

Basic Electronics

V-I CHARACTERISTICS OF SILICON AND GERMANIUM

FORWARD CHARACTERISTICS

Ge

- A very small forward current flows until the forward voltage exceeds 0.3V
- When the forward voltage exceeds 0.3V, the current increases rapidly.



REVERSE CHARACTERISTICS

- When the applied reverse voltage is below the breakdown voltage, the diode current is very small, typically around 2mA (which is lower than the reverse current for a silicon diode).
- When the reverse voltage exceeds breakdown voltage (around 50V) the current ↑ very rapidly.
- Reverse breakdown voltage for Ge is less than that of Si from the characteristic $|I_r| \gg |I_s|$.

V-I Characteristics of Ge

FORWARD CHARACTERISTICS

Si

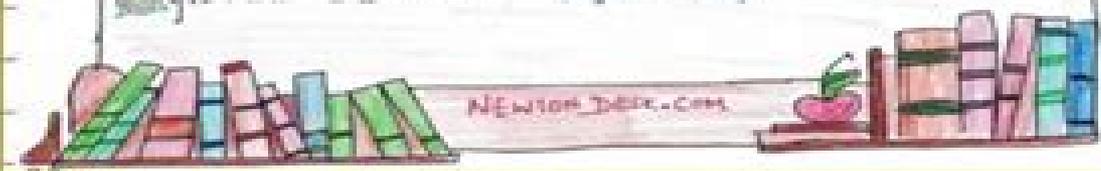
- A very small forward current flows until the forward voltage exceeds 0.7V
- When the forward voltage exceeds 0.7V, the current increases rapidly.



REVERSE CHARACTERISTICS

- When the applied voltage below the breakdown voltage, the diode current is very small (around 100 nA)
- When the reverse voltage is exceeds breakdown voltage (around 70V) the current increases very rapidly.
- from the characteristic $|I_r| \gg |I_s|$

V-I Characteristics of Si



Industrial Electronics Lecture Notes

Bogdan M. Wilamowski, J. David Irwin



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LECTURE NOTES ON POWER ELECTRONICS Amit Bhattacharyya, 2015-12-04 Power Electronics is a field which combines Power electric power Electronics and Control systems Power engineering deals with the static and rotating power equipment for the generation transmission and distribution of electric power Electronics deals with the study of solid state semiconductor power devices and circuits for Power conversion to meet the desired control objectives to control the output voltage and output power Power electronics may be defined as the subject of applications of solid state power semiconductor devices Thyristors for the control and conversion of electric power Power electronics deals with the study and design of Thyristorised power controllers for a variety of applications like Heat control Light Illumination control Motor control AC DC motor drives used in industries High voltage power supplies Vehicle propulsion systems and High voltage direct current HVDC transmission

Power Electronics Handbook Muhammad H. Rashid, 2010-07-19 Power electronics which is a rapidly growing area in terms of research and applications uses modern electronics technology to convert electric power from one form to another such as ac dc dc dc dc ac and ac ac with a variable output magnitude and frequency Power electronics has many applications in our every day life such as air conditioners electric cars sub way trains motor drives renewable energy sources and power supplies for computers This book covers all aspects of switching devices converter circuit topologies control techniques analytical methods and some examples of their applications 25% new content Reorganized and revised into 8 sections comprising 43 chapters Coverage of numerous applications including uninterruptable power supplies and automotive electrical systems New content in power generation and distribution including solar power fuel cells wind turbines and flexible transmission

Fundamentals of Industrial Electronics Bogdan M. Wilamowski, J. David Irwin, 2018-10-03 The Industrial Electronics Handbook Second Edition combines traditional and newer more specialized knowledge that will help industrial electronics engineers develop practical solutions for the design and implementation of high power applications Embracing the broad technological scope of the field this collection explores fundamental areas including analog and digital circuits electronics electromagnetic machines signal processing and industrial control and communications systems It also facilitates the use of intelligent systems such as neural networks fuzzy systems and evolutionary methods in terms of a hierarchical structure that makes factory control and supervision more efficient by addressing the needs of all production components Enhancing its value this fully updated collection presents research and global trends as published in the IEEE Transactions on Industrial Electronics Journal one of the largest and most respected publications in the field Fundamentals of Industrial Electronics covers the essential areas that form the basis for the field This volume presents the basic knowledge that can be applied to the other sections of the handbook Topics covered include Circuits and signals Devices Digital circuits Digital and analog signal processing Electromagnetics Other volumes in the set Power Electronics and Motor Drives Control and Mechatronics Industrial Communication Systems

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various basic principles with applications from domestic to industrial the learner will have the feeling of this field Basic principles are explained without the use of complex mathematics and further understanding can be sought via dedicated computer animations Consolidated with several experiments it is very helpful for beginners and useful as a first practical course on power electronics for technical colleges and corporate in house training *Electronics for Industrial Design* M. Hajian, Delft University of Technology, Faculty of Industrial Design Engineering. Product Engineering Group, 2012

Industrial Electronics Colin David Simpson, 1996 Industrial Electronics provides a clearly written comprehensive treatment of topics in industrial electronics offering valuable information on state of the art equipment and control techniques used in the industry Broad in scope its unparalleled coverage spans all important areas in industrial electronics and supports concepts discussed mathematically where required The book was written for both two and four year programs in industrial electronics electronics or electrical technology readers will find its coverage of topics complete and will refer to this book again and again as a most valuable resource *Control of Power Inverters in Renewable Energy and Smart Grid Integration* Qing-Chang Zhong, Tomas Hornik, 2012-11-16 Integrating renewable energy and other distributed energy sources into smart grids often via power inverters is arguably the largest new frontier for smart grid advancements Inverters should be controlled properly so that their integration does not jeopardize the stability and performance of power systems and a solid technical backbone is formed to facilitate other functions and services of smart grids This unique reference offers systematic treatment of important control problems in power inverters and different general converter theories Starting at a basic level it presents conventional power conversion methodologies and then non conventional methods with a highly accessible summary of the latest developments in power inverters as well as insight into the grid connection of renewable power Consisting of four parts Power Quality Control Neutral Line Provision Power Flow Control and Synchronisation this book fully demonstrates the integration of control and power electronics Key features include the fundamentals of power processing and hardware design innovative control strategies to systematically treat the control of power inverters extensive experimental results for most of the control strategies presented the pioneering work on synchronverters which has gained IET Highly Commended Innovation Award Engineers working on inverter design and those at power system utilities can learn how advanced control strategies could improve system performance and work in practice The book is a useful reference for researchers who are interested in the area of control engineering power electronics renewable energy and distributed generation smart grids flexible AC transmission systems and power systems for more electric aircraft and all electric ships This is also a handy text for graduate students and university professors in the areas of electrical power engineering advanced control engineering power electronics renewable energy and smart grid integration *Electronics* M. Hajian, Delft University of Technology, Faculty of Industrial Design Engineering. Product Engineering Group, 2011

Industrial Electronics ,1968 *Power Electronics* V. R. Moorthi, 2005 The book provides an exhaustive coverage of

various power electronic devices and other related topics in a student friendly manner The text is supported by a large number of examples and review exercises to test the understanding of fundamental concepts *College of Engineering* Cornell University. College of Engineering,1955 **Research and Development in Electrical Sciences** Indian Institute of Science,1984 **General Catalog** Georgia Institute of Technology,1954 **Proceedings of the ... International Conference on Power Electronics, Drives and Energy Systems for Industrial Growth** ,1996 **Electronic Engineering** ,1974 Power Electronic Circuits Issa Batarseh,2004 Power electronic circuits for modern industrial applications Offering a remarkable variety of exercises examples and problems including design oriented problems Issa Batarseh s POWER ELECTRONIC CIRCUITS will help you develop the skills and knowledge you need to analyze and design power electronic circuits for modern industrial applications Batarseh presents detailed explanations of circuit operations clear discussions of the theory behind power electronic circuits and an effective problem solving approach The text first prepares you with necessary background material on devices switching circuit analysis techniques and converter types and methods of conversion and then covers high frequency non isolated dc to dc converters isolated dc to dc converters and resonant soft switching converters The final chapters address traditional diode and SCR converters and dc ac inverters Highlights Each chapter features at least 10 exercises which will help you understand basic concepts equations and circuit operations Throughout the text more than 250 problems of varying levels of difficulty give you the opportunity to use what you ve learned Special design problems highlighted with a D offer open ended opportunities to apply design techniques Solved examples help you refine your problem solving skills Introductory material on devices switching circuit analysis techniques and converter types provides the background you need to understand power electronics concepts Features detailed discussion on resonant and soft switching dc to dc converters Provides a simplified discussion of Pulse Wide Modulation PWM Technique A Web site is provided with detailed lecture notes and practice quizzes

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