

The IGBT Device Physics Design And Applications Of The Insulated Gate Bipolar Transistor

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The IGBT device has proved 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 gasolinepowered motor vehicles and energy-saving compact fluorescent light bulbs.

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The IGBT Device - 1st Edition

The IGBT Device: Physics, Design and Applications of the Insulated Gate Bipolar Transistor. The IGBT Device. : B. Jayant Baliga. William Andrew, Mar 6, 2015 - Technology & Engineering - 732 pages....

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electrical engineering field.

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A. Nakagawa et al. invented the device design concept of non-latch-up IGBTs in 1984. The invention is characterized by the device design setting the device saturation current below the latch-up current, which triggers the parasitic thyristor. This invention realized complete suppression of the parasitic thyristor action, for the first time, because the maximal collector current was limited by the saturation current and never exceeded the latch-up current.

Insulated-gate bipolar transistor - Wikipedia

Practical insulated gate bipolar transistor (IGBT) devices have a finite size with a well-defined active area where the current flow occurs, an edge termination region surrounding the active area, and pads for locating the wires to carry current into and out of the chip. The design of the active area is related to the on-state current density.

The IGBT Device | ScienceDirect

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Insulated Gate Bipolar Transistor IGBT Theory And Design

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The Insulated Gate Bipolar Transistor (IGBT) is a minority-carrier device with high input impedance and large bipolar current-carrying capability. Many designers view IGBT as a device with MOS input characteristics and bipolar output characteristic that is a voltage-controlled bipolar device.

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Insulated Gate Bipolar Transistor (IGBT) Basics

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Insulated Gate Bipolar Transistor IGBT Theory and Design. A comprehensive and "state-of-the-art" coverage of the design and fabrication of IGBT. Explains the fundamentals of MOS and bipolar...

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A comprehensive and "state-of-the-art" coverage of the design and fabrication of IGBT. All-in-one resource Explains the fundamentals of MOS and bipolar physics. Covers IGBT operation, device and process design, power modules, and new IGBT structures.

Wide Bandgap Semiconductor Power Devices: Materials, Physics, Design and Applications provides readers with a single resource on why

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these devices are superior to existing silicon devices. The book lays the groundwork for an understanding of an array of applications and anticipated benefits in energy savings. Authored by the Founder of the Power Semiconductor Research Center at North Carolina State University (and creator of the IGBT device), Dr. B. Jayant Baliga is one of the highest regarded experts in the field. He thus leads this team who comprehensively review the materials, device physics, design considerations and relevant applications discussed. Comprehensively covers power electronic devices, including materials (both gallium nitride and silicon carbide), physics, design considerations, and the most promising applications Addresses the key challenges towards the realization of wide bandgap power electronic devices, including materials defects, performance and reliability Provides the benefits of wide bandgap semiconductors, including opportunities for cost reduction and social impact

Power devices are key to modern power systems, performing functions such as inverting and changing voltages, buffering and switching. Following a device-centric approach, this book covers power electronic applications, semiconductor physics, materials science, application engineering, and key technologies such as MOSFET, IGBT and WBG.

The growth of power electronics, centering on inverters and converters as its key system topology, has accelerated recently due to the demand for efficient power conversion. This growth has also been backed up by several evolutionary changes and breakthroughs achieved in the areas of power semiconductor device physics, process technology, and design. However, as power semiconductor technology remains a highly specialized subject, the literature on further research, development, and design in related fields is not adequate. With this in view, two specialists of power semiconductors, well known for their research and contributions to the field, compiled this book as a review volume focusing on power chip and module technologies. The prime purpose is to help researchers, academia, and engineers, engaged in areas related to power devices and power electronics, better understand the evolutionary growth of major power device components, their operating principles, design aspects, application features, and trends. The book is filled with unique topics related to power semiconductors, including tips on state-of-the-art and futuristic-oriented applications. Numerous diagrams, illustrations, and graphics are included to adequately support the content and to make the book extremely attractive as a practical and user-friendly reference book for researchers, technologists, and engineers, as well as a textbook for advanced graduate-level and postgraduate students.

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.

The aim of this book is to provide an overview of the various types of power semiconductor devices, to give an insight into how they function, and to explain and analyze the characteristics of the various components. All the important classes of power semiconductors are

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covered. Of particular interest, the author takes into account the role of plasma formation in the operation of highpower semiconductor devices.

During the last 30 years, significant progress has been made to improve our understanding of gallium nitride and silicon carbide device structures, resulting in experimental demonstration of their enhanced performances for power electronic systems. Gallium nitride power devices made by the growth of the material on silicon substrates have gained a lot of interest. Power device products made from these materials have become available during the last five years from many companies. This comprehensive book discusses the physics of operation and design of gallium nitride and silicon carbide power devices. It can be used as a reference by practicing engineers in the power electronics industry and as a textbook for a power device or power electronics course in universities. Request Inspection Copy

Power semiconductor devices are widely used for the control and management of electrical energy. The improving performance of power devices has enabled cost reductions and efficiency increases resulting in lower fossil fuel usage and less environmental pollution. This book provides the first cohesive treatment of the physics and design of silicon carbide power devices with an emphasis on unipolar structures. It uses the results of extensive numerical simulations to elucidate the operating principles of these important devices.

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