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Fundamentals Of Power Electronics

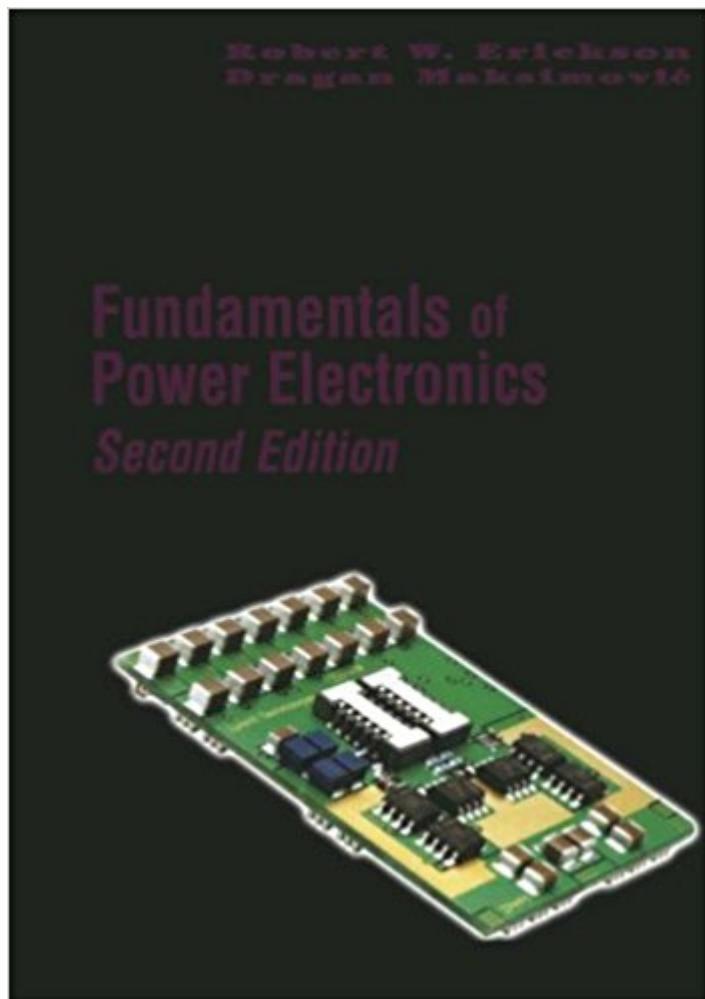Robert W. Erickson
Dragan Maksimović

Fundamentals of Power Electronics
Second Edition

Synopsis

Fundamentals of Power Electronics, Second Edition, is an up-to-date and authoritative text and reference book on power electronics. This new edition retains the original objective and philosophy of focusing on the fundamental principles, models, and technical requirements needed for designing practical power electronic systems while adding a wealth of new material. Improved features of this new edition include: A new chapter on input filters, showing how to design single and multiple section filters;   Major revisions of material on averaged switch modeling, low-harmonic rectifiers, and the chapter on AC modeling of the discontinuous conduction mode;   New material on soft switching, active-clamp snubbers, zero-voltage transition full-bridge converter, and auxiliary resonant commutated pole. Also, new sections on design of multiple-winding magnetic and resonant inverter design;   Additional appendices on Computer Simulation of Converters using averaged switch modeling, and Middlebrook's Extra Element Theorem, including four tutorial examples; and   Expanded treatment of current programmed control with complete results for basic converters, and much more.   This edition includes many new examples, illustrations, and exercises to guide students and professionals through the intricacies of power electronics design. Fundamentals of Power Electronics, Second Edition, is intended for use in introductory power electronics courses and related fields for both senior undergraduates and first-year graduate students interested in converter circuits and electronics, control systems, and magnetic and power systems. It will also be an invaluable reference for professionals working in power electronics, power conversion, and analogue and digital electronics.

Book Information

Hardcover: 883 pages

Publisher: Springer; 2nd edition (January 31, 2001)

Language: English

ISBN-10: 0792372700

ISBN-13: 978-0792372707

Product Dimensions: 7 x 1.9 x 10 inches

Shipping Weight: 4.1 pounds (View shipping rates and policies)

Average Customer Review: 4.0 out of 5 stars   50 customer reviews

Best Sellers Rank: #124,598 in Books (See Top 100 in Books)   #8 inÃ Â Books > Engineering & Transportation > Engineering > Energy Production & Extraction > Power Systems   #24 inÃ Â Books > Engineering & Transportation > Engineering > Energy Production & Extraction >

Customer Reviews

I haven't finished the course yet, so I haven't finished the book by a long shot. So far it's fine. The first few chapters cover Buck, Boost, Buck-Boost, and Cuk converters. Steady state, ripple analysis, and continuous vs discontinuous conduction mode. I assume we'll get to transient analysis before too long too. If you have a strong sense of what Power Electronics is (what the combination of those two words together means specifically) then the material should be easy enough to grasp for you.Chapter Titles:1 Introduction2 Principles of Steady State Converter Analysis3 Steady-State Equivalent Circuit Modeling, Losses, and Efficiency4 Switch Realization5 The Discontinuous Conduction Mode6 Converter Circuits7 AC Equivalent Circuit Modeling8 Converter Transfer Functions9 Controller Design10 Input Filter Design11 AC and DC Equivalent Circuit Modeling of the Discontinuous Conduction Mode12 Current Programmed Control13 Basic Magnetics Theory14 Inductor Design15 Transformer Design16 Power and Harmonics in Nonsinusoidal Systems17 Line-Commutated Rectifiers18 Pulse-Width Modulated Rectifiers19 Resonant Conversion20 Soft Switching

NOTE: I have only completed the first 6 of 20 chapters in this book, but I will give my review based on my experience so far.As a graduate student in Electric Power Engineering, this is one of the best books I have purchased in all of my university studies. As long as you have taken an introductory circuits course in your undergraduate curriculum, Dr. Erickson does a great job at explaining power electronics in a way that anyone can understand. I have been assigned books in many of my classes that contain poor explanations/example problems, unorganized structure, or even missing material that is vital to understanding the subject. However, this is not one of those textbooks. Although my current professor does a phenomenal job at teaching the material, I honestly feel that I could fully understand the course material by only reading this textbook. For me, as someone who prefers learning in-lecture, this is a rare instance. Do not hesitate to purchase this textbook!

This book covers a variety of topics a very well versed manner. It "refreshes" all the techniques you will need to analyze power electronics as it is needed, so no need to start with several chapters reviewing years of mathematics or electric circuits. The coverage of such material is so good that I feel that you will (re)learn the material here better than in the class that it was taught, such as the

coverage of transformer models of power electronics, linearizations, bode plots, magnetics, filters, lagrange multipliers (!), resonant circuits, etc. The reason for this is because as soon as it is covered you will see how it is applied in power electronics and how these techniques provide you with a "feel" and "intuition" for the system. There is great emphasis in design and developing your skills as an engineer. This book is great as an introduction to this field.

I have several power electronics textbooks, and this is the best book I've found to use as a reference. I have also used Krein's book, which is a good introduction if you're taking his class at UIUC, but not as useful for reference.This book really takes you through all the main topics with pretty thorough coverage. At CU it's used for several courses, so it's more than just an introductory book. The first few chapters cover the basics, and then it gets into the more advanced topics (which are more practical for reference once you have learned the basics). I'm now taking those courses online and finding that Erickson follows his book pretty closely, so you get the added benefit of seeing it all twice whether you are a visual or audio learner.I was impressed that he devoted about 100 pages to magnetics design, which is really helpful. Not the same as having McLyman's book, but it will do if just need a fairly straight-forward inductor or transformer designed.Bottom line: I already have this book and am considering buying another copy to have one at home and the other at the office.

Fundamentals of Power Electronics (2nd Ed) is one of the most readable engineering texts I've ever come across. This text was required for a power electronics graduate course. The course covered about 80% of the book. Given it's 850+ pages, I expected that I'd be skimming most of it to pick out the important topics as fast as I could, but I ended up reading every page. The topics are presented in a clear concise manner, and the references are very useful. If you've been out of school for a while like I have, you may want to peruse an introductory circuit theory text first. Though, I found that I only had to reference the basics once or twice while reading this book. Keep in mind that while this text does touch on some "practical" points (specifying components, for example), it is primarily an introductory text on the theory of switching converters. My only complaint is that within the first month of owning this book, the binding ripped, and so I had to glue/tape it back together. But the content is outstanding (provided you're looking for a text book on the theory of switching converters).

Great explanations of the topic materials and great examples. This book is a perfect

accompaniment to the Introduction to Power Electronics course offered on Coursera.org. Definitely recommend that course as well.

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