PASSIVE FILTER VS. ACTIVE FILTER

Definitions

A **passive filter** is a kind of electronic filter that is made only from passive elements – in contrast to an active filter, it does not require an external power source (beyond the signal).

An **active filter** is a type of analog electronic filter, distinguished by the use of one or more active components and require an external power source.

Passive filter

A passive filter is a kind of electronic filter that is made only from passive elements -- in contrast to an active filter, it does not require an external power source (beyond the signal). Since most filters are linear, in most cases, passive filters are composed of just the four basic linear elements -- resistors, capacitors, inductors, and transformers. More complex passive filters may involve nonlinear elements, or more complex linear elements, such as transmission lines.

A passive filter has several advantages over an active filter:

- Guaranteed stability
- Passive filters scale better to large signals (tens of amps, hundreds of volts), where active devices are often impractical
- No power consumption (aside from possibly taking some power out of the signal)
- Cheap

They are commonly used in speaker crossover design (due to the moderately large voltages and currents, and the lack of easy access to power), filters in power distribution networks (due to the large voltages and currents), power supply bypassing (due to low cost, and in some cases, power requirements), as well as a variety of discrete and home brew circuits (for low-cost and simplicity). Passive filters are less common in integrated circuit design, where active devices are comparatively inexpensive compared to resistors and capacitors, and inductors are prohibitively expensive.

Active filter

An active filter is a type of analog electronic filter, distinguished by the use of one or more active components i.e. voltage amplifiers or buffer amplifiers. Typically this will be a vacuum tube, transistor or operational amplifier.

There are two principal reasons for the use of active filters. The first is that the amplifier powering the filter can be used to shape the filter's response, e.g., how quickly and how steeply it moves from its passband into its stopband. (To do this passively, one must use inductors, which tend to pick up surrounding electromagnetic signals and are often quite physically large.) The second is that the amplifier powering the filter can be used to buffer the filter from the electronic components it drives. This is often necessary so that they do not affect the filter's actions.

Active filter circuit configurations (topology) include:

There are several varieties of active filter. Some of them, also available in passive form, are:

- High-pass filters – attenuation of frequencies below their cut-off points.
- Low-pass filters – attenuation of frequencies above their cut-off points.

- Band-pass filters – attenuation of frequencies both above and below those they allow to pass.
- Notch filters – attenuation of certain frequencies while allowing all others to pass.

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