The proposed NBTI-aware DLDO instead more evenly distributes the electrical stress among all of the available power transistors without affecting the normal operation of the DLDO.

Phase of Development

TRL: 4-5
Simulated using state-of-the-art tools.

Desired Partnerships

This technology is now available for:

- License
- Sponsored research
- Co-development

Please contact our office to share your business' needs and learn more.

Researchers

- Ulya Rahmet Karpuzcu Associate Professor, Department of Electrical and Computer Engineering

Technology ID

2019-053

Category

Engineering & Physical Sciences/Design Specifications
Engineering & Physical Sciences/Instrumentation, Sensors & Controls

View online page

References

1. Wang, L., Khatamifard, S.K., Karpuzcu, U.R. and Köse, S.(March, 2018) , https://ieeexplore.ieee.org/abstract/document/8342116, Design, Automation & Test in Europe Conference & Exhibition (DATE)