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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.

Emitter (of a Transistor). A region from which *charge carriers* that are *minority carriers* in the *base* are injected into the *base.*

Energy Gap (of a Semiconductor). The energy range between the bottom of the *conduction band* and the top of the *valence band.*

Extrinsic Properties (of a Semiconductor). The properties of a *semiconductor* as modified by *impurities* or *imperfections* within the crystal.

Forward Direction (of a Semiconductor Diode). The direction of lower resistance to the flow of steady direct current.

Generation Rate (in a Semiconductor). The time rate of creation of *electron-hole* pairs.

Hall Coefficient (of an Electrical Conductor). The constant of proportionality R in the relation

$$E_h = R[J \times B]$$

where

E_h = transverse electric field (Hall Field),
J = current density,
B = magnetic flux density.

Note: The sign of the *majority carrier* can be inferred from the sign of the Hall Coefficient.

Hole. A vacancy in the electronic band structure of a *semiconductor* which acts like a positive electronic charge with a positive mass.

Imperfection (of a Crystalline Solid). Any deviation in structure from that of a perfect crystal.

Impurity. An *imperfection* that is chemically foreign to the perfect crystal.

Impurity, Acceptor (in a Semiconductor). An *impurity* that may act as a source of mobile *holes.*

Impurity, Donor (in a Semiconductor). An *impurity* that may act as a source of *conduction electrons.*

Impurity, Stoichiometric. A crystalline *imperfection* arising from a deviation from stoichiometric composition.

Intrinsic Properties (of a Semiconductor). The properties of a *semiconductor* that are characteristic of the ideal crystal.

Intrinsic Temperature Range (in a Semiconductor). The temperature range in which the *charge-carrier* concentration of a *semiconductor* is substantially the same as that of an ideal crystal.

Junction (in a Semiconductor Device). A region of transition between *semiconductor* regions of different electrical properties (*e.g.*, *n-n+*, *p-n*, *p-p+* semiconductors), or between a metal and a *semiconductor.*

Junction, Collector (of a Transistor). A *junction* normally biased in the high-resistance direction, the current through which can be controlled by the introduction of *minority carriers.*

Junction, Emitter (of a Transistor). A *junction* normally biased in the low-resistance direction to inject *minority carriers* into a *base.*

Junction (Semiconductor), Diffused. A *junction* which has been formed by the diffusion of an *impurity* within a *semiconductor* crystal.

Junction (Semiconductor), Doped. A *junction* produced by the addition of an *impurity* to the melt during crystal growth.

Junction, Fused (or Alloy) (in a Semiconductor). A *junction* formed by recrystallization on a base crystal from a liquid phase of one or more components and the *semiconductor.*

Junction (Semiconductor) Grown. A *junction* produced during growth of a crystal from a melt.

Junction (Semiconductor), Rate-Grown. A *grown junction* produced by varying the rate of crystal growth.

Lifetime, Volume. The average time interval between the generation and recombination of *minority carriers* in a homogeneous *semiconductor.*

Majority Carrier (in a Semiconductor). The type of *charge carrier* constituting more than one half the total *charge-carrier* concentration.

Minority Carrier (in a Semiconductor). The type of *charge carrier* constituting less than one half the total *charge-carrier* concentration.

Mobility. See *Drift Mobility.*

Mobility, Hall (of an Electrical Conductor). The quantity μ_H in the relation $\mu_H = R\sigma$, where $R =$ *Hall Coefficient* and σ = conductivity.

Ohmic Contact. A purely resistive contact; *i.e.*, one which has a linear voltage-current characteristic throughout its entire operating range.

PIV (Peak Inverse Voltage). The maximum instantaneous anode-to-cathode voltage in the *reverse direction* which is actually applied to the diode in an operating circuit.

Note: This is an applications term not to be confused with *Breakdown Voltage* which is a property of the device.

PIV, Maximum Rated (of a Semiconductor Diode). The recommended maximum instantaneous anode-to-cathode voltage which may be applied in the *reverse direction*.

Point Contact. Pressure contact between a *semiconductor* body and a metallic point.

Recombination Velocity (on a Semiconductor Surface). The quotient of the normal component of the *electron* (*hole*) current density at the surface by the excess *electron* (*hole*) charge density at the surface.

Reverse Current (of a Semiconductor Diode). The total current flowing through a *semiconductor diode* in the *reverse direction.*

Reverse Direction (of a Semiconductor Diode). The direction of higher resistance to the flow of steady direct current.

Saturation Current (of a Semiconductor Diode). That portion of the steady-state *reverse-current* which flows as a result of the transport across the *junction* of *minority carriers* thermally generated within the regions adjacent to the *junction.*

Semiconductor. An electronic conductor with resistivity usually in the range between metals and insulators in which the electrical *charge-carrier* concentration increases with increasing temperature over some temperature range.

Semiconductor, Compensated. A *semiconductor* in which one type of *impurity* or *imperfection* (*e.g.*, *donor*) partially cancels the electrical effects of the other type of *impurity* or *imperfection* (*e.g.*, *acceptor*).

Semiconductor Device. An electron device in which the characteristic distinguishing electronic conduction takes place within a *semiconductor.*

Semiconductor, Extrinsic. A semiconductor with *charge-carrier* concentration dependent upon impurities.

Semiconductor, Intrinsic. A *semiconductor* whose *charge-carrier* concentration is substantially the same as that of the ideal crystal.

Semiconductor, *N*-Type. An *extrinsic semiconductor* in which the *conduction electron* concentration exceeds the mobile *hole* concentration.

> *Note:* It is implied that the net ionized *impurity* concentration is *donor type.*

Semiconductor, *N*+-Type. An *n-type semiconductor* in which the excess *conduction electron* concentration is very large.

Semiconductor, P-Type. An *extrinsic semiconductor* in which the mobile *hole* concentration exceeds the *conduction electron* concentration.

> *Note:* It is implied that the net ionized *impurity* concentration is *acceptor* type.

Semiconductor, *P*+-Type. A *p-type semiconductor* in which the excess mobile *hole* concentration is very large.

Space-Charge Region (of a Semiconductor Device). A region in which the net charge density is significantly different from zero. See also *Depletion Layer.*

Terminal (of a Semiconductor Device). The externally available point of connection to one or more *electrodes.*

Thermal Resistance, Effective (of a Semiconductor Device). The effective temperature rise per unit power dissipation of a designated *junction* above the temperature of a stated external reference point under conditions of thermal equilibrium.

Thermistor. An electron device which makes use of the change of resistivity of a *semiconductor* with change in temperature.

Transistor. An active *semiconductor device* with three or more *terminals.*

Transistor, Conductivity Modulation. A *transistor* in which the active properties are derived from *minority-carrier* modulation of the bulk resistivity of a *semiconductor.*

Transistor, Filamentary. A *conductivity modulation transistor* with a length much greater than its transverse dimensions.

Transistor, Junction. A *transistor* having a *base* and two or more junctions.

Transistor, Point-Contact. A *transistor* having a base and two or more *point-contacts.*

Transistor, Unipolar. A *transistor* which utilizes *charge carriers* of only one polarity.

Valence Band. The range of energy states in the spectrum of a solid crystal in which lie the energies of the valence electrons which bind the crystal together.

Varistor. A two-terminal *semiconductor device* having a voltage-dependent nonlinear resistance.

Zener Breakdown (of a Semiconductor Device). A *breakdown* that is caused by the field emission of *charge carriers* in the *depletion layer.*

Zener Impedance. Obsolete, see *Breakdown Impedance.*

Zener Voltage. Obsolete, see *Breakdown Voltage.*