

# Download File Optimal Design Of Switching Power Supply Free Download Pdf

**Switching Power Supply Design, 3rd Ed.** Switching Power Supplies A - Z **Practical Switching Power Supply Design Simplified Design of Switching Power Supplies Switchmode Power Supply Handbook 3/E** *Power Supply Cookbook* **High-frequency Switching Power Supplies Switch-Mode Power Supplies Spice Simulations and Practical Designs** Switching Power Supply Design **Designing Control Loops for Linear and Switching Power Supplies Computer-Aided Analysis and Design of Switch-Mode Power Supplies** *Troubleshooting Switching Power Converters Optimal Design of Switching Power Supply* **Switching Power Supply Design and Optimization, Second Edition** **Switching Power Supply Design & Optimization** *Switching Power Supplies A - Z* **Switch-Mode Power Supplies, Second Edition** *Power Supplies for LED Driving* **Switch Mode Power Supply Applications DC Power Supplies Power Supplies, Switching Regulators, Inverters, and Converters** *Power Electronics Applied to Industrial Systems and Transports, Volume 3* **Switched Mode Power Supplies** *Switch-mode Power Supply SPICE Cookbook* Demystifying Switching Power Supplies Optimal Design of Switching Power Supply **Practical Design of Power Supplies**

**Fundamentals of Power Supply Design** *Switch-Mode Power Converters* **Power Sources and Supplies: World Class Designs** Dynamic Analysis of Switching-Mode DC/DC Converters Power Supply Cookbook **Voltage Regulator Circuit Manual Handbook of Power Management Circuits** **Dynamic Power Supply Transmitters** **Switching Power Supply Design Ask a Manager** **Switch-mode Power Supply Design** **Switching and Linear Power Supply, Power Converter Design** Switch Mode Power Conversion

An all-in-one guide to design, applications, and operation--with hundreds of helpful schematics and diagrams. Updated to cover new IC technology, low-voltage logic devices, and one-watt power supplies for ISDN equipment. Detailed enough for professional engineers and technicians . . . accessible enough for students and hobbyists. First Published in 2017. Routledge is an imprint of Taylor & Francis, an Informa company. A practical guide to state-of-the-art power supply design, covering every aspect of this new technology. The latest techniques for designing state-of-the-art power supplies, including resonant (LLC) converters Extensively revised throughout, *Switching Power Supply Design & Optimization, Second Edition*, explains how to design reliable, high-performance switching power supplies for today's cutting-edge electronics. The book covers modern topologies and converters and features new information on designing or selecting bandgap references, transformer design using detailed new design charts for proximity effects, Buck efficiency loss teardown diagrams, active reset techniques, topology morphology, and a meticulous AC-DC front-end design procedure. This updated resource contains design charts and numerical examples for comprehensive feedback loop design, including TL431, plus the world's first top-down simplified design methodology for wide-input resonant (LLC) converters. A step-by-step comparative design procedure for Forward and

Flyback converters is also included in this practical guide. The new edition covers: Voltage references DC-DC converters: topologies to configurations Contemporary converters, composites, and related techniques Discontinuous conduction mode Comprehensive front-end design in AC-DC power conversion Topologies for AC-DC applications Tapped-inductor (autotransformer-based) converters Selecting inductors for DC-DC converters Flyback and Forward converter transformer design Forward and Flyback converters: step-by-step design and comparison PCBs and thermal management Closing the loop: feedback and stability, including TL431 Practical EMI filter design Reset techniques in Flyback and Forward converters Reliability, testing, and safety issues Unraveling and optimizing Buck converter efficiency Introduction to soft-switching and detailed LLC converter design methodology with PSpice simulations Practical circuits, design ideas, and component FAQs Switch-Mode Power Converters introduces an innovative, highly analytical approach to symbolic, closed-form solutions for switched-mode power converter circuits. This is a highly relevant topic to power electronics students and professionals who are involved in the design and analysis of electrical power converters. The author uses extensive equations to explain how solid-state switches convert electrical voltages from one level to another, so that electronic devices (e.g., audio speakers, CD players, DVD players, etc.) can use different voltages more effectively to perform their various functions. Most existing comparable books published as recently as 2002 do not discuss closed-loop operations, nor do they provide either DC closed-loop regulation equations or AC loop gain (stability) formulae. The author Wu, a leading engineer at Lockheed Martin, fills this gap and provides among the first descriptions of how error amplifiers are designed in conjunction with closed-loop bandwidth selection. **BENEFIT TO THE READER:** Readers will gain a mathematically rigorous introduction to numerous, closed-form solutions that are readily applicable to the design and development of various switch-mode power

converters. Provides symbolic, closed-form solutions for DC and AC studies Provides techniques for expressing close-loop operation Gives readers the ability to perform closed-loop regulation and sensitivity studies Gives readers the ability to design error amplifiers with precision Employs the concept of the continuity of states in matrix form Gives accelerated time-domain, steady-state studies using Laplace transform Gives accelerated time-domain studies using state transition Extensive use of matrix, linear algebra, implicit functions, and Jacobian determinants Enables the determination of power stage gain that otherwise could not be obtained A contemporary evaluation of switching power design methods with real world applications • Written by a leading author renowned in his field • Focuses on switching power supply design, manufacture and debugging • Switching power supplies have relevance for contemporary applications including mobile phone chargers, laptops and PCs • Based on the authors' successful "Switching Power Optimized Design 2nd Edition" (in Chinese) • Highly illustrated with design examples of real world applications Ready-made SPICE power supply solutions Now you can get solutions to the most difficult problems facing power supply designers: shrinking size and increased thermal constraints. Christophe Basso's SMPS SPICE Cookbook is a complete designer's toolkit with tested, ready-to-run SPICE models on an accompanying CD-ROM. The models come in all three SPICE flavors with demo versions. You can start from scratch, installing the software and simulating the examples in the book without any SPICE experience whatsoever. All the common SMPS topologies are covered: buck, boost, buck-boost, and SEPIC. Each is described in terms of relative strengths and weaknesses and then modeled. Just turn to the CD, pull out the model in the flavor of SPICE you use, plug in your own values – and out comes a design solution. All the models in the book have been carefully simulated and tested. A special website even lets you access new models that will be posted on a continuing basis Loop control is an essential area of electronics

engineering that today's professionals need to master. Rather than delving into extensive theory, this practical book focuses on what you really need to know for compensating or stabilizing a given control system. You can turn instantly to practical sections with numerous design examples and ready-made formulas to help you with your projects in the field. You also find coverage of the underpinnings and principles of control loops so you can gain a more complete understanding of the material. This authoritative volume explains how to conduct analysis of control systems and provides extensive details on practical compensators. It helps you measure your system, showing how to verify if a prototype is stable and features enough design margin. Moreover, you learn how to secure high-volume production by bench-verified safety margins. Power Supply design is all about detail. And a large part of that detail lies in the practical domain, largely because of the typically small number of microseconds of switching periods involved, and the even smaller tens of nanoseconds of switch transition times --- all these, in effect accentuating various "second-order" effects, that eventually end up playing prime havoc with "normal" expectations of how the circuit should behave. So not unsurprisingly, even after reading several books, most readers still find themselves no closer to the ultimate goal of designing an actual power supply. Sooner or later, all engineers start realizing the hard fact that designing a switching power supply isn't the trivial task it once seemed to be. But even after years of successfully mastering the underlying theory, the ultimate goal of creating a cost-effective, reliable and commercially viable power supply may still remain a distant dream, since success ultimately hinges on experience. That is, in fact, what clearly differentiates a senior and seasoned power supply engineer from the others --- the ability to navigate and surmount a veritable minefield of tricky issues that can only be learned the hard way, by actual hands-on experience on the job. This book presents practical knowledge the author acquired rather painfully, while working "in the

trenches" for several years in major engineering companies scattered across several continents. This is intended to be the mythical senior engineer's "bag of tricks," finally made available in the form of an easy-to-read book on your shelf. This book will make life for the ambitious power supply engineer much simpler --- besides reducing significantly, the rigorous requirement of having to be a senior engineer's protégé for years on end, just to gain a small measure of real success in this field. \* A practical presentation that answers the important question: why is my switching converter behaving so differently than what I was expecting on the basis of my paper design? And how do I bridge that huge gap? \* For the first time, a systematic and thorough discussion of troubleshooting switching power supplies. \* Coverage of AC/DC and DC/DC power supplies. \* Bench Evaluation of semiconductor ICs used in power conversion --- describing standard and unusual techniques mastered by the author, while testing similar chips at National Semiconductor. \* Detailed coverage of vital topics that haven't been covered by available sources --- grounding systems, the subtleties of component datasheets, and using instruments and probes effectively. \* Systematic investigation (type of failure mechanism, topology, etc.) and solutions for 5 years of reported power supply issues on a prominent, public web forum. This approach will ensure that engineers will not repeat the same mistakes. \* A unique, readable style: personal and direct; no mystification--- just the plain truth, easily and logically explained, with plenty of pictures, graphs and plots. "Power is dissipated (lost) when this current flows through any resistance, which includes the amplifier's transistor. This dissipated power is the product of the current in the load times the voltage difference between the supply voltage to the amplifier and the output signal voltage. When the voltage supplied to the amplifier is a constant value, and by far the most common design practice, the situation in Fig. 1-2a results. Power dissipation in the amplifier is maximum when the output signal voltage is 1/2 of the supply voltage. When the output signal voltage

is higher, even though the current value is larger the voltage drop is less and the power dissipation is lower. Similarly, when the output signal voltage is small, even though the voltage drop is now large the current in the load is smaller and again the power dissipation is lower"-- Light-emitting diodes are being widely used due to their efficient use of power. The applications for power LEDs include traffic lights, street lamps, automotive lighting, architectural lights, household light replacements, signage lighting (replacing neon strip lights and fluorescent tubes), and many more. Powering (driving) these LED's is not always simple. Linear driving is inefficient and generates far too much heat. With a switching supply, the main issues are EMI and efficiency, and of course cost. The problem is to get a design that meets legal requirements and is efficient, while costing the least. This book covers the design trade-offs involved in LED driving applications, from low-power to UB-LEDs and beyond. Practical, "hands-on" approach to power supply design for LED drivers Detailed examples of what works and why, throughout the design process Commentary on how the calculated component value compares with the actual value used, including a description of why the choice was made This comprehensive reference/text explains the development and principles of operation, modelling, and analysis of switch-mode power supplies (SMPS)-highlighting conversion efficiency, size, and steady state/transient regulation characteristics.;Covering the practical design techniques of SMPS,this book - reveals how to develop specific models of circuits and components for simulation and design purposes; explains both the computer simulation of the switching behaviours of dc-to-dc converters and the modelling of linear and nonlinear circuit components; deals with the modelling and simulation of the low-frequency behaviours of converters (including current-controlled converters and converters with multiple outputs) and regulators; describes computer-aided design (CAD) techniques as applied to converters and regulators; introduces the principles and design of quasi-resonant and resonant

converters; provides details on SPICE, a circuit simulator package used to calculate electrical circuit behaviour.;Containing over 1000 helpful drawings, equations, and tables, this is a valuable reference for circuit design, electrical, and electronics engineers, and serves as an excellent text for upper-level undergraduate and graduate students in these disciplines. Take the "black magic" out of switching power supplies with Practical Switching Power Supply Design! This is a comprehensive "hands-on" guide to the theory behind, and design of, PWM and resonant switching supplies. You'll find information on switching supply operation and selecting an appropriate topology for your application. There's extensive coverage of buck, boost, flyback, push-pull, half bridge, and full bridge regulator circuits. Special attention is given to semiconductors used in switching supplies. RFI/EMI reduction, grounding, testing, and safety standards are also detailed. Numerous design examples and equations are given and discussed. Even if your primary expertise is in logic or microprocessor engineering, you'll be able to design a power supply that's right for your application with this essential guide and reference! Gives special attention to resonant switching power supplies, a state-of-the-art trend in switching power supply design Approaches switching power supplies in an organized way beginning with the advantages of switching supplies and thier basic operating principles Explores various configurations of pulse width modulated (PWM) switching supplies and gives readers ideas for the direction of their designs Especially useful for practicing design engineers whose primary specialty is not in analog or power engineering fields This is a rigorous, carefully explained and motivated "beginner's bible" to power supply design. Between dense, mathematical textbooks on power electronics and tiny power supply "cookbooks" there exists no practical tutorial on the hazards of contemporary power supply design. Our Pressman book, the 800 lb gorilla in the field, is both mathematically dense and 7 years old. This new book, detailing cutting edge thermal management



techniques, grouping key design equations in a special reference section, and containing a concise Design FAQ, will serve both as an invaluable tutorial and quick reference. Harness Powerful SPICE Simulation and Design Tools to Develop Cutting-Edge Switch-Mode Power Supplies

**Switch-Mode Power Supplies: SPICE Simulations and Practical Designs** is a comprehensive resource on using SPICE as a power conversion design companion. This book uniquely bridges analysis and market reality to teach the development and marketing of state-of-the-art switching converters. Invaluable to both the graduating student and the experienced design engineer, this guide explains how to derive founding equations of the most popular converters...design safe, reliable converters through numerous practical examples...and utilize SPICE simulations to virtually breadboard a converter on the PC before using the soldering iron. Filled with more than 600 illustrations, **Switch-Mode Power Supplies: SPICE Simulations and Practical Designs** enables you to:

- Derive founding equations of popular converters
- Understand and implement loop control via the book-exclusive small-signal models
- Design safe, reliable converters through practical examples
- Use SPICE simulations to virtually breadboard a converter on the PC

Access design spreadsheets and simulation templates on the accompanying CD-ROM, with numerous examples running on OrCAD<sup>®</sup>, ICAPS<sup>®</sup>, Cap<sup>®</sup>, TINA<sup>®</sup>, and more

**Inside This Powerful SPICE Simulation and Design Resource**

- Introduction to Power Conversion
- Small-Signal Modeling
- Feedback and Control Loops
- Basic Blocks and Generic Models
- Simulation and Design of Nonisolated Converters
- Simulation and Design of Isolated Converters-Front-End Rectification and Power Factor Correction
- Simulation and Design of Isolated Converters-The Flyback
- Simulation and Design of Isolated Converters-The Forward

This book is a crash course in the fundamental theory, concepts, and terminology of switching power supplies. It is designed to quickly prepare engineers to make key decisions about power supplies for their projects. Intended for readers who need to quickly

understand the key points of switching power supplies, this book covers the 20% of the topic that engineers use, 80% of the time. Unlike existing switching power supply books that deal strictly with design issues, this book also recognizes the growing importance of "off-the-shelf" commercial switching power supplies, giving readers the background necessary to select the right commercial supply. This book covers the core essentials of power supply theory and design while keeping mathematics to the absolute minimum necessary. Special attention is given to the selection of appropriate components, such as inductors and transformers, to ensure safe and reliable operation. Engineers, whose main design responsibilities are in other areas, will better understand the strengths and weaknesses of switching power supplies and whether such supplies are appropriate for their projects. They will be able to give more meaningful design requirements and specifications to those who design switching power supplies. \* Discusses both AC line supplies and DC-DC inverters. \* Covers the main switching power supply designs, including flyback, forward conversion, bridge, buck, boost, and boost/buck topologies. \* Design examples include a 220 volt offline switching power supply and a 110 volt uninterruptible supply. THE LATEST SPICE SIMULATION AND DESIGN TOOLS FOR CREATING STATE-OF-THE-ART SWITCHMODE POWER SUPPLIES Fully updated to incorporate new SPICE features and capabilities, this practical guide explains, step by step, how to simulate, test, and improve switch-mode power supply designs. Detailed formulas with founding equations are included. Based on the author's continued research and in-depth, hands-on work in the field, this revised resource offers a collection of the latest SPICE solutions to the most difficult problem facing power supply designers: creating smaller, more heat-efficient power supplies in shorter design cycles. NEW to this edition: Complete analysis of rms currents for the three basic cells in CCM and DCM PWM switch at work in the small-signal analysis of the DCM boost and the QR flyback

OTA-based compensators Complete transistor-level TL431 model Small-signal analysis of the borderline-operated boost PFC circuit operated in voltage or current mode All-over power phenomena in QR or fixed-frequency discontinuous/continuous flyback converters Small-signal model of a QR flyback converter Small-signal model of the active clamp forward converter operated in voltage mode control Electronic content—design templates and examples available online Switch-Mode Power Supplies: SPICE Simulations and Practical Designs, Second Edition, covers: Small-signal modeling \* Feedback and control loops \* Basic blocks and generic switched models \* Nonisolated converters \* Off-line converters \* Flyback converters \* Forward converters \* Power factor correction This book is about how to analyze and design DC to DC converters by using both hand analysis and a wealth of Simulation so that the reader sees all the waveforms and understands what they mean. Both DC and AC small signal hand and simulation are compared using average and switching models. There are many tricks in quickly designing these DC to DC converters that are illustrated. Switched mode power supplies are now established as an industry standard method of providing power to many types of electronic equipment. This book provides thorough, up-to-date coverage of all aspects of switched mode power supply technology. Covers the full range of topics associated with the successful design and production of a switched mode power supply. -- Provides a sound, rigorous treatment of the theory, as well as practical applications, to allow the reader to achieve a suitable design and functionally satisfactory switched mode power supply. -- Considerably expanded since the first edition. The second edition includes coverage of electromagnetic compatibility, the main statutory regulations associated with switched mode power supply production, and validated simulation programs. Whether you are a student, a newly-minted engineer entering the field of power electronics, a salesperson needing to understand a customer's needs, or a seasoned power supply designer desiring

to track down a forgotten equation, this book will be a significant aid. Beginning with the basic definition of a power supply, we will traverse through voltage regulation techniques and the components necessary for their implementation, and then move on to the myriad of circuit topologies and control algorithms prevalent in modern-day design solutions. Separate chapters on feedback-loop compensation and magnetic design principles will build on this foundation, along with in-depth descriptions for dealing with regulations for electromagnetic compatibility, human safety, and energy efficiency issues. Additional chapters will describe the value proposition for digital control and the practical aspects power supply construction. The most critical part of the modern switching-mode power supply is the regulated dc/dc converter. Its dynamic behavior directly determines or influences four of the important characteristics of the power supply:

- Stability of the feedback loop
- Rejection of input-voltage ripple and the closely-related transient response to input-voltage perturbation
- Output impedance and the closely-related transient response to load perturbation
- Compatibility with the input EMI filter

Due to the complexity of the operation of the converter, predicting its dynamic behavior has not been easy. Without accurate prediction, and depending only on building the circuit and tinkering with it until the operation is satisfactory, the engineering cost can easily escalate and schedules can be missed. The situation is not much better when the circuit is built in the computer, using a general-purpose circuit-simulation program such as SPICE. (At the end of this book is a form for obtaining information on a computer program especially well suited for dynamic analysis of switching-mode power converters: DYANA, an acronym for "DYnamic ANALYSIS." DYANA is based on the method given in this book. ) The main goal of this book is to help the power-supply designer in the prediction of the dynamic behavior by providing user-friendly analytical tools, concrete results of already-made analyses, tabulated for easy application by the reader, and examples of how to

apply the tools provided in the book. The definitive guide to switchmode power supply design--fully updated Covering the latest developments and techniques, Switchmode Power Supply Handbook, third edition is a thorough revision of the industry-leading resource for power supply designers. New design methods required for powering small, high-performance electronic devices are presented. Based on the authors' decades of experience, the book is filled with real-world solutions and many nomograms, and features simplified theory and mathematical analysis. This comprehensive volume explains common requirements for direct operation from the AC line supply and discusses design, theory, and practice. Engineering requirements of switchmode systems and recommendations for active power factor correction are included. This practical guide provides you with a working knowledge of the latest topologies along with step-by-step approaches to component decisions to achieve reliable and cost-effective power supply designs. Switchmode Power Supply Handbook, third edition covers: Functional requirements of direct off-line switchmode power supplies Power components selection and transformer designs for converter circuits Transformer, choke, and thermal design Input filters, RFI control, snubber circuits, and auxiliary systems Active power factor correction system design Worked examples of would components Examples of fully resonant and quasi-resonant systems A resonant inverter fluorescent ballast An example of high-power phase shift modulated system A new MOSFET resonant inverter drive scheme A single-control, wide-range wave oscillator The design of Switching Power Supplies has become one of the most crucial aspects of power electronics, particularly in the explosive market for portable devices. Unfortunately, this seemingly simple mechanism is actually one of the most complex and under-estimated processes in Power Electronics. Switching power conversion involves several engineering disciplines: Semiconductor Physics, Thermal Management, Control Loop theory, Magnetics etc, and all these come into play eventually, in ways hard for non-experts to grasp.

This book grows out of decades of the author's experience designing commercial power supplies. Although his formal education was in physics, he learned the hard way what it took to succeed in designing power supplies for companies like Siemens and National Semiconductor. His passion for power supplies and his empathy for the practicing or aspiring power conversion engineer is evident on every page.

- \* The most comprehensive study available of the theoretical and practical aspects of controlling and measuring Electromagnetic Interference in switching power supplies, including input filter instability considerations.
- \* Step-by-step and iterative approach for calculating high-frequency losses in forward converter transformers, including Proximity losses based on Dowell's equations.
- \* Thorough, yet uniquely simple design flow-chart for building DC-DC converters and their magnetic components under typical wide-input supply conditions
- \* Step-by-step, solved examples for stabilizing control loops of all three major topologies, using either transconductance or conventional operational amplifiers, and either current-mode or voltage-mode control. A contemporary evaluation of switching power design methods with real world applications
- Written by a leading author renowned in his field
- Focuses on switching power supply design, manufacture and debugging
- Switching power supplies have relevance for contemporary applications including mobile phone chargers, laptops and PCs
- Based on the authors' successful "Switching Power Optimized Design 2nd Edition" (in Chinese)
- Highly illustrated with design examples of real world applications

Practical Design of Power Supplies

"In a rare and very welcome departure from the power industry's standard technical treatise, Ron Lenk's book . . . offers a clear, pragmatic view of the practical real-world aspects governing power supply design . . . Engineers at all levels . . . can expect to gain an enlightened perspective normally gained only after years of design experience." --Frank Wahl, Managing Editor, PCIM Magazine

"This is a real hands-on reference in which Ron has done an outstanding job of combining just enough

theory for understanding, together with several lifetimes' worth of experience. I am confident that it is destined to become dog-eared and worn on the top of every power supply designer's desk." --Bob Mammano, Vice President Advanced Technology, Unitrode

**Practical Design of Power Supplies** details key techniques and offers advice to engineers and technicians who want to design and build power supplies that work the first time they are turned on. Leading authority Ron Lenk presents current, experiment-based information that can save hours of research and design time. Containing many handy "Practice Notes" and real-world examples, **Practical Design of Power Supplies** is an excellent how-to reference to keep by your side throughout the design, lab, and production phases. The topics covered will be immediately useful in everyday circuits and systems work:

- \* Common terms and instrumentation
- \* How to design successful magnetics
- \* How to compensate the feedback loop to obtain stable operation
- \* Practical EMI
- \* Topology selection
- \* Worst-case analysis

**Practical Design of Power Supplies** will be especially useful to designers who need to understand and implement the concepts behind loop compensation and magnetics design.

- \* Describes the operation of each circuit in detail
- \* Examines a wide selection of external components that modify the IC package characteristics
- \* Provides hands-on, essential information for designing a switching power supply

**Simplified Design of Switching Power Supplies** is an all-inclusive, one-stop guide to switching power-supply design. Step-by-step instructions and diagrams render this book essential for the student and the experimenter, as well as the design professional. **Simplified Design of Switching Power Supplies** concentrates on the use of IC regulators. All popular forms of switching supplies, including DC-DC converters, inverters, buck, boost, buck-boost, pulse frequency modulation, pulse width modulation, current-mode control and pulse skipping, are described in detail. The design examples may be put to immediate use or may be modified to meet a specific design goal. As an instructional text for those unfamiliar with switching

supplies, or as a reference for those in need of a refresher, this unique book is essential for those involved in switching power-supply design. Voltage Regulator Circuit Manual highlights the techniques in DC regulator design. This book contains seven chapters that cover different circuit types, from the simple incorporation of silicon chips to the complex IC manufacturing. After providing an overview of the changes in power supply design, this book goes on discussing the various circuit configurations applicable to linear IC voltage regulators and switching regulator designs. The following chapters contain schematic diagrams of a general assortment of regulators. In these chapters, the circuits are based on three-terminal, linear regulator ICs that offer simplicity of design, low cost, minimal circuit complexity, and relatively fast construction times. A chapter focuses on a wide assortment of regulators that fall into the general category of “switchers”, which is a very broad class of circuit that encompasses several highly different configurations. The discussion then shifts to the switching power-supply circuits that fall into the category of flyback regulators, also known as ringing choke regulators. The last chapters deal with DC regulators that perform true value voltage conversions and their distinct characteristics. These chapters also include circuits that did not exactly fit the other circuit categories, such as battery chargers and motor controllers. Technicians and electronic engineers and designers who are interested in electronic design will find this book beneficial. This comprehensive book focuses on DC–DC switching power supply circuits, which are receiving attention as a key technology in green IT, especially in the automotive and consumer electronics industries. It covers buck converters, isolated converters, PFC converters, their modeling and analysis, several control methods, passive components, and their several recent applications (on-chip power supplies, DC–DC and AC–DC converter applications, single-inductor multi-output DC–DC converters, energy harvest applications, wireless power delivery, charge pump circuits, and



power amplifiers). The contents are well balanced as the authors are from both academia and industry and include pioneers and inventors of hysteretic PWM control. As we increasingly use electronic devices to direct our daily lives, so grows our dependence on reliable energy sources to power them. Because modern electronic systems demand steady, efficient, reliable DC voltage sources—often at a sub-1V level—commercial AC lines, batteries, and other common resources no longer suffice. New technologies also require intricate techniques to protect against natural and manmade disasters. Still, despite its importance, practical information on this critical subject remains hard to find. Using simple, accessible language to balance coverage of theoretical and practical aspects, *DC Power Supplies, Power Management and Surge Protection* details the essentials of power electronics circuits applicable to low-power systems, including modern portable devices. A summary of underlying principles and essential design points, it compares academic research and industry publications and reviews DC power supply fundamentals, including linear and low-dropout regulators. Content also addresses common switching regulator topologies, exploring resonant conversion approaches. Coverage includes other important topics such as: Control aspects and control theory Digital control and control ICs used in switching regulators Power management and energy efficiency Overall power conversion stage and basic protection strategies for higher reliability Battery management and comparison of battery chemistries and charge/discharge management Surge and transient protection of circuits designed with modern semiconductors based on submicron dimension transistors This specialized design resource explores applicable fundamental elements of power sources, with numerous cited references and discussion of commercial components and manufacturers. Regardless of their previous experience level, this information will greatly aid designers, researchers, and academics who, study, design, and produce the viable new power sources needed to propel our modern electronic world. CRC Press

Authors Speak Nihal Kularatna introduces his book. Watch the video The World's #1 Guide to Power Supply Design Now Updated! Recognized worldwide as the definitive guide to power supply design for over 25 years, Switching Power Supply Design has been updated to cover the latest innovations in technology, materials, and components. This Third Edition presents the basic principles of the most commonly used topologies, providing you with the essential information required to design cutting-edge power supplies. Using a tutorial, how-and-why approach, this expert resource is filled with design examples, equations, and charts. The Third Edition of Switching Power Supply Design features:

- Designs for many of the most useful switching power supply topologies
- The core principles required to solve day-to-day design problems
- A strong focus on the essential basics of transformer and magnetics design
- New to this edition: a full chapter on choke design and optimum drive conditions for modern fast IGBTs

Get Everything You Need to Design a Complete Switching Power Supply:

- Fundamental Switching Regulators
- \* Push-Pull and Forward Converter Topologies
- \* Half- and Full-Bridge Converter Topologies
- \* Flyback Converter Topologies
- \* Current-Mode and Current-Fed Topologies
- \* Miscellaneous Topologies
- \* Transformer and Magnetics Design
- \* High-Frequency Choke Design
- \* Optimum Drive Conditions for Bipolar Power Transistors, MOSFETs, Power Transistors, and IGBTs
- \* Drive Circuits for Magnetic Amplifiers
- \* Postregulators
- \* Turn-on, Turn-off Switching Losses and Low Loss Snubbers
- \* Feedback-Loop Stabilization
- \* Resonant Converter Waveforms
- \* Power Factor and Power Factor Correction
- \* High-Frequency Power Sources for Fluorescent Lamps, and Low-Input-Voltage Regulators for Laptop Computers and Portable Equipment

Newnes has worked with Marty Brown, a leader in the field of power design to select the very best design-specific material from the Newnes portfolio. Marty selected material for its timelessness, its relevance to current power supply design needs, and its real-world approach to design issues. Special

attention is given to switching power supplies and their design issues, including component selection, minimization of EMI, toroid selection, and breadboarding of designs. Emphasis is also placed on design strategies for power supplies, including case histories and design examples. This is a book that belongs on the workbench of every power supply designer! \*Marty Brown, author and power supply design consultant, has personally selected all content for its relevance and usefulness \*Covers best design practices for switching power supplies and power converters \*Emphasis is on pragmatic solutions to commonly encountered design problems and tasks

**Power Supply Cookbook, Second Edition** provides an easy-to-follow, step-by-step design framework for a wide variety of power supplies. With this book, anyone with a basic knowledge of electronics can create a very complicated power supply design in less than one day. With the common industry design approaches presented in each section, this unique book allows the reader to design linear, switching, and quasi-resonant switching power supplies in an organized fashion. Formerly complicated design topics such as magnetics, feedback loop compensation design, and EMI/RFI control are all described in simple language and design steps. This book also details easy-to-modify design examples that provide the reader with a design template useful for creating a variety of power supplies. This newly revised edition is a practical, "start-to-finish" design reference. It is organized to allow both seasoned and inexperienced engineers to quickly find and apply the information they need. Features of the new edition include updated information on the design of the output stages, selecting the controller IC, and other functions associated with power supplies, such as: switching power supply control, synchronization of the power supply to an external source, input low voltage inhibitors, loss of power signals, output voltage shut-down, major current loops, and paralleling filter capacitors. It also offers coverage of waveshaping techniques, major loss reduction techniques, snubbers, and quasi-resonant

converters. Guides engineers through a step-by-step design framework for a wide variety of power supplies, many of which can be designed in less than one day Provides easy-to-understand information about often complicated topics, making power supply design a much more accessible and enjoyable process

Chapter 1: The Principles of Switching Power Conversion Chapter 2: DC-DC Converter Design and Magnetics Chapter 3: Off-line Converter Design and Magnetics Chapter 4: The Topology FAQ Chapter 5: Optimal Core Selection Chapter 6: Component Ratings, Stresses, Reliability and Life Chapter 7: Optimal Power Components Selection Chapter 8: Conduction and Switching Losses Chapter 9: Discovering New Topologies Chapter 10: Printed Circuit Board Layout Chapter 11: Thermal Management Chapter 12: Feedback Loop Analysis and Stability Chapter 13: Paralleling, Interleaving and Sharing Chapter 14: The Front-End of AC-DC Power Supplies Chapter 15: DM and CM Noise in Switching Power Supplies Chapter 16: Fixing EMI across the Board Chapter 17: Input Capacitor and Stability Chapter 18: The Math behind the Electromagnetic Puzzle Chapter 19: Solved Examples Appendix A. Power Supply Cookbook, Second Edition provides an easy-to-follow, step-by-step design framework for a wide variety of power supplies. With this book, anyone with a basic knowledge of electronics can create a very complicated power supply design in less than one day. With the common industry design approaches presented in each section, this unique book allows the reader to design linear, switching, and quasi-resonant switching power supplies in an organized fashion. Formerly complicated design topics such as magnetics, feedback loop compensation design, and EMI/RFI control are all described in simple language and design steps. This book also details easy-to-modify design examples that provide the reader with a design template useful for creating a variety of power supplies. This newly revised edition is a practical, "start-to-finish" design reference. It is organized to allow both seasoned and inexperienced engineers to quickly find and apply the

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pleasure to read, and her advice can be widely applied to relationships in all areas of readers' lives. Ideal for anyone new to the job market or new to management, or anyone hoping to improve their work experience."—Library Journal (starred review) "I am a huge fan of Alison Green's Ask a Manager column. This book is even better. It teaches us how to deal with many of the most vexing big and little problems in our workplaces—and to do so with grace, confidence, and a sense of humor."—Robert Sutton, Stanford professor and author of *The No Asshole Rule* and *The Asshole Survival Guide* "Ask a Manager is the ultimate playbook for navigating the traditional workforce in a diplomatic but firm way."—Erin Lowry, author of *Broke Millennial: Stop Scraping By and Get Your Financial Life Together*

Some power electronic converters are specifically designed to power equipment under a smoothed DC voltage. Therefore, the filtering part necessarily involves the use of auxiliary passive components (inductors and capacitors). This book deals with technical aspects such as classical separation between isolated and non-isolated power supplies, and soft switching through a special converter. It addresses the problem of regulating the output voltage of the switching power supplies in terms of modeling and obtaining transfer of SMPS functions. *Power Electronics for Industry and Transport, Volume 3*, offers a case study of an isolated flyback power which the complete design is presented: the active and passive components are sized based on the specifications initially set. Particular attention is given to the converter output capacitors and all the surrounding organs. Introducing Essential notions in power electronics from both the theoretical and technological perspectives Detailed chapters with a focus on switch-mode power supplies, another key area in which power electronics is used is in the supply of energy to a variety of electronic equipment for signal and information processing Presented from a user's perspective to enable you to apply the theory of power electronics to practical applications