

PREFACE

We were very pleased with the warm reception that industry analysts, the trade press, and most importantly, hard working circuit designers, gave to our book entitled *Closing the Gap Between ASIC and Custom* that was first published in 2002. In that book, we focused on identifying the factors that cause a significant speed differential between circuits designed in an ASIC methodology and those designed with a “no holds barred” custom approach. We also sought to identify and describe design tools and techniques that could close the gap between the speeds of ASIC and custom circuits. That book wasn’t even in press before designers and fellow researchers came forward to challenge us to investigate a gap of growing importance: the gap in power dissipation and energy efficiency between circuits designed in ASIC and custom methodologies.

We learned a lot from our first book. In the content of our work we learned that circuit design and layout tricks were unlikely to be the source of sustained advantages of custom design. Instead clocking methodologies and microarchitecture were more likely to be areas where custom circuits sustained their advantage over ASICs. In our presentation of our research we found that technical conferences such as the Design Automation Conference were good venues for trying out our material and getting valuable feedback. Finally, in the production of the book itself we learned that putting high-level surveys and detailed descriptions of current research together with illustrative design examples was a good formula for creating a book of broad interest.

Like its predecessor we envision three main audiences for this book. The first audience is ASIC and ASSP designers who are restricted to a high productivity ASIC design methodology but still need to produce low-power circuits with high-energy efficiency. The second audience is custom designers who are seeking to design low power circuits with a more productive design flow. While the perspective of these two groups is different, the solutions they are seeking are very similar. In this book we account for the relative power impact of different elements of a custom-design methodology. We believe that this analysis should help custom design groups to determine where their limited design resources are best spent and help ASIC-oriented design groups understand where they most need improvement. Secondly, we identify specific tools and methodologies targeted to reduce the power of ASICs that are consistent with an ASIC design methodology, but which can also be usefully employed in custom circuit design.

The third audience for this book is researchers in electronic design automation who are looking for a broader survey of contemporary low-power

tools, methodologies, and design techniques. We hope that this book offers a more complete presentation of the battery of techniques that can be brought to bear to save power than is typically offered in conference publications or even survey articles. We also hope that the design examples used in this book will help researchers to contextualize their own research.

Occasionally at technical conferences you will hear someone say: “Another power paper? Isn’t that a solved problem?” Low power design has indeed been a focal research area for fifteen years. However, a look at the power challenges of today’s industrial designs indicates that the topic of this book has never been timelier.

David Chinnery
Kurt Keutzer

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Closing the Power Gap between ASIC & Custom
Tools and Techniques for Low Power Design

Chinnery, D.; Keutzer, K.

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