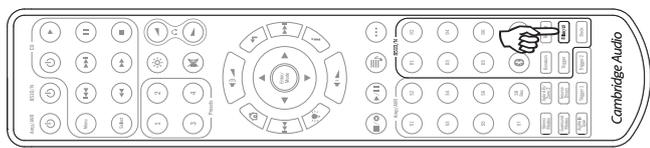
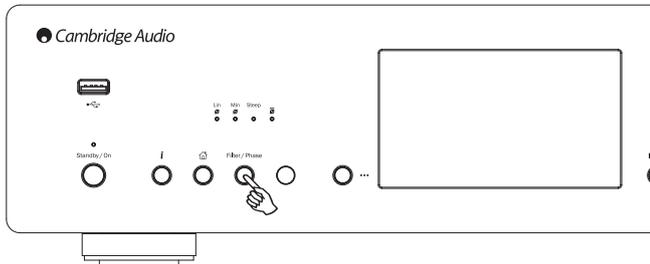


## 851N Filters

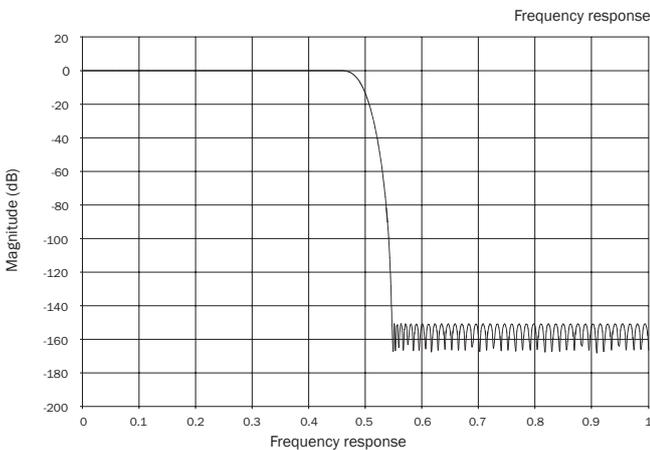
The Filter/Phase button on the front panel and the Filter button on the remote may be used to toggle through three alternative digital filter characteristics.



The 851N DSP has three different Filter functions: Linear Phase, Minimum Phase and Steep. All three filters are highly sophisticated audiophile topologies, optimised specifically for audio playback. In our opinion, these filters offer excellent sound quality but differ subtly in optimisation, hence we've made all three available to you.

**Note:** For clarity, all diagrams show the theoretical response of the DSP itself, excluding any analogue filtering at the DAC output or the anti-aliasing filter applied during recording and/or mastering of the digital source.

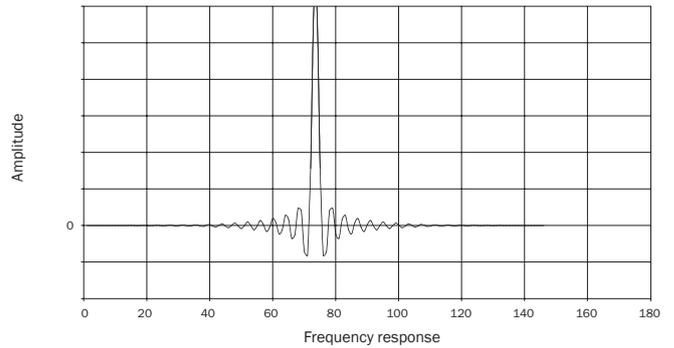
### Linear Phase Filter



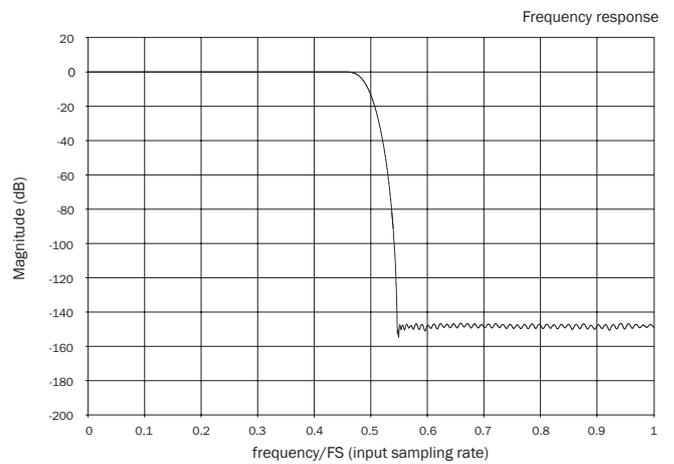
The Linear Phase filter is a highly regarded audio filter offering low ripple in both the pass and stop bands, and what is known as constant group delay. Constant group delay means that audio signals of all frequencies are always delayed by the same amount when passing through the filter. All audio is therefore fully time-coherent at the output.

The trade-off with this type of filter is that due to internal feed-forward in the DSP, its impulse response will exhibit some pre-ringing. In other words, when excited with a theoretical impulse, the output has both a small amount of pre- and post-spike amplitude ringing (albeit well damped).

Frequency response

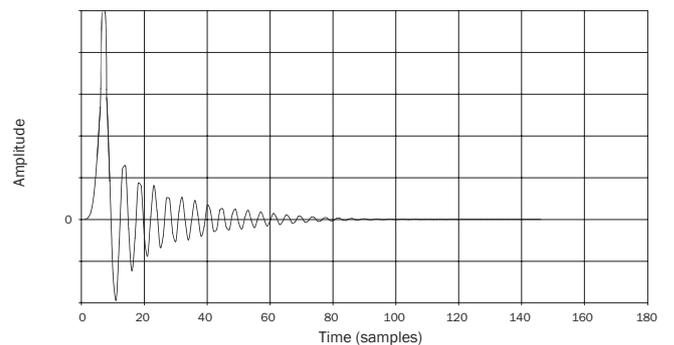


### Minimum Phase Filter

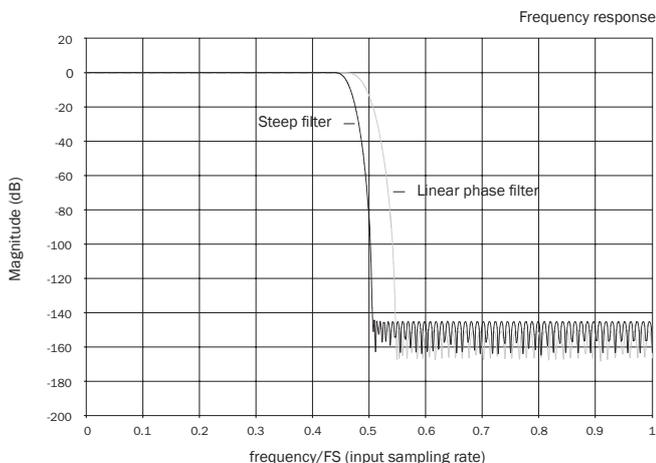


The Minimum Phase filter is another highly regarded audio filter that offers even lower ripple in the pass and stop bands. Unlike the Linear Phase filter, group delay is not constant; however, phase shift is low and the particular benefit with this filter is that the impulse response exhibits no pre-ringing.

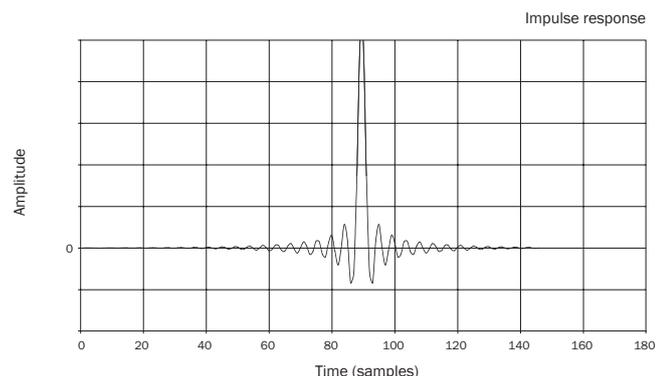
Impulse response



### Step Filter



Our Steep filter is a linear phase filter that has been optimised for stop band attenuation of close-in aliasing images. Here we have traded a little attenuation of the very highest frequency response (-2dB at 20kHz for 44.1kHz material) and a little more pre- and post-ringing for a very steep attenuation just outside the pass band. The Steep filter is able to attenuate aliasing at 22kHz by some 80dB for 44.1kHz material for instance.



**Note:** All filters exhibit the same ultimate roll-off of approximately 140dB.

The following table shows the filter stop band attenuation for 44.1kHz material:

	Linear Phase	Minimum Phase	Steep
Roll-off at 20kHz	-0.1dB	-0.1dB	-2dB
Roll-off at 22kHz	-10dB	-10dB	-82dB
Ultimate roll-off	140dB	140dB	140dB

We encourage you to experiment with the filters to determine which sound best to your ears and using your source equipment/programme material. The 851N remembers and recalls the selected filter type for each input individually, making it possible, for example, to select Steep for the USB input and Linear Phase for Digital Input 1, and so on.