Cutoff frequency

In physics and electrical engineering, a **cutoff frequency**, **corner frequency**, or **break frequency** is a boundary in a system's frequency response at which energy flowing through the system begins to be reduced (attenuated or reflected) rather than passing through.

Typically in electronic systems such as filters and communication channels, cutoff frequency applies to an edge in a lowpass, highpass, bandpass, or band-stop characteristic – a frequency characterizing a boundary between a passband and a stopband. It is sometimes taken to be the point in the filter response where a transition band and passband meet, for example as defined by a 3 dB corner, a frequency for which the output of the circuit is −3 dB of the nominal passband value. Alternatively, a stopband corner frequency may be specified as a point where a transition band and a stopband meet: a frequency for which the attenuation is larger than the required stopband attenuation, which for example may be 30 dB or 100 dB.

In the case of a waveguide or an antenna, the cutoff frequencies correspond to the lower and upper **cutoff wavelengths**.

Cutoff frequency can also refer to the plasma frequency.

The -3dB, come from 20 Log (0.707) or 10 Log (0.5). To determine the bandwidth of signal, when decrease the voltage from maximum to 0.707Max or decreasing the power from max to half power.

## Electronics

In electronics, cutoff frequency or corner frequency is the frequency either above or below which the power output of a circuit, such as a line, amplifier, or electronic filter has fallen to a given proportion of the power in the passband. Most frequently this proportion is one half the passband power, also referred to as the 3 dB point since a fall of 3 dB corresponds approximately to half power. As a voltage ratio this is a fall to \scriptstyle \sqrt{1/2} \ \approx \ 0.707 of the passband voltage.

However, other ratios are sometimes more convenient. For instance, in the case of the Chebyshev filter it is usual to define the cutoff frequency as the point after the last peak in the frequency response at which the level has fallen to the design value of the passband ripple. The amount of ripple in this class of filter can be set by the designer to any desired value; hence the ratio used could be any value.

 It's because decibels are logarithmic, and the log (base 10) of 3 is about 50% power. So the 3 decibel cutoff is where power drops off by a half.