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| Autore | Baliga B. Jayant |
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| Descrizione fisica | 1 online resource (XXXII, 1086 p. 838 illus., 559 illus. in color.) |
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| Soggetti | Electronic circuits<br>Electronics<br>Microelectronics<br>Circuits and Systems<br>Electronic Circuits and Devices<br>Electronics and Microelectronics, Instrumentation |
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| Nota di contenuto | Introduction -- Material Properties and Transport Physics -- Breakdown Voltage -- Schottky Rectifiers -- P-i-N Rectifiers -- Power MOSFETs -- Bipolar Junction Transistors -- Thyristors -- Insulated Gate Bipolar Thyristors -- Synopsis. |
| Sommario/riassunto | This textbook provides an in-depth treatment of the physics of power semiconductor devices that are commonly used by the power electronics industry. Drawing upon decades of industry and teaching experience and using numerous examples and illustrative applications, the author discusses in detail the various device performance attributes that allow practicing engineers to develop energy-efficient products. Coverage includes all types of power rectifiers and transistors and analytical models for explaining the operation of all power semiconductor devices are developed and demonstrated in each section of the book. Throughout the book, emphasis is placed on deriving simple analytical expressions that describe the underlying physics and enable representation of the device electrical characteristics. This treatment is invaluable for teaching a course on power devices because it allows the operating principles and concepts to be conveyed with |

quantitative analysis. The treatment focuses on silicon devices but includes the unique attributes and design requirements for emerging silicon carbide devices. This new edition also includes a chapter on the impact of power semiconductor devices on energy savings and reduction of carbon emissions. Provides comprehensive textbook for courses on physics of power semiconductor devices; Includes extensive analytical formulations for design and analysis of device structures; Uses numerical simulation examples in every section to elucidate the operating physics and validate the models; Analyzes device performance attributes that enable development of real, energy-efficient products; Includes numerous exercises in each chapter to reinforce concepts introduced; Includes a chapter on the impact of power semiconductor devices on energy savings and reduction of carbon emissions.