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
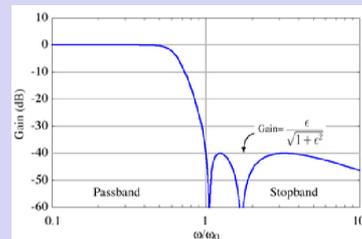
Band-reject filters

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.
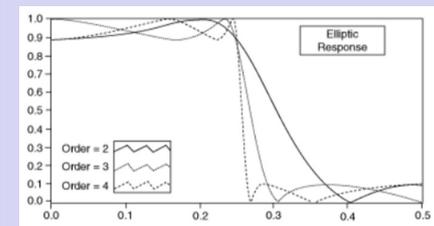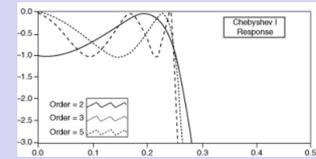
Bessel Filter
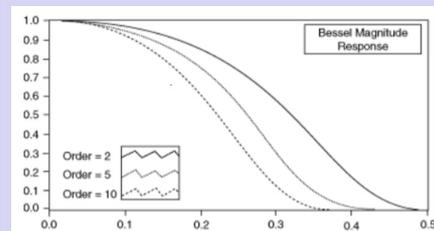
Chebyshev type 2

Elliptic Filter

Transper Function of All Filters

Chebyshev LPF

Butterworth Filter