

B. Jayant Baliga



# Advanced Power MOSFET Concepts

 Springer

# Advanced Power Mosfet Concepts

**B. Jayant Baliga**



## **Advanced Power Mosfet Concepts:**

**Advanced Power MOSFET Concepts** B. Jayant Baliga, 2010-06-26 During the last decade many new concepts have been proposed for improving the performance of power MOSFETs. The results of this research are dispersed in the technical literature among journal articles and abstracts of conferences. Consequently the information is not readily available to researchers and practicing engineers in the power device community. There is no cohesive treatment of the ideas to provide an assessment of the relative merits of the ideas. Advanced Power MOSFET Concepts provides an in depth treatment of the physics of operation of advanced power MOSFETs. Analytical models for explaining the operation of all the advanced power MOSFETs will be developed. The results of numerical simulations will be provided to give additional insight into the device physics and validate the analytical models. The results of two dimensional simulations will be provided to corroborate the analytical models and give greater insight into the device operation.

## **Fundamentals of Power Semiconductor Devices**

B. Jayant Baliga, 2018-09-28 Fundamentals of Power Semiconductor Devices provides an in depth treatment of the physics of operation of power semiconductor devices that are commonly used by the power electronics industry. Analytical models for explaining the operation of all power semiconductor devices are shown. The treatment here focuses on silicon devices but includes the unique attributes and design requirements for emerging silicon carbide devices. The book will appeal to practicing engineers in the power semiconductor device community.

## **Silicon Carbide Power Devices** Yuan Gao, Yan

Zhang, 2025-10-02 This book provides comprehensive technical information on SiC power devices from multiple perspectives covering topics from device research and development to system applications. Chapters 1 to 4 focus on the characteristics of SiC devices initially outlining the limitations of Si power devices and explaining why SiC has superior properties at the material level. It then offers updates on the latest developments in the SiC industry chain and products innovations along with a detailed discussion of the characteristics and specifications of SiC Diodes and MOSFETs. Chapters 5 and 6 zoom in on SiC device testing and evaluation techniques including CP testing, FT testing, system application testing, reliability assessment, failure analysis and double pulse testing. Chapters 7 to 12 focus on SiC device application technology addressing common challenges in real applications and providing solutions. This includes voltage spikes during turn off, crosstalk, common mode current, common source inductance and driver circuits concluding with case studies of SiC device applications in various scenarios. The book can serve as a textbook for higher education and vocational training as well as a reference material for engineers in the power semiconductor and electrical electronics industries. To make the book genuinely helpful for readers the authors have invested significant effort in content and data selection. First the chosen technical points come from real world requirements in device R D and applications. Second the book emphasizes practicality while integrating cutting edge developments detailing research outcomes with industrial potential. Third the book offers a wealth of data and waveforms most of which are actual measurements to bridge the gap between theory and practice. Lastly extensive further reading

materials are provided at the end of each chapter for broader and deeper exploration

**The IGBT Device** B. Jayant Baliga, 2022-11-25 The IGBT Device Physics Design and Applications of the Insulated Gate Bipolar Transistor Second Edition provides the essential information needed by applications engineers to design new products using the device in sectors including consumer industrial lighting transportation medical and renewable energy The IGBT device has proven to be a highly important Power Semiconductor providing the basis for adjustable speed motor drives used in air conditioning and refrigeration and railway locomotives electronic ignition systems for gasoline powered motor vehicles and energy saving compact fluorescent light bulbs The book presents recent applications in plasma displays flat screen TVs and electric power transmission systems alternative energy systems and energy storage but it is also used in all renewable energy generation systems including solar and wind power This book is the first available on the applications of the IGBT It will unlock IGBT for a new generation of engineering applications making it essential reading for a wide audience of electrical and design engineers as well as an important publication for semiconductor specialists Presents essential design information for applications engineers utilizing IGBTs in the consumer industrial lighting transportation medical and renewable energy sectors Teaches the methodology for the design of IGBT chips including edge terminations cell topologies gate layouts and integrated current sensors Covers applications of the IGBT a device manufactured around the world by more than a dozen companies with sales exceeding 5 Billion Written by the inventor of the device this is the first book to highlight the key role of the IGBT in enabling electric vehicles and renewable energy systems with global impacts on climate change

**Modern Power Electronics** Bimal K. Bose, 1992 Provides the latest techniques and energy saving applications for working with power semiconductor devices ac dc converters ac ac converters dc dc converters dc ac converters PWM methods and converter applications This book starts with a very comprehensive tutorial section which reviews state of the art power electronics technology integrating power semiconductor devices different classes of converter topologies PWM techniques and key power electronics applications

**Power MOSFET Design** B. E. Taylor, 1993-05-24 Concentrates on the actual design philosophy covering the driving and behavior of these devices Topics include the driving and protection of all MOSFET structures from conventional to current sensing devices and those with in built conductivity modulation Avoids the use of complex mathematics and minimizes the number of equations

*Machine Design*, 1984 *Power Electronics Design Handbook* Nihal Kularatna, 1998 Power Electronics Design Handbook covers the basics of power electronics theory and components while emphasizing modern low power components and applications Coverage includes power semiconductors converters power supplies batteries protection systems and power ICs One of the unique features of the Power Electronics Design Handbook is the integration of component and system theory with practical applications particularly energy saving low power applications Many chapters also include a section that looks forward to future developments in that area References for further information or more in depth technical reading are also included Nihal Kularatna is a principal

research engineer with the Arthur C Clarke Foundation in Sri Lanka He is also the author of Modern Electronic Test and Measuring Instruments published by the Institute of Electrical Engineers Emphasizes low and medium power components Offers a unique mix of theory and practical application Provides a useful guide to further reading      **Modern Power Devices** B. Jayant Baliga,1987-03-10 Written in a tutorial form the text supplies in depth the physics design and fabrication technology for power devices Each chapter includes a discussion of the basic concepts of device operation and their electrical characteristics a detailed analysis of the device physics and the technology of fabrication Extensive analytical solutions are used to enable the reader to obtain an understanding of the physics      **Northcon/94** ,1994      **EDN** ,2008      *Insulated Gate Bipolar Transistor IGBT Theory and Design* Vinod Kumar Khanna,2003 Table of contents      **Conference Record** ,1994 **Proceedings** ,1985      *Conference Record, Industry Applications Society, IEEE-IAS Annual Meeting (1981)* IEEE Industry Applications Society,1995      International Aerospace Abstracts ,1991      **ESD** ,1988      *Digest* ,2003 *Conference Digest* ,2003      **IECON' 90** IEEE Industrial Electronics Society,1990

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