

# Saving pins and power with integrated voltage converters

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## Abstract

Recently, demand for increased processor performance coupled with reducing power budget has been addressed using emerging parallel processors. Parallel computation is an energy efficient (**cite chandrakasan**) way of increasing performance but requires wider interconnect busses. At the die boundary, the consequence is that systems face an IO bottleneck. The connection between silicon and substrate ends the scope of Moores law in a system, with IO density of packages increasing at a slower rate than on chip.

Compounding this problem, addressing performance by increasing parallel units result in increasing energy density due to the end of Dennard scaling (**cite**). Devices therefore require an increasing number of power pins, further limiting IO pin availability. **HOW ABOUT COMPELLING EXAMPLE?** We examine integrated power converters in this context. A review of the literature suggests with further research this technique could address the IO bottleneck of future processors.

## 1 Introduction

- Motivation
- Stakeholders
- Historical context
- Current state of art
- State of art limitations
- Content of doc

More fascinating text. Features<sup>1</sup> galore, plethora of promises.

## 2 The DC DC converter

### Definition of the problem

How it works, critical parameters

### 2.1 Problems of an Integrated DC DC Converter

#### Definition of the system problem lives in

History of research

System type 1(Switched capacitor AND HISTORY)

System type 2(Integrated buck AND HISTORY Kurson book)

Want to show how General CMOS components are made for this role and why they didn't work.

### 2.2 Performance drawbacks of Baseline DC DC Converters

#### Taxonomy of problem (deeper drill and more specifics of the problem)

what is wrong with the switches?

what is wrong with the control?

What is wrong with the capacitors?

What is wrong with the inductors?

### 2.3 Solutions

**System: well defined, class of problems: well defined, now we will see "fixed" systems**

- Switches fixes paper list and description DONT USE EXOTIC TECH! THESE WERE NEVER USED ON INTEGRATED DESIGNS!!!

- Control fixes paper list and description NOTE THAT THIS PROBLEM IS WELL UNDER CONTROL, CONCLUDE FROM THIS SECTION
- Capacitor fixes paper list and description NOTE THAT THIS PROBLEM CANNOT BE "SOLVED" FROM A SC TOPOLOGY POINT OF VIEW AND INDUCTORS ARE "BETTER" IN TERMS OF ENERGY DENSITY AND LINE REGULATION
- Inductor fixes paper list and description. NOTE THAT THIS IS "SOLVED" BUT FOR SEMI-INTEGRATED OR WHATEVER

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## Notes

<sup>1</sup>Remember to use endnotes, not footnotes!

## 3 Saving pins with DC DC converters

### Solutions & Stakeholders, why is there still work to be done?

Now we're going to cite somebody. Watch for the cite tag. Here it comes [?].

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