The photovoltaic effect is the basic physical process through which a PV cell converts sunlight into electricity.Thus, a 12% efficiency solar cell having 1 m2 of surface area in full sunlight at solar noon at the equator during either the March or September equinox will produce approximately 120 watts of peak power.For systems large enough to justify the extra expense (say, ~1 kiloWatt), a power point tracker tracks the instantaneous power by continually measuring the voltage and current (and hence, power transfer), and uses this information to dynamically adjust the load so the maximum power is always transferred, regardless of the variation in lighting.This term is calculated using the ratio of P m, divided by the input light irradiance under "standard" test conditions (E, in W/m 2) and the surface area of the solar cell (A c in m2). At solar noon on a clear March or September equinox day, the solar radiation at the equator is about 1000 W/m 2 . Hence, the "standard" solar radiation (known as the "air mass 1.5 spectrum") has a power density of 1000 watts per square meter.They have long been used in situations where electrical power from the grid is unavailable, such as in remote area power systems, Earth -orbiting satellites and space probes, consumer systems, e.g. handheld calculators or wrist watches, remote radiotelephones and water pumping applications.Scientists have concentrated their efforts over the last several years on improving the efficiency of solar cells to make them more competitive with conventional power -generation technologies.We use crystalline silicon to explain the photovoltaic effect for several reasons.Other PV cell materials have band -gap energies ranging from 1 to 3.3 eV. The energy of individual photons in light is also measured in eV. Photons with different energies correspond to distinct wavelengths of light.The electrons farthest from the nucleus interact with those of neighboring atoms to determine the way solid structures are formed.The silicon atom has 14 electrons.Visible light represents only a fraction of the total radiation spectrum; infrared and ultraviolet rays are also significant parts of the solar spectrum.In a crystalline solid, each silicon atom normally shares one of its four valence electrons in a covalent bond with each of four neighboring silicon The solid, then, consists of basic units of five silicon atoms: the original atom plus the four other atoms with which it shares its valence electrons.This technique, known as "doping," introduces an atom of another element (called the "dopant") into the silicon crystal to alter its electrical properties.The entire spectrum of sunlight, from infrared to ultraviolet, covers a range of about 0.5 eV to about 2.9 eV. Red light has an energy of about 1.7 eV; blue light has an energy of about 2.7 eV. One key to obtaining an efficient PV cell is to convert as much sunlight into electricity as possible.The electrons orbit the nucleus at different distances, depending on their energy level; an electron of lesser energy orbits close to the nucleus, while one of greater energy orbits farther away.This regular, fixed arrangement of silicon atoms is known as the crystal lattice.When a photon of sufficient energy strikes a valence electron, it may impart enough energy to free it from its connection to the atom.The absorbed photons generate electricity.The energy of a photon is transferred to an electron in an atom of the semiconductor device.Vm x Im = Pm in watts.