

Glossary

amplitude the height, or magnitude, of an electromagnetic wave

amplitude modulation (AM) a method for placing information on electromagnetic waves by modulating the amplitude of a carrier wave with an audio signal, resulting in a wave with constant frequency but varying amplitude

carrier wave an electromagnetic wave that carries a signal by modulation of its amplitude or frequency

electric field a vector quantity (**E**); the lines of electric force per unit charge, moving radially outward from a positive charge and in toward a negative charge

electric field lines a pattern of imaginary lines that extend between an electric source and charged objects in the surrounding area, with arrows pointed away from positively charged objects and toward negatively charged objects. The more lines in the pattern, the stronger the electric field in that region

electric field strength the magnitude of the electric field, denoted E -field

electromagnetic spectrum the full range of wavelengths or frequencies of electromagnetic radiation

electromagnetic waves radiation in the form of waves of electric and magnetic energy

electromotive force (emf) energy produced per unit charge, drawn from a source that produces an electrical current

extremely low frequency (ELF) electromagnetic radiation with wavelengths usually in the range of 0 to 300 Hz, but also about 1kHz

frequency the number of complete wave cycles (up-down-up) passing a given point within one second (cycles/second)

frequency modulation (FM) a method of placing information on electromagnetic waves by modulating the frequency of a carrier wave with an audio signal, producing a wave of constant amplitude but varying frequency

gamma ray (γ ray); extremely high frequency electromagnetic radiation emitted by the nucleus of an atom, either from natural nuclear decay or induced nuclear processes in nuclear reactors and weapons. The lower end of the γ -ray frequency range overlaps the upper end of the X-ray range, but γ rays can have the highest frequency of any electromagnetic radiation

hertz an SI unit denoting the frequency of an electromagnetic wave, in cycles per second

infrared radiation (IR) a region of the electromagnetic spectrum with a frequency range that extends from just below the red region of the visible light spectrum up to the microwave region, or from $0.74\ \mu\text{m}$ to $300\ \mu\text{m}$

intensity the power of an electric or magnetic field per unit area, for example, Watts per square meter

magnetic field a vector quantity (**B**); can be used to determine the magnetic force on a moving charged particle

magnetic field lines a pattern of continuous, imaginary lines that emerge from and enter into opposite magnetic poles. The density of the lines indicates the magnitude of the magnetic field

magnetic field strength the magnitude of the magnetic field, denoted B -field

maximum field strength the maximum amplitude an electromagnetic wave can reach, representing the maximum amount of electric force and/or magnetic flux that the wave can exert

Maxwell's equations a set of four equations that comprise a complete, overarching theory of electromagnetism

microwaves electromagnetic waves with wavelengths in the range from 1 mm to 1 m; they can be produced by currents in macroscopic circuits and devices

oscillate to fluctuate back and forth in a steady beat

radar a common application of microwaves. Radar can determine the distance to objects as diverse as clouds and aircraft, as well as determine the speed of a car or the intensity of a rainstorm

radio waves electromagnetic waves with wavelengths in the range from 1 mm to 100 km; they are produced by currents in wires and circuits and by astronomical phenomena

resonant a system that displays enhanced oscillation when subjected to a periodic disturbance of the same frequency as its natural frequency

RLC circuit an electric circuit that includes a resistor, capacitor and inductor

speed of light in a vacuum, such as space, the speed of light is a constant $3 \times 10^8\ \text{m/s}$

standing wave a wave that oscillates in place, with nodes where no motion happens

thermal agitation the thermal motion of atoms and molecules in any object at a temperature above absolute zero, which causes them to emit and absorb radiation

transverse wave a wave, such as an electromagnetic wave, which oscillates perpendicular to the axis along the line of travel

TV video and audio signals broadcast on electromagnetic waves

ultra-high frequency (UHF) TV channels in an even higher frequency range than VHF, of 470 to 1000 MHz

ultraviolet radiation (UV) electromagnetic radiation in the range extending upward in frequency from violet light and overlapping with the lowest X-ray frequencies, with wavelengths from 400 nm down to about 10 nm

very high frequency (VHF) TV channels utilizing frequencies in the two ranges of 54 to 88 MHz and 174 to 222 MHz

visible light the narrow segment of the electromagnetic spectrum to which the normal human eye responds

wavelength the distance from one peak to the next in a wave

X-ray invisible, penetrating form of very high frequency electromagnetic radiation, overlapping both the ultraviolet range and the γ -ray range