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<<数字集成电路设计>>

图书基本信息

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前言

Why this book? Designing integrated electronics has become a multisciplinary enterprise that involves solving problems from fields as disparate as · Hardware architecture · Software engineering · Marketing and investment · Solid-state physics · Systems engineering · Circuit design · Discrete mathematics · Electronic design automation · Layout design · Hardware test equipment and measurement techniques Covering all these subjects is clearly beyond the scope of this text and also beyond the authors proficiency. Yet, I have made an attempt to collect material from the above fields that I have found to be relevant for deciding whether or not to develop digital Very Large Scale Integration(VLSI) circuits, for making major design decisions, and for carrying out the actual engineering work. The present volume has been written with two audiences in mind. As a textbook. it wants to intro- duce engineering students to the beauty and the challenges of digital VLSI design while preventing them from repeating mistakes that others have made before. Practising electronics engineers should find it appealing as a reference book because of its comprehensiveness and the many tables, check- lists, diagrams, and case studies intended to help them not to overlook important action items and alternative options when planning to develop their own hardware components. What sets this book apart from others in the field is its top-down approach. Beginning with hardware architectures, rather than with solid。
state physics, naturally follows the normal VLSI design flow and makes the material more accessible to readers with a background in systems engineering, information technology, digital signal processing, or management .

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内容概要

本书从架构与算法讲起，介绍了功能验证、VHDL建模、同步电路设计、异步数据获取、能耗与散热、信号完整性、物理设计、设计验证等必备技术，还讲解了VLSI经济运作与项目管理，并简单阐释了CMOS技术的基础知识，全面覆盖了数字集成电路的整个设计开发过程。

本书既可作为高等院校微电子、电子技术等相关专业高年级师生和研究生的参考教材，也可供半导体行业工程师参考。

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作者简介

Hubert Kaeslin，1985年于瑞士苏黎世联邦理工学院获得博士学位，现为该校微电子设计中心的负责人，具有20多年教授VLSI的丰富经验。

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章节摘录

From Algorithms to Architectures 2. 1 The goals of architecture design VLSI architecture design is concerned with deciding on the necessary hardware resources for solving problems from data and／or signal processing and with organizing their interplay in such a way as to meet target specifications defined by marketing. The foremost concern is to get the desired functionality right. The second priority is to meet some given performance target j often expressed in terms of data throughput or operation rate. A third objective, of economic nature this timej is to minimize production costs. Assuming a given fabrication process, this implies minimizing circuit size and maximizing fabrication yield SO as to obtain as many functioning parts per processed wafer as possible. Another general concern in VLSI design is energy efficiency. Battery-operated equipment , such as hand-held cellular phones, laptop computers, digital hearing aids ; etc. , obviously imposes stringent limits on the acceptable power consumption. It is perhaps less evident that energy efficiency is also of interest when power gets supplied from the mains. The reason for this is the cost of removing the heat generated by high. performance high-density ICs. While the VLSI designer is challenged to meet a given performance figure at minimum power in the former case, maximizing performance within a limited power budget is what is sought in the latter. The ability to change from one mode of operation to another in very little time, and the flexibility to accommodate evolving needs and／or to upgrade to future standards are other highly desirable qualities and subsumed here under the term agility. Last but not least, two distinct architectures are likely to differ in terms of the overall engineering effort required to work them out in full detail and, hence also, in their respective times to market.

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今天，集成电路设计技术高速发展，在各个领域得到广泛应用，已经成为一种横跨多学科的技术。

《数字集成电路设计：从VLSI体系结构到CMOS制造(英文版)》从架构与算法讲起，介绍了功能验证、VHDL建模、同步电路设计、异步数据获取、能耗与散热、信号完整性、物理设计、设计验证等必备技术，还讲解了VLSI经济与项目管理，并简单阐释了CMOS技术的基础知识，全面覆盖了数字集成电路的整个设计开发过程。

作为一本教科书，《数字集成电路设计：从VLSI体系结构到CMOS制造(英文版)》向工程专业学生展示了数字VLSl设计之美。

揭示了各种技术难点，使他们避免重复前人的错误；作为一本技术参考书，《数字集成电路设计：从VLSI体系结构到CMOS制造(英文版)》内容全面，丰富的表格、清单、电路图和个案研究能够帮助正在开发硬件电路的在职工程师更好地完成自己的设计。

《数字集成电路设计：从VLSI体系结构到CMOS制造(英文版)》特点　　·涵盖了数字VLSI设计的大部分问题　　·从算法设计到晶圆生产，以自顶向下方式一一讲述　　·重点阐释了流行的CMOS技术和静态电路　　·全面覆盖数字VLSI设计者需要知道的半导体物理知识　　·图文并茂，深度体现课堂教学和实际设计项目验证的思想

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