



Parameter	Symbol	Conditions
Conductivity	σ	Temperature dependent
Resistivity	ρ	Temperature dependent
Current density	J	Depends on electric field and material properties
Electric field	E	Applied voltage divided by distance
Voltage	V	Potential difference across the sample
Distance	L	Length of the sample
Cross-sectional area	A	Area perpendicular to current flow
Charge carrier concentration	n	Number of charge carriers per unit volume
Mobility	μ	Measure of how easily charge carriers move under an electric field
Drift velocity	v_d	Average velocity of charge carriers due to the electric field
Mean free path	λ	Average distance between collisions of charge carriers
Fermi energy	E_F	Energy level at absolute zero temperature
Boltzmann constant	k_B	Relates temperature to energy
Temperature	T	Affects conductivity and other thermodynamic properties
Band gap energy	E_g	Energy difference between valence and conduction bands
Intrinsic carrier concentration	n_i	Carrier concentration in pure semiconductor
Doping concentration	N_D or N_A	Added impurities to modify electrical properties
Extrinsic carrier concentration	n or p	Carrier concentration in doped semiconductor
Recombination lifetime	τ	Average time before recombination of electron-hole pairs
Diffusion coefficient	D	Describes the rate of diffusion of charge carriers
Debye length	λ_D	Characteristic length scale for screening of charges
Grain size	d	Size of crystalline grains in polycrystalline materials
Surface state density	N_{ss}	Density of electronic states at the surface
Work function	ϕ	Minimum energy needed to remove an electron from the solid
Barrier height	Φ_B	Energy barrier at a metal-semiconductor junction
Ideal factor	n	Deviation from ideal diode behavior
Saturation current density	J_0	Reverse saturation current density of a p-n junction
Forward bias voltage	V_f	Voltage applied to forward bias a diode
Reverse bias voltage	V_r	Voltage applied to reverse bias a diode
Open circuit voltage	V_{oc}	Voltage across a solar cell under illumination with no load
Short circuit current density	J_{sc}	Current density of a solar cell under illumination with shorted terminals
Fill factor	FF	Ratio of maximum power to product of V_{oc} and J_{sc}
Efficiency	η	Conversion efficiency of a device
Quantum yield	Φ_q	Ratio of emitted photons to absorbed photons
Excitation energy	E_{exc}	Energy provided to excite electrons
Fluorescence lifetime	τ_f	Average time before fluorescence emission
Phosphorescence lifetime	τ_p	Average time before phosphorescence emission
Thermal quenching parameter	U	Parameter describing non-radiative relaxation processes
Non-radiative decay rate	k_{nr}	Rate constant for non-radiative transitions
Radiative decay rate	k_r	Rate constant for radiative transitions
Total decay rate	k_t	Sum of radiative and non-radiative rates
Internal quantum efficiency	η_{int}	Ratio of radiative recombination to total recombination
External quantum efficiency	η_{ext}	Ratio of emitted photons to injected electrons
Light absorption cross-section	σ_a	Probability of photon absorption
Photon flux	Φ_{ph}	Number of photons incident per unit area per unit time
Electron injection efficiency	γ_e	Ratio of injected electrons to total injected carriers
Hole injection efficiency	γ_h	Ratio of injected holes to total injected carriers
Charge balance ratio	β	Ratio of electron to hole injection efficiencies
Carrier multiplication factor	M	Factor describing generation of multiple electron-hole pairs per photon
Auger recombination coefficient	C	Coefficient for three-carrier recombination process
Shockley-Read-Hall recombination coefficient	A	Coefficient for recombination via defects/traps
Spontaneous emission coefficient	B	Coefficient for two-carrier recombination process
Population inversion	Δn	Condition where excited state population exceeds ground state
Optical gain	G	Amplification of light intensity
Threshold current density	J_{th}	Minimum current density for lasing action
Output power	P_{out}	Power of emitted laser beam
Wall-plug efficiency	η_w	Ratio of optical output power to electrical input power
Line width	$\Delta\lambda$	Width of the emission spectrum
Wavelength	λ	Distance between wave peaks
Frequency	ν	Number of cycles per second
Energy	E	Capacity to do work
Force	F	Interaction that causes change in motion
Pressure	P	Force per unit area
Stress	σ	Internal force per unit area
Strain	ϵ	Relative displacement or deformation
Elastic modulus	E	Material's resistance to elastic deformation
Poisson's ratio	ν	Ratio of transverse contraction to longitudinal extension
Young's modulus	E	Another term for elastic modulus
Shear modulus	G	Resistance to shear deformation
Volume modulus	K	Resistance to uniform compression
Dislocation density	ρ_d	Number of dislocations per unit area
Grain boundary energy	γ_{gb}	Energy associated with grain boundaries
Surface energy	γ_s	Energy associated with surfaces
Interfacial energy	γ_{if}	Energy associated with interfaces
Adhesion energy	Γ	Energy required to separate two bonded surfaces
Friction coefficient	μ_f	Ratio of frictional force to normal force
Viscosity	η_v	Fluid's resistance to flow
Elongation at break	ϵ_b	Maximum strain before fracture
Tensile strength	σ_t	Maximum stress before fracture
Yield strength	σ_y	Onset of permanent deformation
Elongation to yield	ϵ_y	Strain at yield point
Modulus of elasticity	E	Another term for Young's modulus
Hardness	H	Material's resistance to localized plastic deformation
Impact strength	KIC	Ability to absorb energy during fracture
Toughness	U_T	Energy absorbed up to fracture
Crack growth rate	da/dN	Rate at which a crack advances per cycle
Cyclic loading	σ_c	Repeated loading and unloading
Static loading	σ_s	Constant loading over time
Dynamic loading	σ_d	Loading that varies rapidly with time
Creep rate	$\dot{\epsilon}_c$	Time-dependent increase in strain
Stress relaxation	$\sigma(t)$	Decrease in stress under constant strain
Strain rate sensitivity	m	Relationship between stress and strain rate
Strain rate	$\dot{\epsilon}$	Rate of change of strain
Stress	σ	Internal force per unit area
Strain	ϵ	Relative displacement or deformation
Displacement	δ	Change in position
Deflection	δ	Another term for displacement
Load	F	Force applied to a system
Weight	W	Force due to gravity
Mass	m	Amount of matter
Volume	V	Space occupied by an object
Area	A	Two-dimensional extent
Perimeter	P	Length of the boundary
Circumference	C	Perimeter of a circle
Radius	r	Distance from center to edge
Diameter	d	Distance across a circle
Height	h	Vertical distance
Depth	z	Horizontal distance
Thickness	t	Small dimension of a plate or film
Width	w	Horizontal dimension
Length	L	Longest dimension
Angle	θ	Measure of rotation or inclination
Phase angle	ϕ	Shift between voltage and current
Impedance	Z	Opposition to AC current flow
Reactance	X_L or X_C	Opposition to AC current flow due to inductors or capacitors

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Typical Performance Characteristics

Figure1. Output Characteristics

Figure2. Transfer Characteristics

Figure3. Capacitance Characteristics

Figure4. Gate Charge

Figure5. Drain-Source on Resistance

Figure6. Drain Current



SOP-8 Package information

SYMBOL	MIN.		
	0.053	0.069	
B	0.004	0.010	
		0.061	
D		0.020	
E			
F			
G	0.050BSC		1.270BSC
H			
J			
K			



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