
Description: Power Electronics and Energy Conversion Systems is a definitive five-volume reference spanning classical theory through practical applications and consolidating the latest advancements in energy conversion technology. Comprehensive yet highly accessible, each volume is organised in a basic-to-sophisticated crescendo, providing a single-source reference for undergraduate and graduate students, researchers and designers.

Volume 1 Fundamentals and Hard-switching Converters introduces the key challenges in power electronics from basic components to operation principles and presents classical hard- and soft-switching, DC to DC converters, rectifiers and inverters. At a more advanced level, it provides comprehensive analysis of DC and AC models comparing the available approaches for their derivation and results. A full treatment of DC to DC hard-switching converters is given, from fundamentals to modern industrial solutions and practical engineering insight. The author elucidates various contradictions and misunderstandings in the literature, for example, in the treatment of the discontinuous conduction operation or in deriving AC small-signal models of converters.

Other key features:

- Consolidates the latest advancements in hard switching converters including discontinuous capacitor voltage mode and true discontinuous inductor current mode in $\mu$Euk, SEPIC or Zeta converters and its use in power-factor-correction applications, modern core reset strategies for forward converter, current and voltage multiplier rectifiers, quadratic, KY and Z-source buck-boost converters, tapped-inductor buck for VRMs for microprocessors
- Includes fully worked design examples, exercises to be solved, and case studies, with discussion of the practical consequences of each choice made during the design
- Explains all topics in detail with step-by-step derivation of formulas appropriate for energy conversion courses
- End-of-section review of the learned material
- Includes topics treated in recent journal, conference and industry application coverage on solutions, theory and practical concerns

With emphasis on clear explanation, the text offers both a thorough understanding of DC to DC converters for undergraduate and graduate students in power electronics, and more detailed material suitable for researchers, designers and practising engineers working on the development and design of power electronics. This is an accessible reference for engineering and procurement managers from industries such as consumer electronics, integrated circuits, aerospace and renewable energy.

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