

FREQUENCY SPECTRUM

Figure 1, which follows, depicts the electromagnetic radiation spectrum and some of the commonly used or known areas. Figure 2 depicts the more common uses of the microwave spectrum. Figure 3 shows areas of the spectrum which are frequently referred to by band designations rather than by frequency.

Section 7-1 provides an additional breakdown of the EO/IR spectrum.

To convert from frequency (f) to wavelength (λ) and vice versa, recall that $f = c/\lambda$, or $\lambda = c/f$; where c = speed of light.

$$\lambda_{meter} = \frac{3 \times 10^8}{f_{Hz}} = \frac{3 \times 10^5}{f_{kHz}} = \frac{300}{f_{MHz}} = \frac{0.3}{f_{GHz}} \quad \text{or} \quad f_{Hz} = \frac{3 \times 10^8}{\lambda_{meter}} \quad f_{kHz} = \frac{3 \times 10^5}{\lambda_{meter}} \quad f_{MHz} = \frac{300}{\lambda_{meter}} \quad f_{GHz} = \frac{0.3}{\lambda_{meter}}$$

Some quick rules of thumb follow:

Metric:

Wavelength in cm = 30 / frequency in GHz

For example: at 10 GHz, the wavelength = 30/10 = 3 cm

English:

Wavelength in ft = 1 / frequency in GHz

For example: at 10 GHz, the wavelength = 1/10 = 0.1 ft

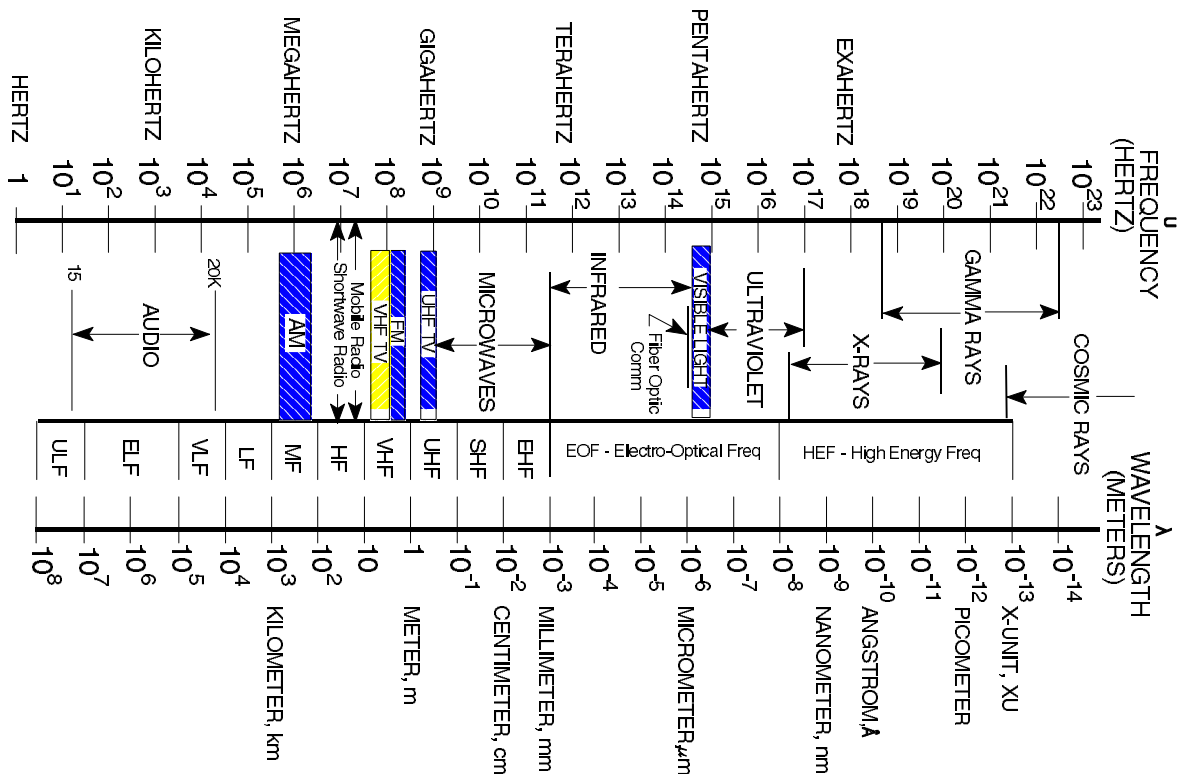


Figure 1. Electromagnetic Radiation Spectrum

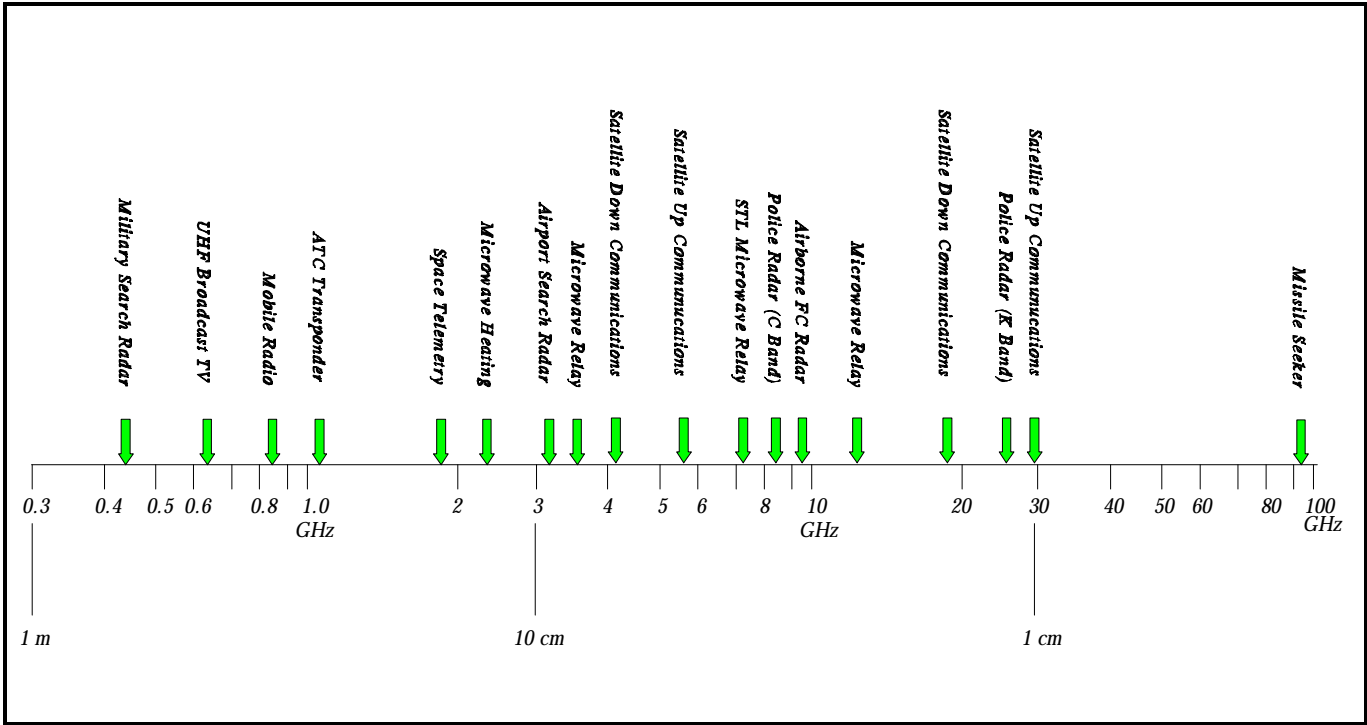


Figure 2. The Microwave Spectrum

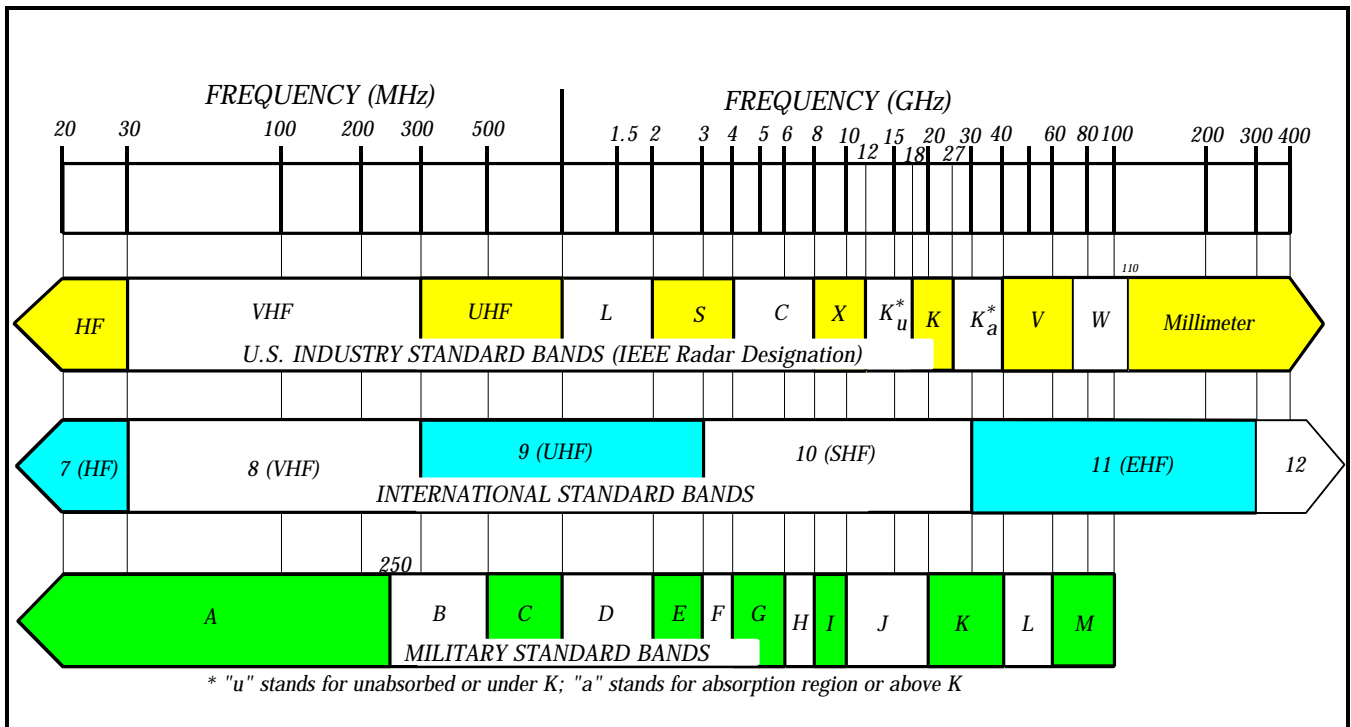


Figure 3. Frequency Band Designations