

Conducted Electrical Weapon (CEW)-Related Electricity Basics (High School Physics Revisited)

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The International System of Units (SI) is the modern metric system of measurement [meter, kilogram, second (MKS) system of measurement]. The SI has been adopted by the National Institute of Standards and Technology (NIST), United States Department of Commerce. See:

- NIST Special Publication 811 (SP 811), 2008, prepared by B. N. Taylor and titled Guide for the Use of the International System of Units (SI), and
- NIST Special Publication 330 (SP 330), 2008, edited by B. N. Taylor and titled The International System of Units (SI).

Unit	Name	Symbol	Description	Expression in terms of other SI units
Base Units [International System of Units (SI)]				
Time	second	s	The “second” (s) is the SI base unit of time. The second is the duration of 9 192 631 770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the cesium 133 atom.	
Length	meter	m	The “meter” (m) is the SI based unit of length of the path travelled by light in vacuum during a time interval of 1/299 792 458 of a second.	
Mass	kilogram	kg	The “kilogram” (kg) is the SI base unit of mass; it is equal to the mass of the International Prototype Kilogram (IPK).	
Electric Current	ampere	A	The “ampere” (A) is the SI base unit of electric current, or amount of electric charge per s. The ampere is that constant current which, if maintained in two straight parallel conductors of infinite length, of negligible circular cross-section, and placed 1 m apart in vacuum, would produce between these conductors a force equal to 2×10^{-7} newton/m of length. <ul style="list-style-type: none"> • measures the current flow rate, how many electrons flow each second. • 1 A is the flow of 1 coulomb (C) of electrons in 1 second (s). • Charge (coulombs) in 1 s. 	$1 \text{ A} = 1 \text{ C} / 1 \text{ s}$ or V / Ω $I = \Delta V / R$
Derived Units [International System of Units (SI)]				
Charge	coulomb	C	The “coulomb” (C) is the SI derived unit of electric charge, quantity of electricity. <ul style="list-style-type: none"> • 1 C is $6.24150962915265 \times 10^{18}$, or ≈ 6.24 quintillion, electrons/elementary charges. • 1 C is the amount of electric charge transported by a current of 1 A in 1 s. 	$1 \text{ C} = 1 \text{ A} \cdot 1 \text{ s}$
Energy	joule	J	The “joule” (J) (unit of energy or work), is the work done when the point of application of 1 SI unit of force [newton] moves a distance of 1 m in the direction of the force.	$V \cdot C$ or $W \cdot s$
Voltage	volt	V	The volt (V) is the unit of potential difference and of electromotive force. The V is the potential difference between two points of a conducting wire carrying a constant current of 1 A, when the power dissipated between these points is equal to 1 W.	W / A or J / C
Resistance	ohm	Ω	The ohm (Ω) is the electric resistance between two points of a conductor when a constant potential difference of 1 V, applied to these points, produces in the conductor a current of 1 A, the conductor not being the seat of any electromotive force.	V / A
Power	watt	W	The watt (W) is the power that in 1 s gives rise to energy of 1 J. Energy (joules) in 1 s.	J / s
Force	newton	N	The newton (N) is the force that gives to a mass of 1 kg an acceleration of 1 m/s^2 .	
Ohm’s Law: the current through a conductor between two points is directly proportional to the potential difference across the two points. $\Delta V = I \cdot R$				