Cheatography

# Analog Filters Cheat Sheet

by tenoooo via cheatography.com/69508/cs/17555/

## Filters

### Passive filters

The circuits built using RC, RL, or RLC circuits.

### Active filters

The circuits that employ one or more op-amps in the design an addition to resistors and capacitors

## Active Filters

### Low-pass filters

A low-pass filter is a filter that passes frequencies from 0Hz to critical frequency, fc and significantly attenuates all other frequencies. The critical frequency of a low-pass RC filter occurs when Xc = R and can be calculated using the formula: fc=1/2πRC

### High-pass filters

A band-pass filter passes all signals lying within a band between a lower-frequency limit and upper-frequency limit and essentially rejects all other frequencies that are outside this specified band

### band-pass filter

A high-pass filter is a filter that significantly attenuates or rejects all frequencies below fc and passes all frequencies above fc. The critical frequency of a high-pass RC filter occurs when Xc = R and can be calculated using the formula: fc=1/2πRC

### Bandpass

The bandwidth (BW) is defined as the difference between the upper critical frequency (fc2) and the lower critical frequency (fc1). BW=Fc2-Fc1

### Center Frequency

The frequency about which the pass band is centered is called the center frequency , f o and defined as the geometric mean of the critical frequencies. f0= √Fc1fc2

### Quality Factor

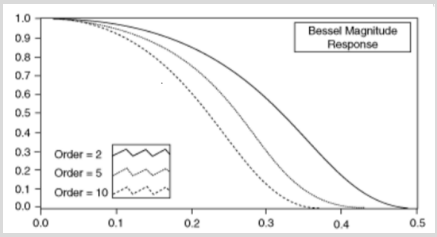
## Active Filters (cont)

The quality factor (Q) of a band-pass filter is the ratio of the center frequency to the bandwidth. Q = f0/BW

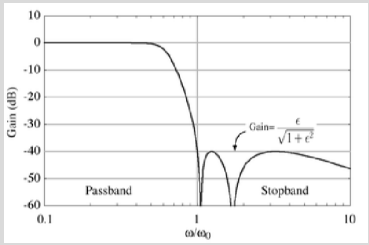
### Band-reject filters

Band-stop filter is a filter which its operation is opposite to that of the band-pass filter because the frequencies within the bandwidth are rejected, and the frequencies above f c1 and f c2 are passed.

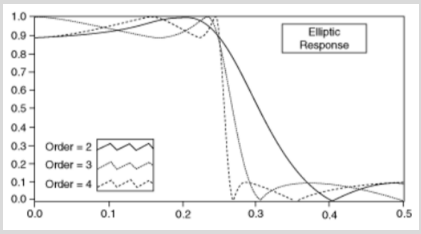
## Bessel Filter




## Chebyshev type 2



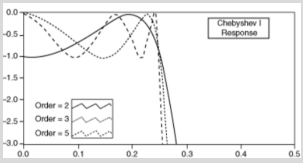

## Elliptic Filter



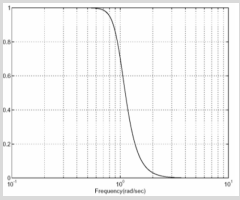

## Transper Function of All Filters

| lowpass | highpass | bandpass | bandreject | allpass |
|---|---|---|---|---|
| $\pm\frac{Gb_0}{s^2+b_1s+b_0}$ | $\pm\frac{Gs^2}{s^2+b_1s+b_0}$ | $\pm\frac{Gb_1s}{s^2+b_1s+b_0}$ | $\pm\frac{a_2s^2+a_0}{s^2+b_1s+b_0}$ | $\pm G\frac{s^2-b_1s+b_0}{s^2+b_1s+b_0}$ |

## Chebyshev LPF




## Butterworth Filter



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