

# F-16 FILTER

1.0.0 User Manual

# Quick Start

F-16 Filter is an Audio Unit Extension that works as a plug-in inside host apps. To start using F-16 Filter, open up your favorite host that supports Audio Units and add it as an effect.

## Overview

F-16 Filter is a flexible multi-mode filter with frequency response display. It features sixteen modes, frequency and resonance controls, saturation for analog-style soft clipping, and wet/dry mix. The lowpass modes offer the same frequency response as the Moog ladder filter. The plug-in offers all of the modes available in the famous Oberheim Matrix 12 and Xpander synthesizers. The Zero Delay Feedback algorithm provides the latest in DSP filtering technology. F-16 Filter gives you a wide variety of options with pristine fidelity.

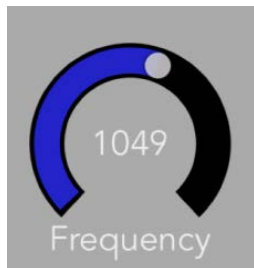
# Controls

## Mode Selection



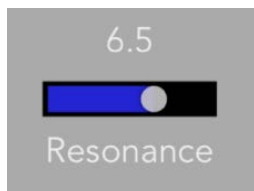
Touching the mode selection area provides a popup menu with the available modes. The menu can be scrolled to reveal all of the sixteen modes.

## Frequency



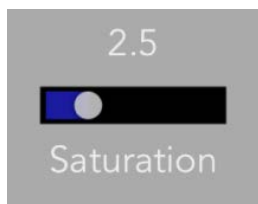
The Frequency knob adjusts the cutoff frequency of the filter. For lowpass and highpass modes this is the transition point between unfiltered and filtered frequencies. For bandpass modes this is the center frequency. You can adjust the response of the filter to lower or higher frequencies.

## Resonance



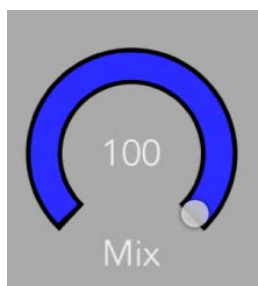
The Resonance slider adjusts the resonance of the filter. Resonance creates a peaking in the filter response that emphasizes frequencies near the cutoff frequency.

## Saturation



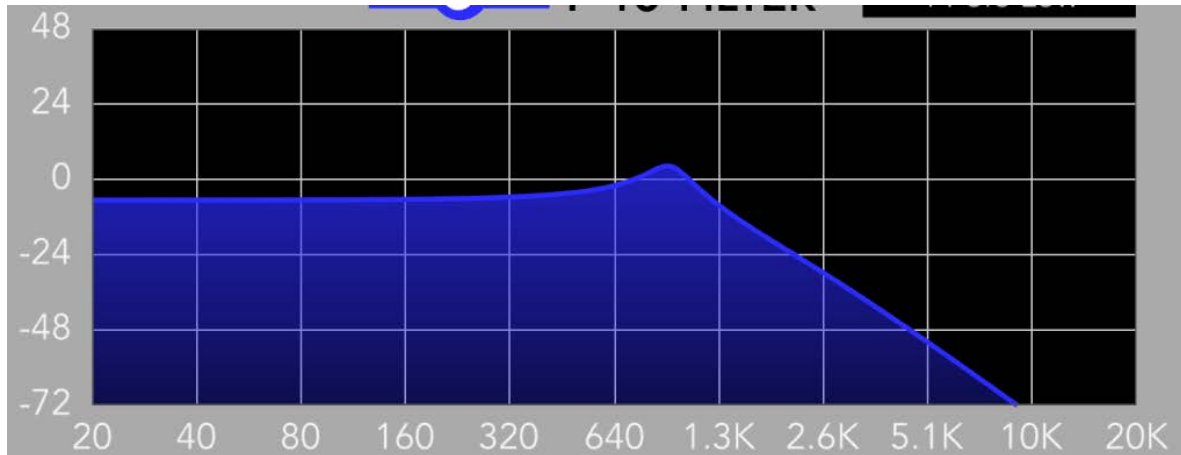
The Saturation slider adjusts the amount of drive applied to the signal. The drive causes the signal to be soft-clipped more by the filter algorithm. After soft-clipping, the signal is scaled back to near the original level. Saturation is a common feature of analog filter circuits.

## Mix



The Mix knob adjusts how much of the wet signal is present in the output.

# Display



## Visual Feedback

The display area shows the filter frequency response. The x axis is logarithmic frequency ranging over the frequencies of human hearing. Frequency can be thought of as pitch, from low to high as the graph goes from left to right. The y axis is magnitude in decibels.

Magnitude represents the loudness at a particular frequency. Where magnitude is above zero, the filter is increasing the loudness, below zero the filter is attenuating those frequencies.

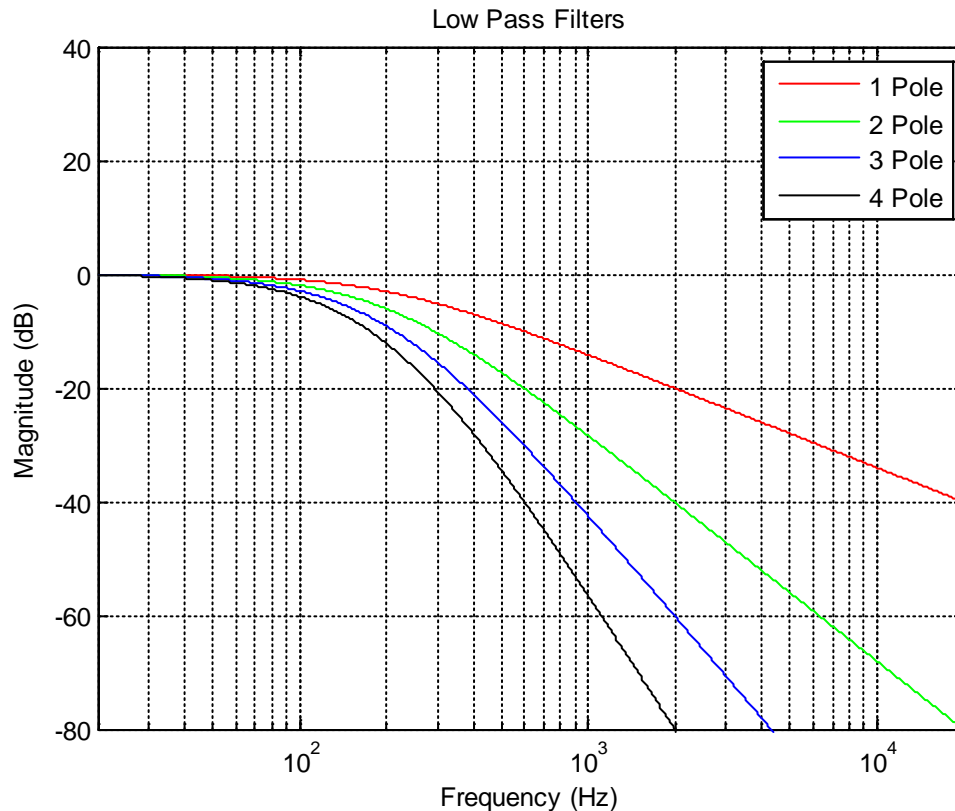
## Control

When you touch and drag on the display, movement along the horizontal direction adjusts the filter frequency. Movement in the vertical direction adjusts the filter resonance.

# Modes

## Lowpass Modes

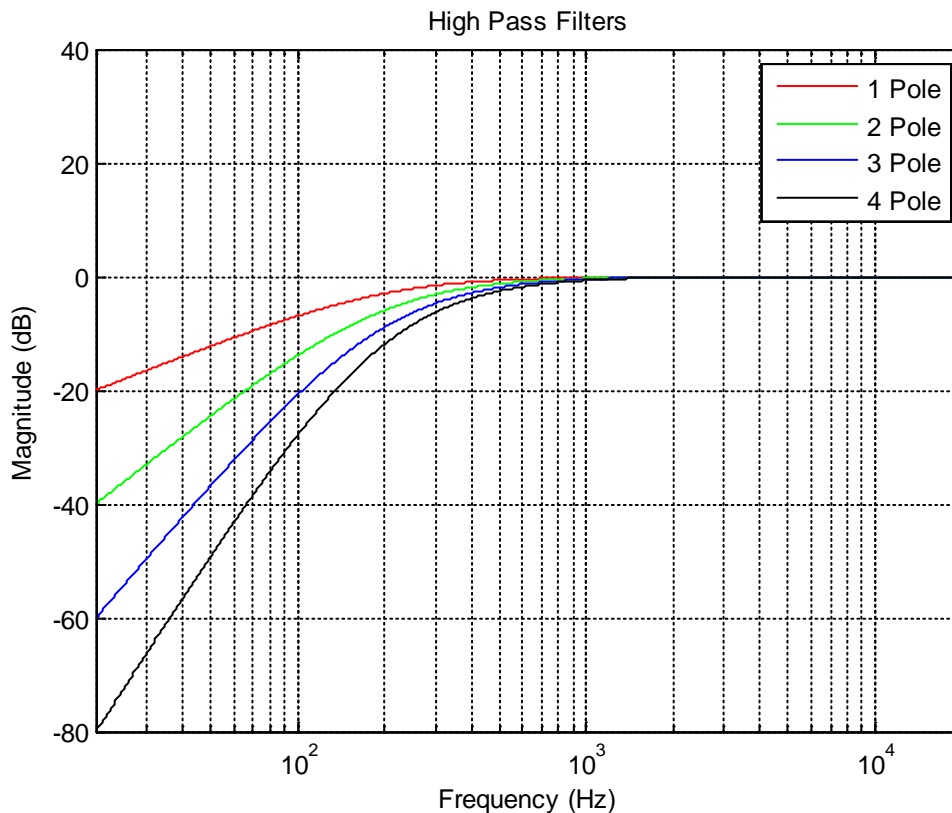
The figure compares the four lowpass filter modes with cutoff set at 200 Hz.



- 1 Pole Low: A one pole lowpass filter offering -3 dB at the cutoff frequency and 6 dB per octave rolloff.
- 2 Pole Low: A two pole lowpass filter offering -6 dB at the cutoff frequency and 12 dB per octave rolloff.
- 3 Pole Low: A three pole lowpass filter offering -9 dB at the cutoff frequency and 18 dB per octave rolloff.
- 4 Pole Low: A four pole lowpass filter offering -12 dB at the cutoff frequency and 24 dB per octave rolloff.

## Highpass Modes

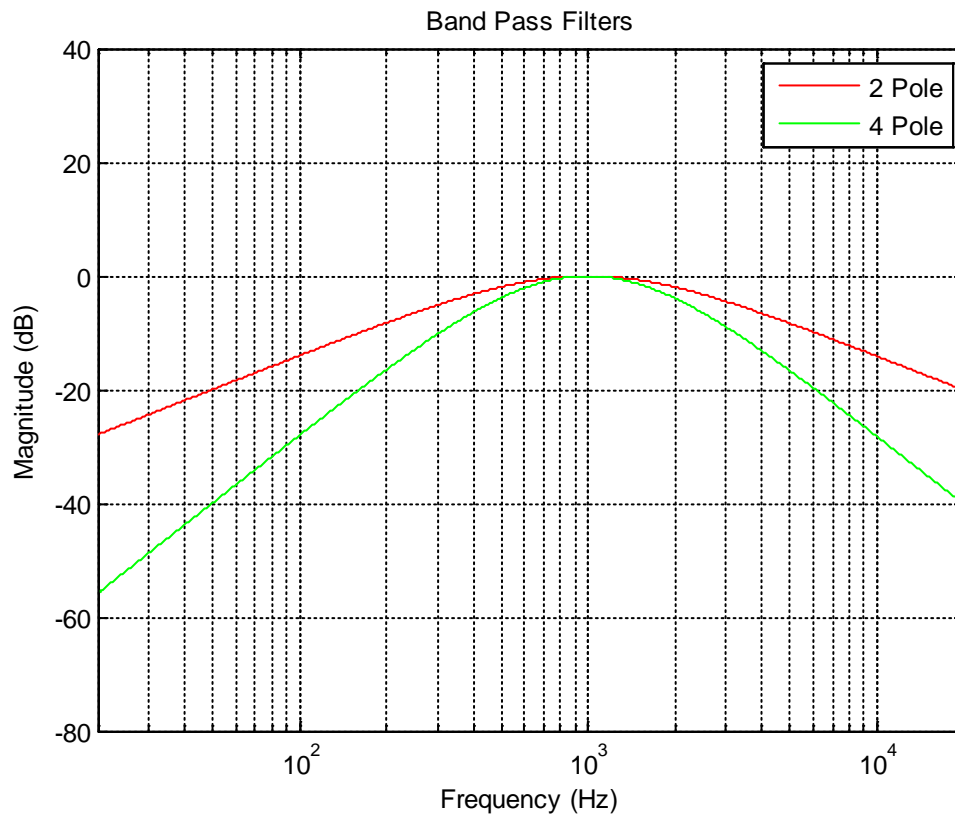
The figure compares the four highpass filter modes with cutoff set at 200 Hz.



- 1 Pole High: A one pole highpass filter offering -3 dB at the cutoff frequency and 6 dB per octave rolloff.
- 2 Pole High: A two pole highpass filter offering -6 dB at the cutoff frequency and 12 dB per octave rolloff.
- 3 Pole High: A three pole highpass filter offering -9 dB at the cutoff frequency and 18 dB per octave rolloff.
- 4 Pole High: A four pole highpass filter offering -12 dB at the cutoff frequency and 24 dB per octave rolloff.

## Bandpass Modes

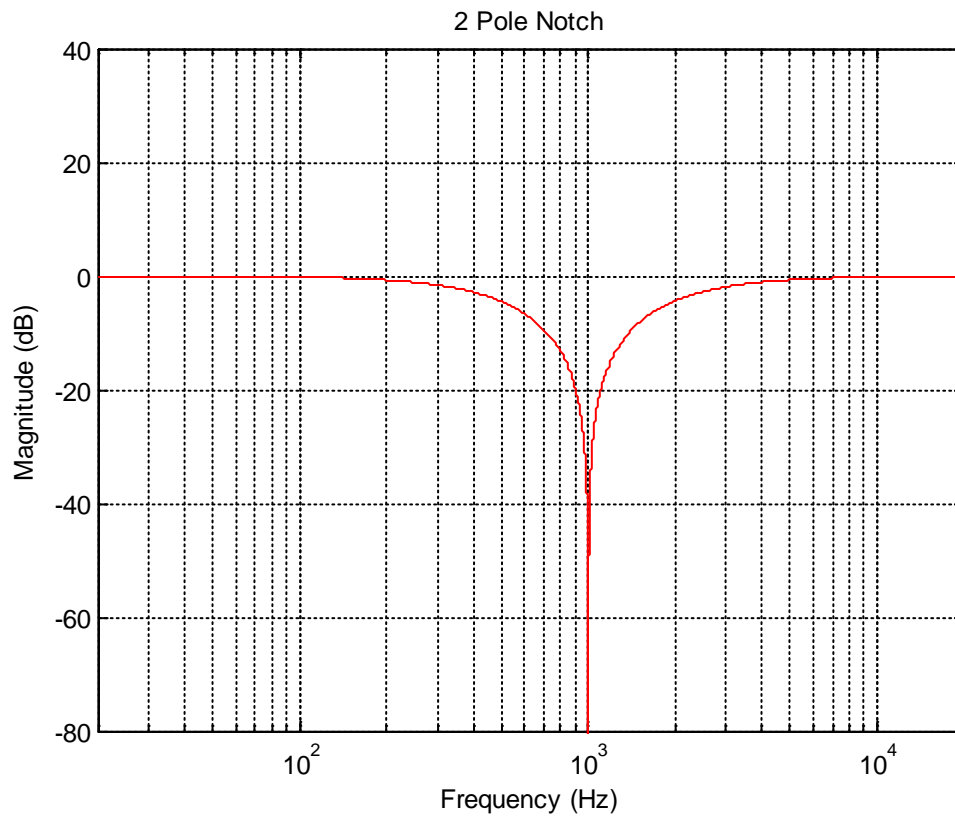
The figure compares the two bandpass modes with cutoff set at 1 kHz.



- 2 Pole Band: A two pole bandpass filter offering 0 dB at the cutoff frequency and 6 dB per octave rolloff in both directions.
- 4 Pole Band: A four pole bandpass filter offering 0 dB at the cutoff frequency and 12 dB per octave rolloff in both directions.

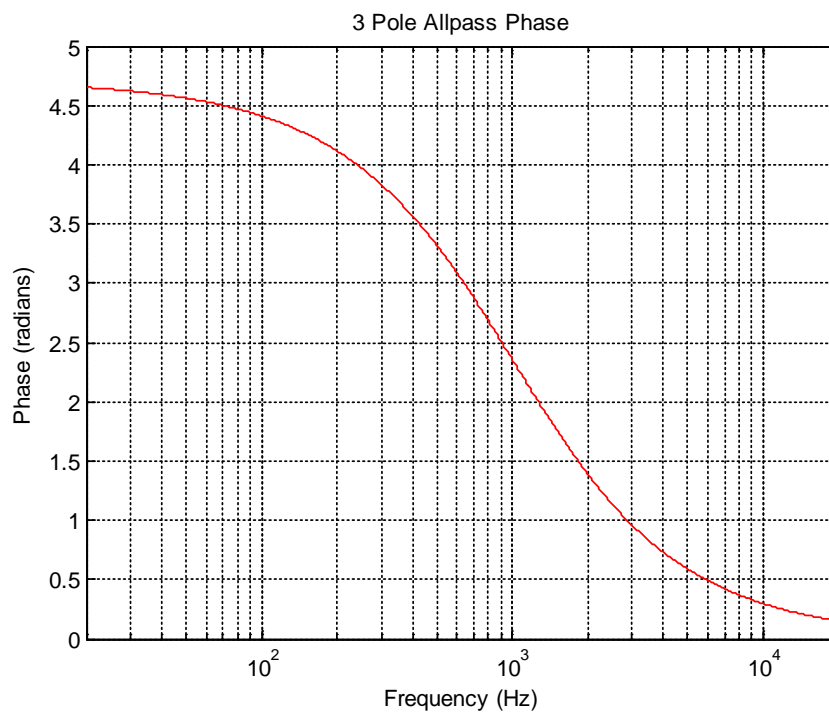
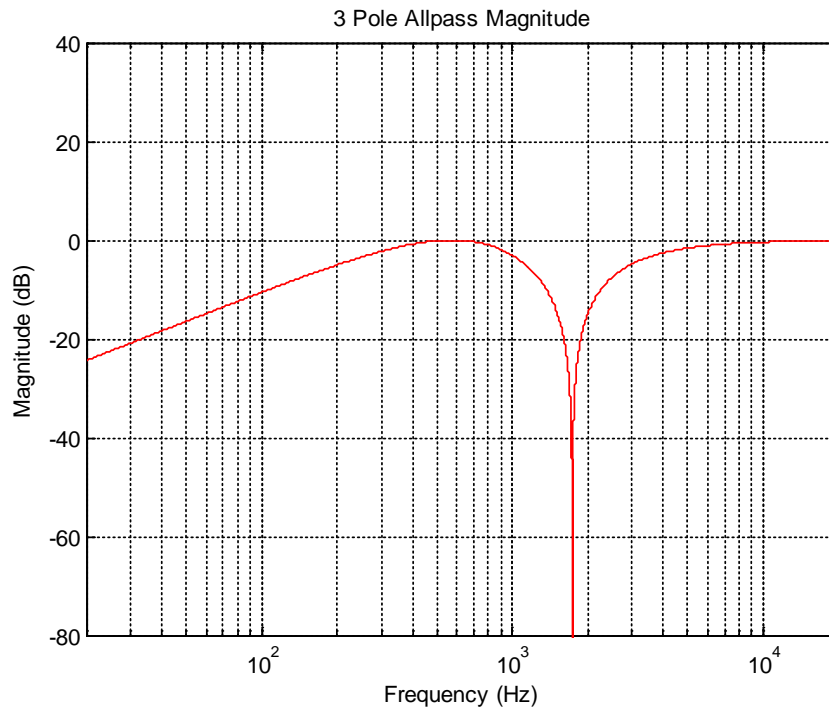


## 2 Pole Notch



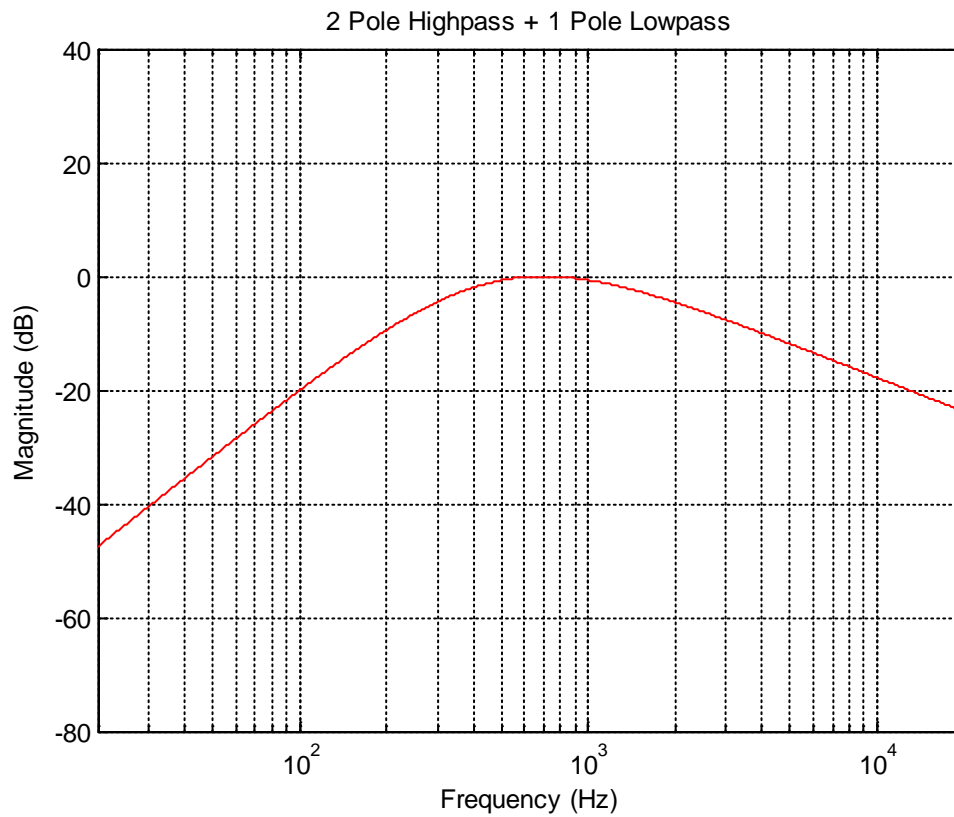
The two pole notch filter offers infinite attenuation at the cutoff frequency.

## 3 Pole Phase



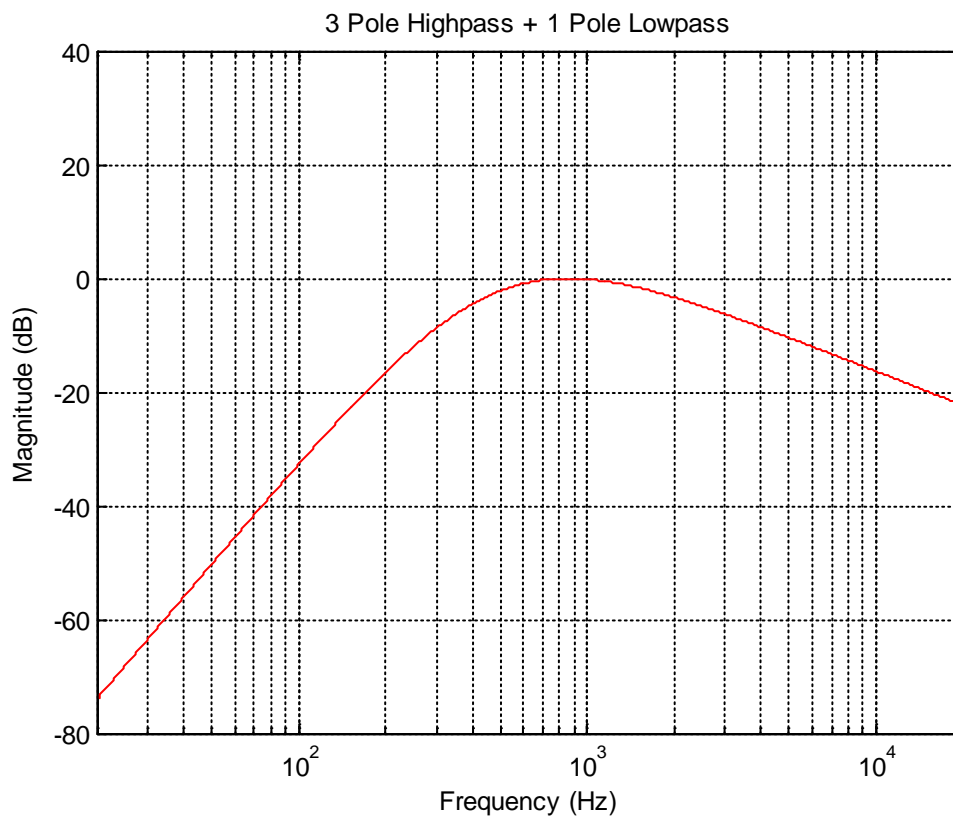
This is a three pole allpass filter. The plots show the filter with cutoff set at 1 kHz.

## 2 High + 1 Low



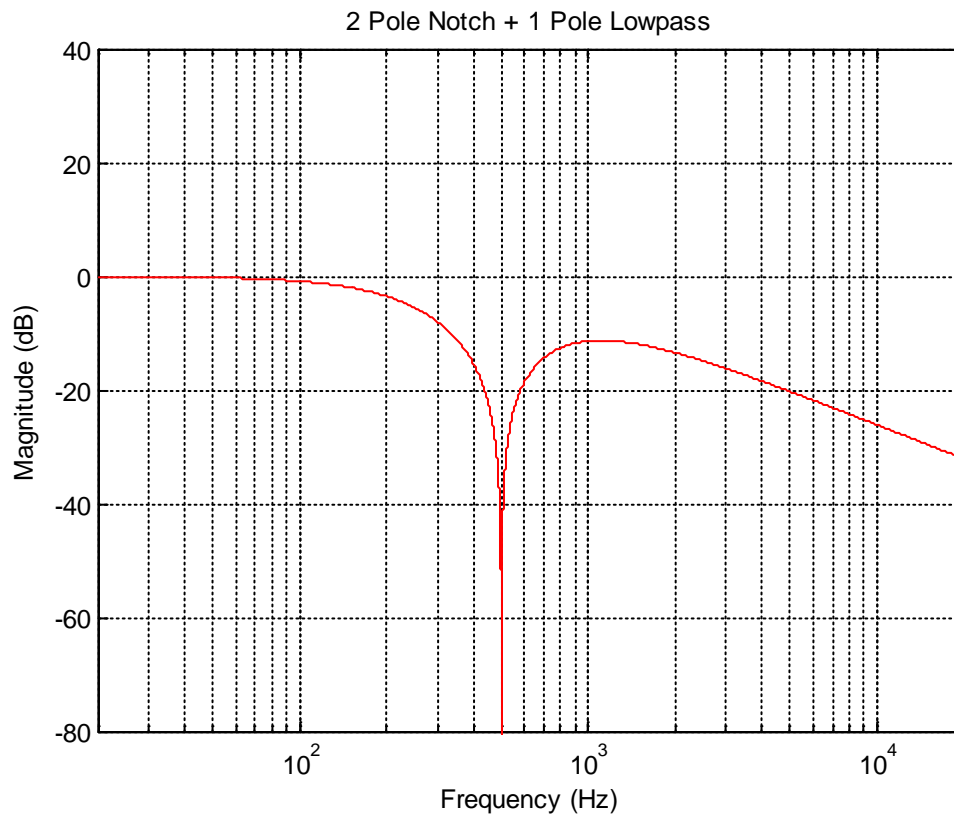
This is a two pole highpass and one pole lowpass combined filter. The rolloff is 12 dB per octave for the highpass section and 6 dB per octave for the lowpass section.

## 3 High + 1 Low



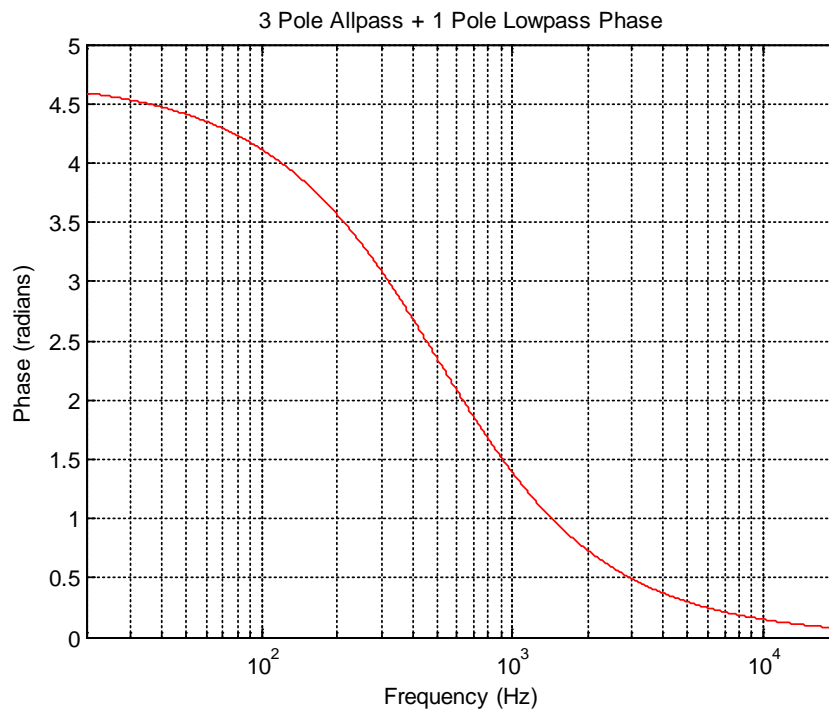
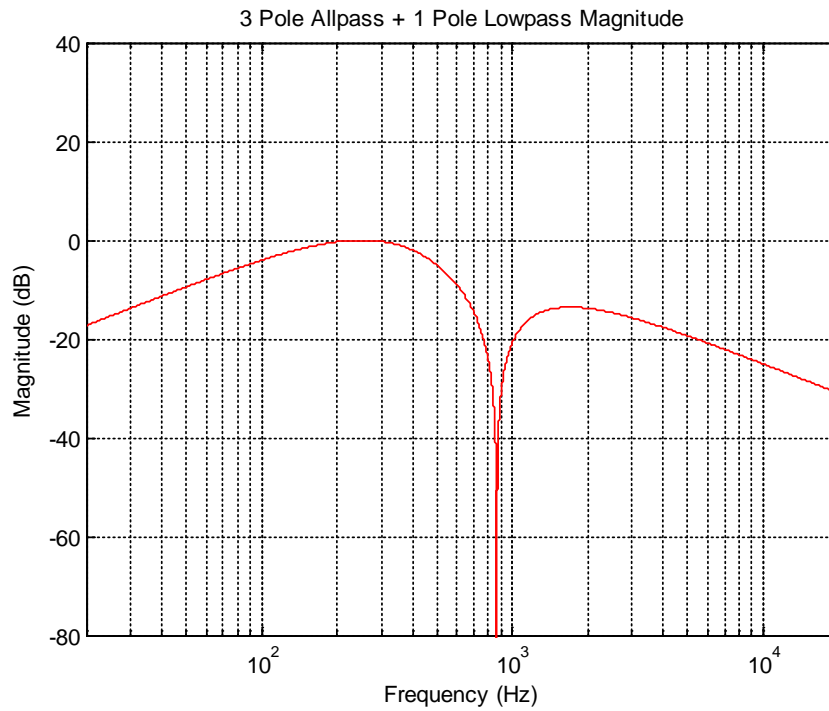
This is a three pole highpass and one pole lowpass combined filter. The rolloff is 18 dB per octave for the highpass section and 6 dB per octave for the lowpass section.

## 2 Notch + 1 Low



This is a two pole notch and one pole lowpass combined filter. The rolloff is 6 dB per octave for the lowpass section and infinite attenuation at the cutoff frequency, shown at 500 Hz.

## 3 Phase + 1 Low



This is a three pole allpass and one pole lowpass combined filter with 6 dB per octave rolloff.

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