Bandpass and Passband

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These two words are both compound words that follow the English rules of formation: **the primary meaning is the latter part of the compound, while the modifier is the first part. Hence, one may correctly say 'A dual bandpass filter has two passbands'.**

"Bandpass" is the term that describes a type of filtering process. A Bandpass Filter is a device that passes frequencies within a certain range and rejects or attenuates frequencies outside that range. **it is frequently confused with passband, which refers to the actual portion of affected spectrum.** An example of an analog electronic Bandpass filter is an RLC (a resistor–inductor–capacitor) circuit. These filters can also be created by combining a low-pass filter with a high-pass filter.

***"Passband" is the term that describes a range of frequencies that can pass through a Bandpass filter without being attenuated*. A passband signal is a bandpass filtered signal** (that is, a signal whose lowest and highest frequencies have been filtered out), as opposed to a baseband signal. **In telecommunications,** optics, and acoustics, **a passband is the portion of the frequency spectrum that is transmitted (with minimum relative loss or maximum relative gain) by some filtering device.** In other words, it is a *band* of frequencies which *pass*es through some filter or set of filters. Radio receivers generally include a tunable band-pass filter with a passband that is wide enough to accommodate the bandwidth of the radio signal transmitted by a single station.

An ideal bandpass filter would have a completely flat passband (e.g. with no gain/attenuation throughout) and would completely attenuate all frequencies outside the passband. Additionally, the transition out of the passband would be instantaneous in frequency. In practice, no bandpass filter is ideal. The filter does not attenuate all frequencies outside the desired frequency range completely; in particular, there is a region just outside the intended passband where frequencies are attenuated, but not rejected. This is known as the filter roll-off, and it is usually expressed in dB of attenuation per octave or decade of frequency. Generally, the design of a filter seeks to make the roll-off as narrow as possible, thus allowing the filter to perform as close as possible to its intended design. Often, this is achieved at the expense of pass-band or stop-band ripple.

The bandwidth of the filter is simply the difference between the upper and lower cutoff frequencies. The shape factor is the ratio of bandwidths measured using two different attenuation values to determine the cutoff frequency, e.g., a shape factor of 2:1 at 30/3 dB means the bandwidth measured between frequencies at 30 dB attenuation is twice that measured between frequencies at 3 dB attenuation.