

IRE Standards on Solid-State Devices: Definitions of Semiconductor Terms, 1960*

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D. C. Dickson

B. Jacobs
J. D. Johnson
A. C. Sheckler

R. P. Lyons
R. H. Rediker

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S. K. Ghandi

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B. J. Rothlein

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E. Weber
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W. T. Wintringham

Definitions Coordinator

C. H. PAGE

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Acceptor (in a Semiconductor). See *Impurity, Acceptor*.

Anode Terminal (of a Semiconductor Diode). The terminal which is positive with respect to the other terminal when the diode is biased in the forward direction.

Avalanche Breakdown (of a Semiconductor Device). A breakdown that is caused by the cumulative multiplication of charge carriers through field-induced impact ionization.

Avalanche Impedance. Obsolete, see *Breakdown Impedance*.

Base (of a Transistor). A region which lies between an emitter and a collector of a transistor and into which minority carriers are injected.

Boundary, P-N. A surface in the transition region between P-type and N-type material at which the donor and acceptor concentrations are equal.

Breakdown (of a Semiconductor Diode). A phenomenon occurring in a reverse biased semiconductor diode, the initiation of which is observed as a transition from a region of high dynamic resistance to a region of substantially lower dynamic resistance for increasing magnitude of reverse current.

Breakdown Impedance (of a Semiconductor Diode). The small-signal impedance at a specified direct current in the breakdown region.

Breakdown Region (of a Semiconductor-Diode Characteristic). That entire region of the volt-ampere characteristic beyond the initiation of breakdown for increasing magnitude of reverse current.

Breakdown Voltage (of a Semiconductor Diode). The voltage measured at a specified current in the breakdown region.

Capacitance (of a Semiconductor Diode). The small-signal capacitance measured between the terminals of the diode under specified conditions of bias and frequency.

Cathode Terminal (of a Semiconductor Diode). The terminal which is negative with respect to the other terminal when the diode is biased in the forward direction.

Charge Carrier (of a Semiconductor). A mobile conduction electron or mobile hole.

Collector (of a Transistor). A region through which a primary flow of charge carriers leaves the base.

Conduction Band. A range of states in the energy spectrum of a solid in which electrons can move freely.

Conductivity Modulation (of a Semiconductor). The variation of the conductivity of a semiconductor by variation of the charge-carrier concentration.

Conductivity, N-Type. The conductivity associated with conduction electrons in a semiconductor.

Conductivity, P-Type. The conductivity associated with holes in a semiconductor.

Contact, High Recombination Rate. A semiconductor-semiconductor or metal-semiconductor contact at which thermal equilibrium charge-carrier concentrations are maintained substantially independent of current density.

Depletion Layer (in a Semiconductor). A region in which the charge-carrier charge density is insufficient to neutralize the net fixed charge density of donors and acceptors.

Diffusion Capacitance (of a Semiconductor Junction). The rate of change of stored minority-carrier charge with the voltage across the junction.

Diffusion Constant, Charge Carrier. In a homogeneous semiconductor, the magnitude of the quotient of diffusion current density by the charge-carrier charge concentration gradient.

Diffusion Length, Charge-Carrier. In a homogeneous semiconductor, the average distance to which minority carriers diffuse between generation and recombination.

Note: The diffusion length is equal to the square root of the product of the charge-carrier diffusion constant and the volume lifetime.

Diode, Semiconductor. A semiconductor device having two terminals and exhibiting a nonlinear voltage-current characteristic; in more restricted usage, a semiconductor device which has the asymmetrical voltage-current characteristic exemplified by a single p-n junction.

Donor (in a Semiconductor). See *Impurity Donor*.

Doping. Addition of an impurity to a semiconductor, or production of a deviation from stoichiometric composition, to achieve a desired characteristic.

Drift Mobility (in a Homogeneous Semiconductor). The ensemble average of the drift velocities of the charge carriers per unit electric field.

Note: In general, the mobilities of electrons and holes are different.

Electrode (of a Semiconductor Device). An electrical and mechanical contact to a region of a semiconductor device.

Electrons, Conduction. The electrons in the conduction band of a solid, which are free to move under the influence of an electric field.

Element (of a Semiconductor Device). Any integral part of the semiconductor device that contributes to its operation.