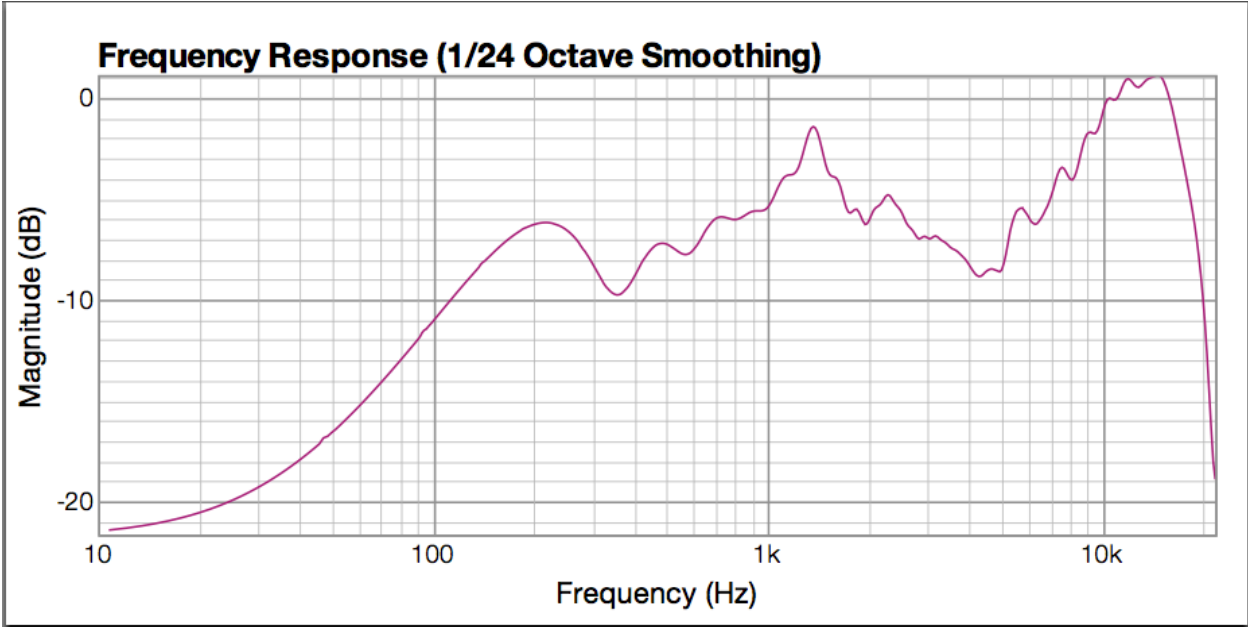


Speaker Tuning Report
Russell Goddard

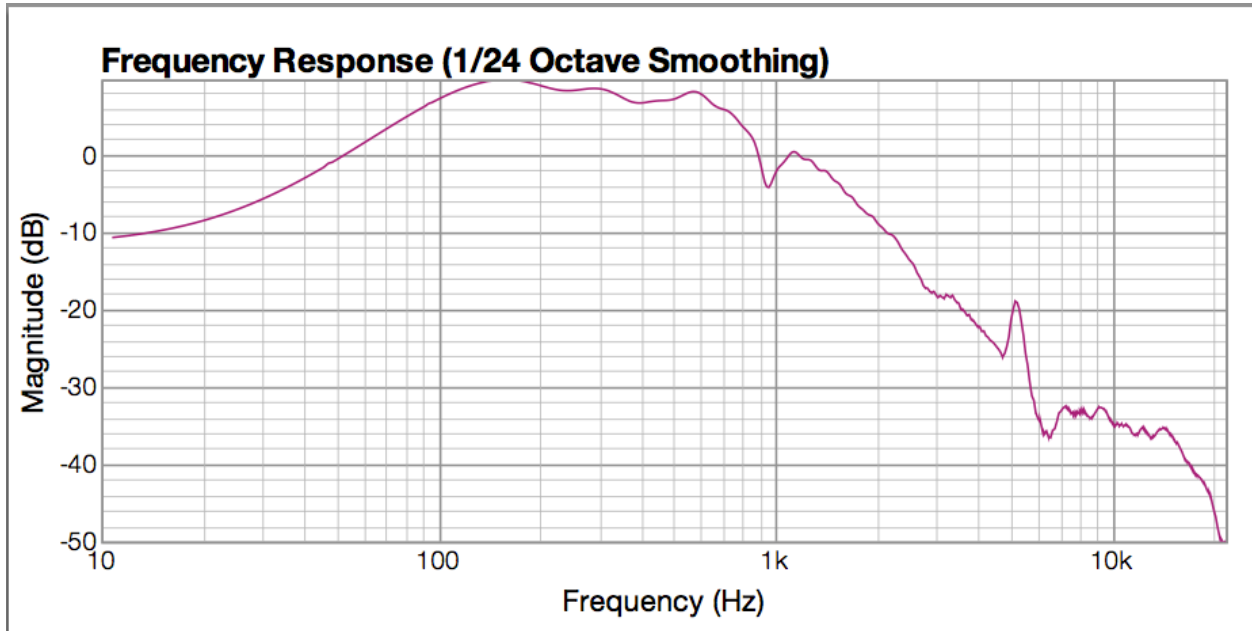
FA 4740
Spring 2012

Initial Testing

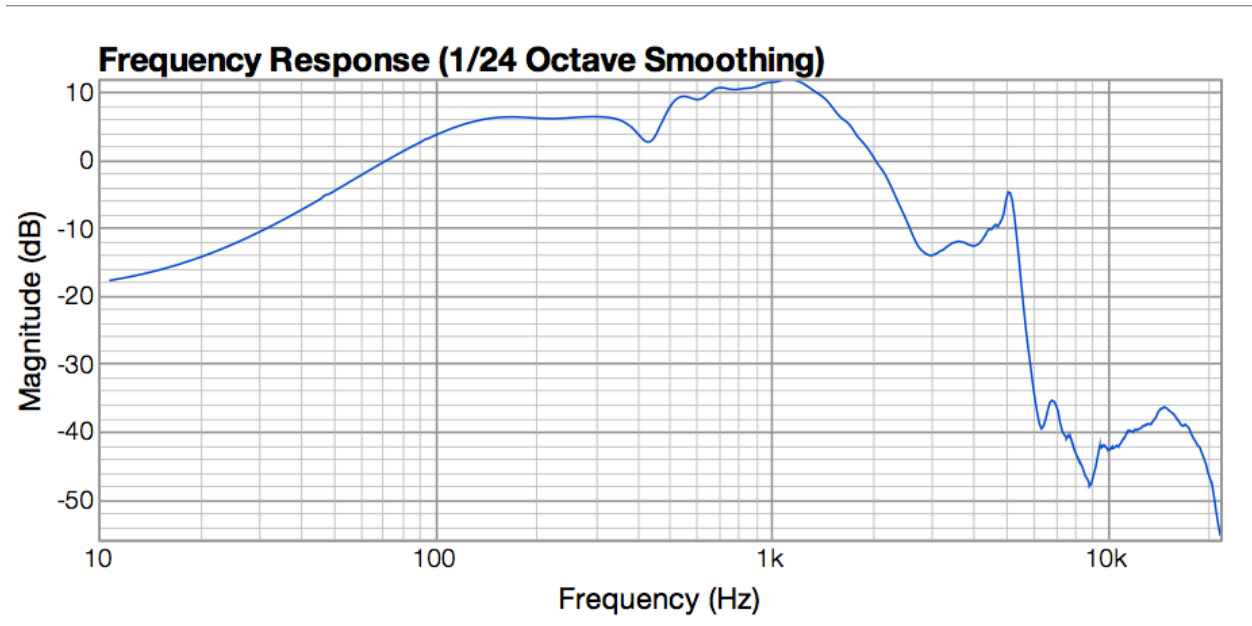
1st Crossover



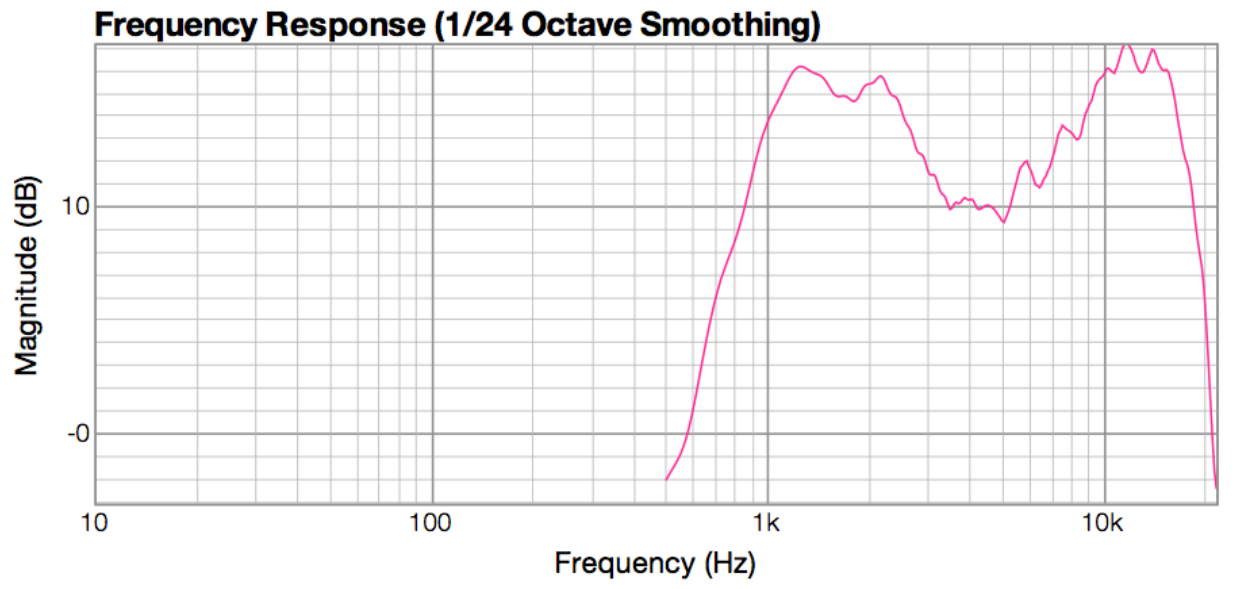
.5 Woofer



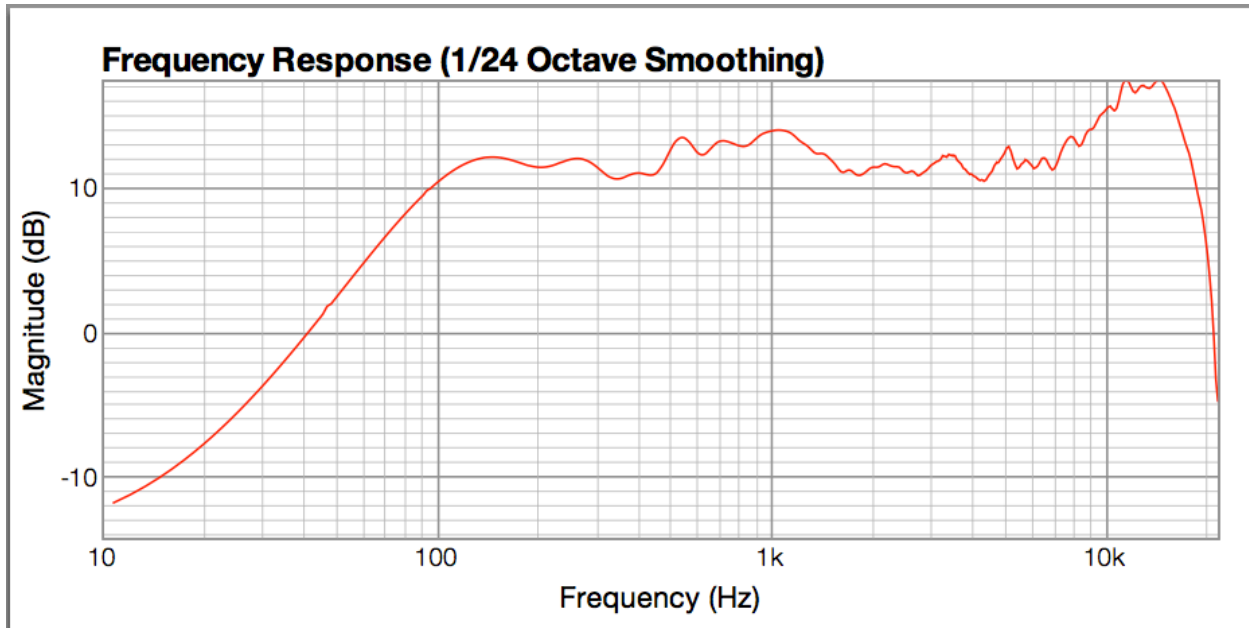
Mid Woofer



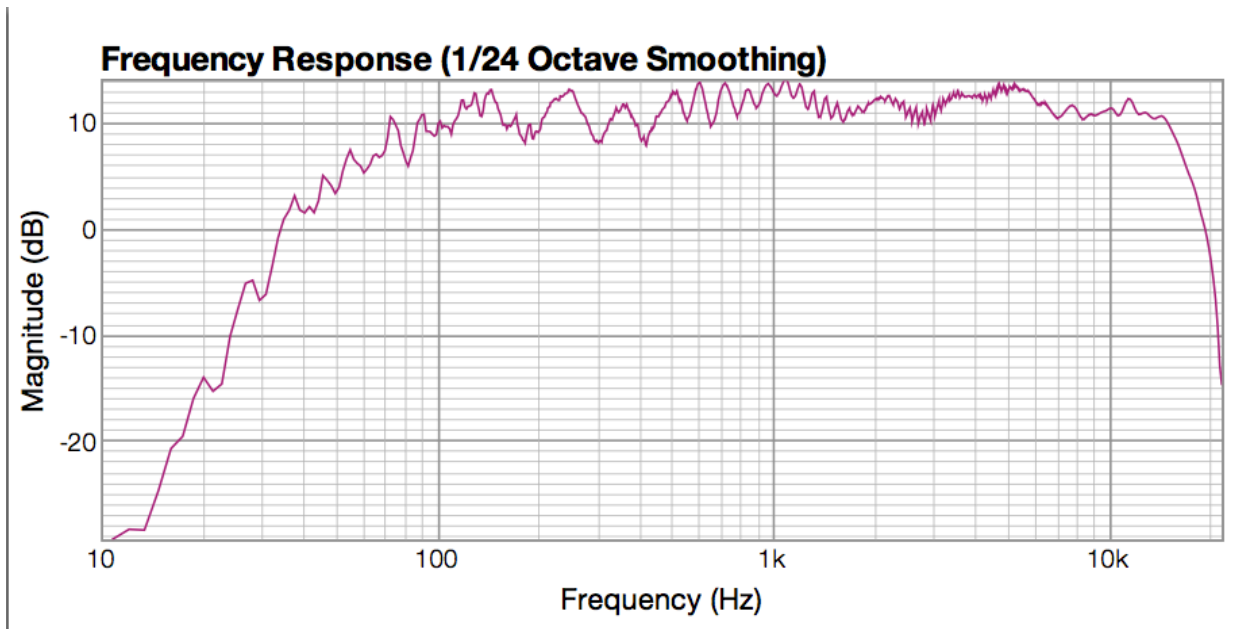
Tweeter



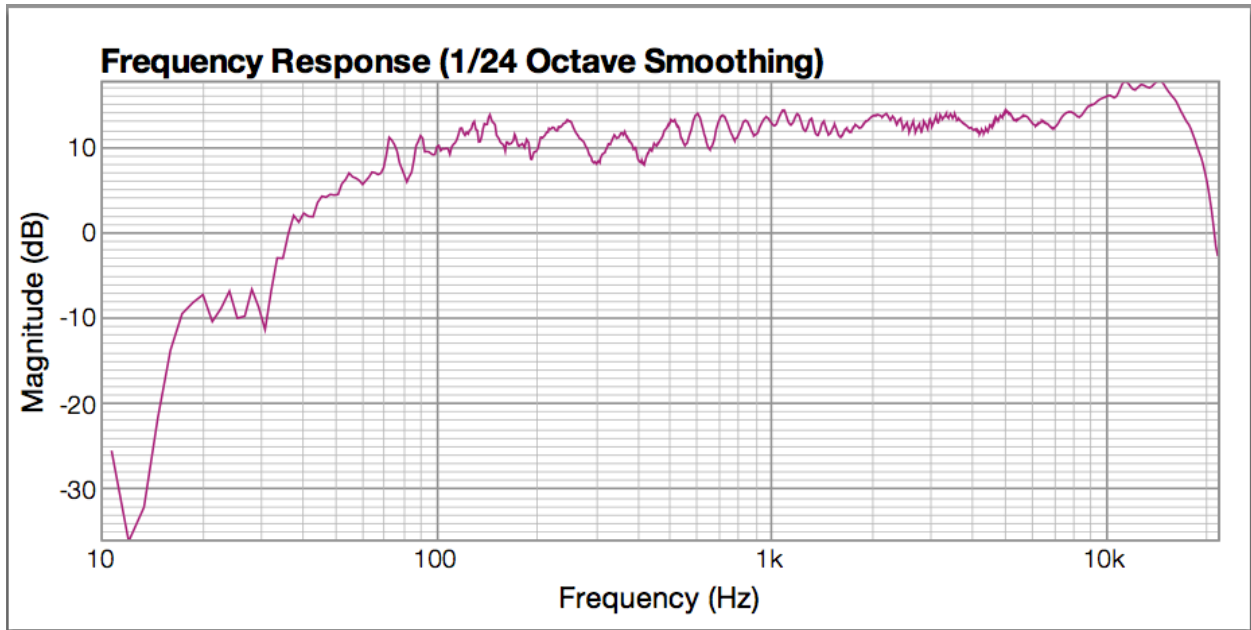
After my initial test my biggest focus was smoothing out the spike at my crossover to the tweeter and adding a high shelf to my tweeter to bring that down. My initial crossover was at 1800 Hz I first moved my tweeter up to 2000 Hz and my mid woofer down to 1400 Hz, which brought the spike down, but there was still a noticeable ridge, caused by the mid woofer.



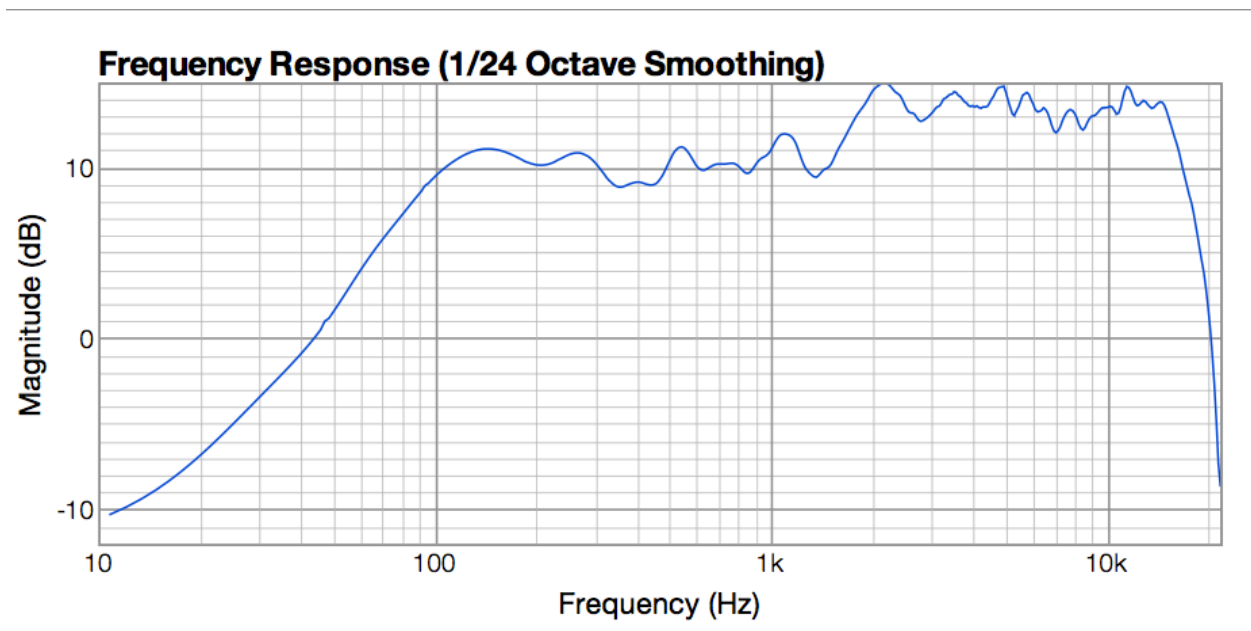
After the tweeter was moved up I moved to focus on the rise in the tweeter, one of the early successes I had was simply placing an inductor in series with the tweeter.



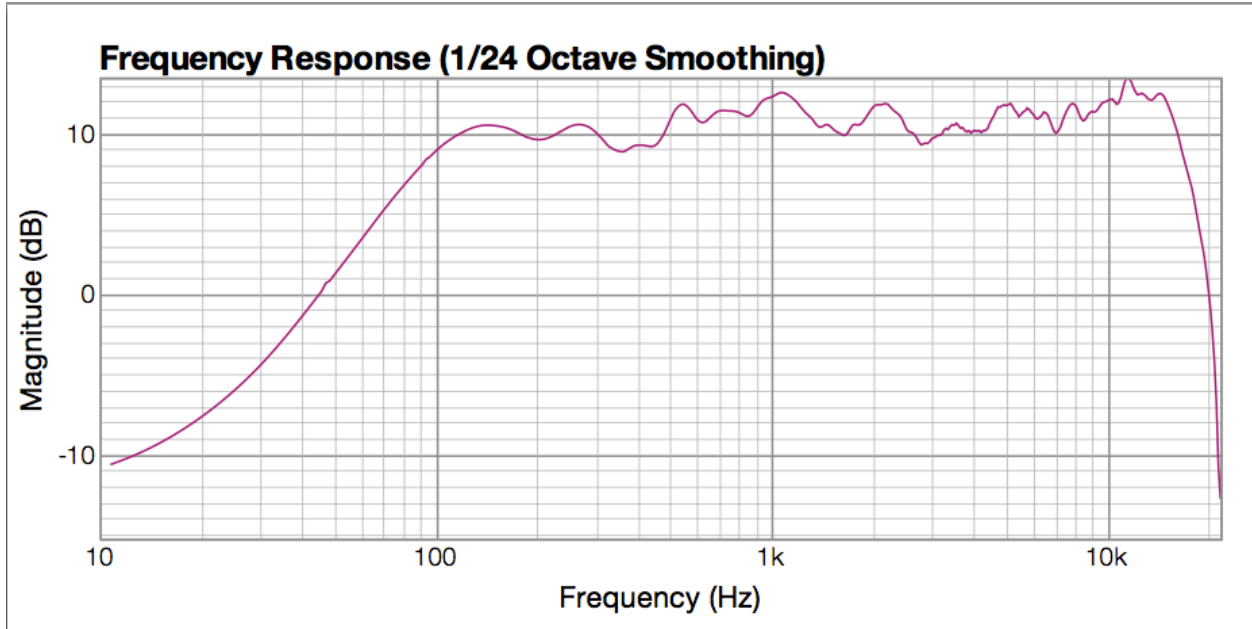
Knowing I could do better than that I spent a lot of time experimenting with different high pass and high shelf filters. One of the best ones that I came up with was a high pass filter with a capacitor going to ground.



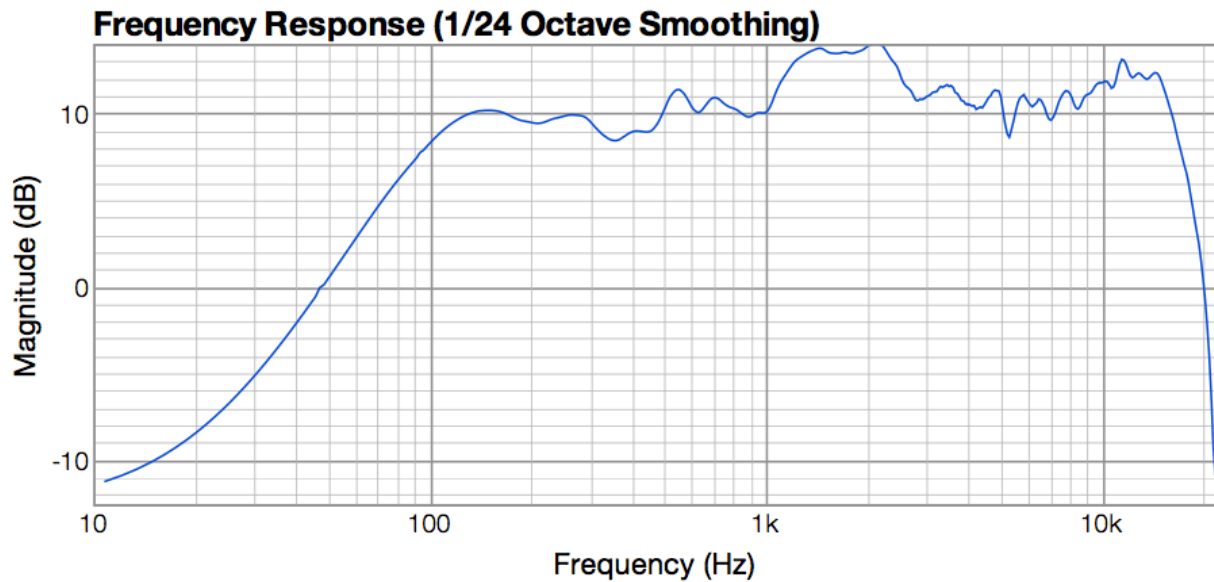
Ultimately a high shelf filter was placed on the tweeter which flattened the tweeter.



After padding the tweeter the response was much better.



Unfortunately inverting the phase on my tweeter resulted in summing at the crossover.



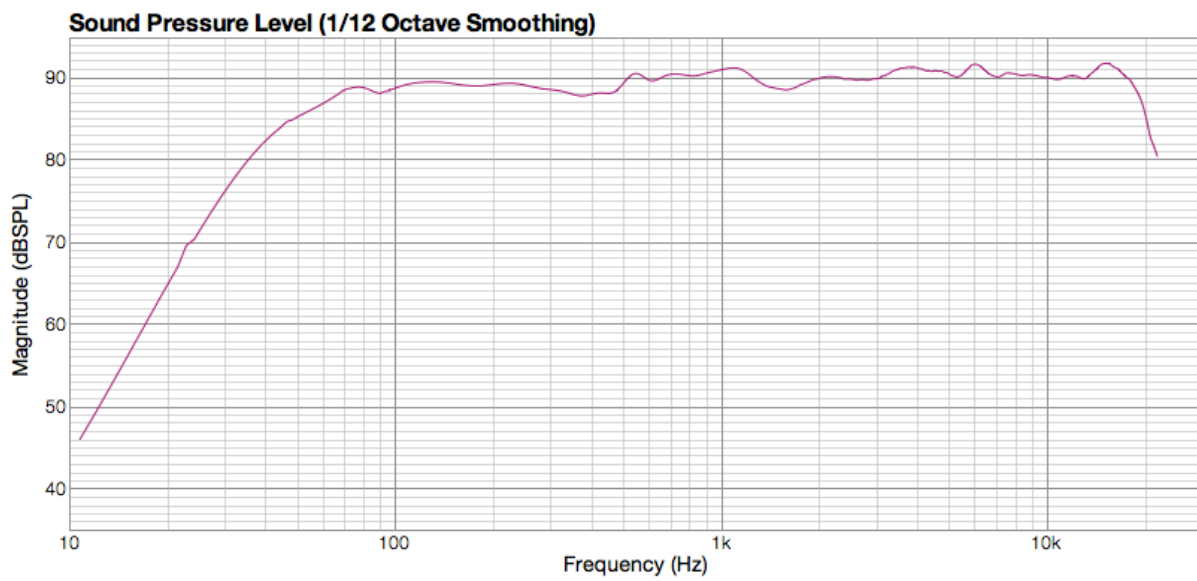
To fix this my mid woofer was pulled down to 1000 Hz, which with minor tweaks to the pad on my tweeter resulted in the final testing response.

Final Testing

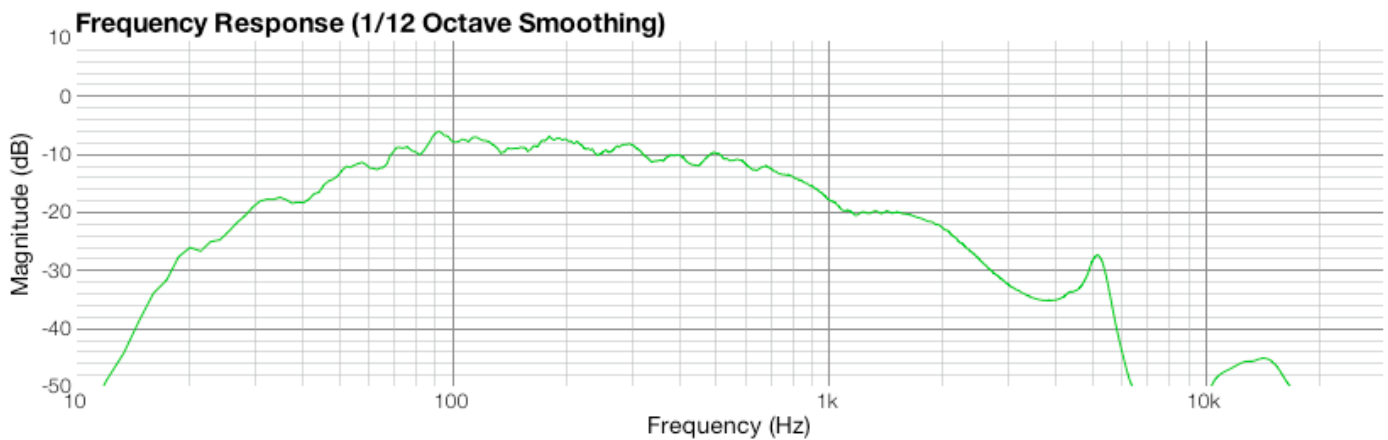
1. Overall Loudspeaker Performance

a. Frequency Response

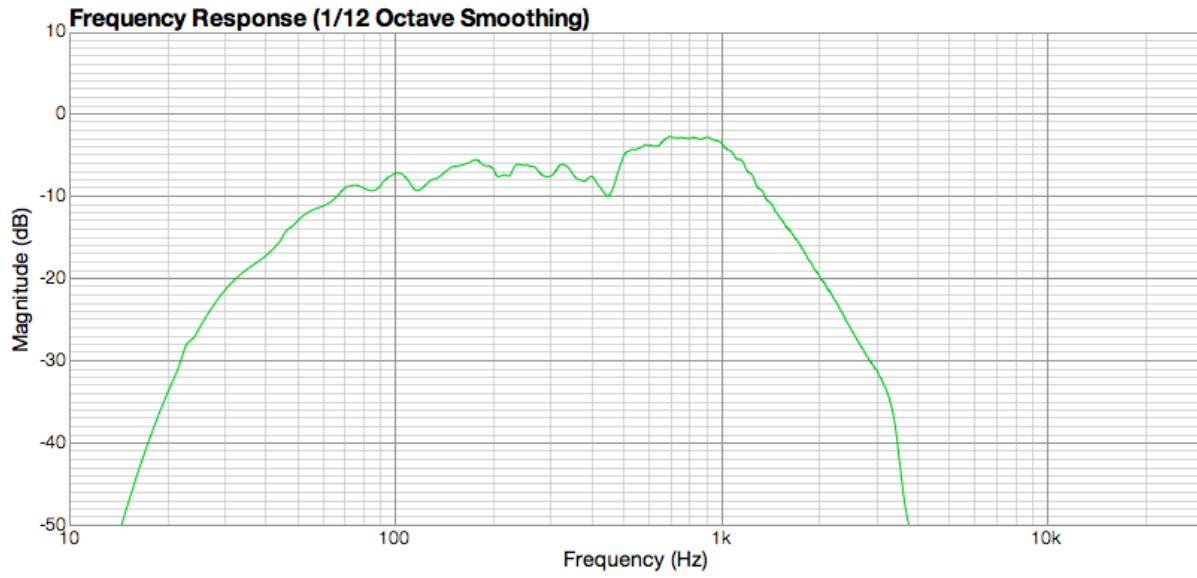
i. Overall System Response



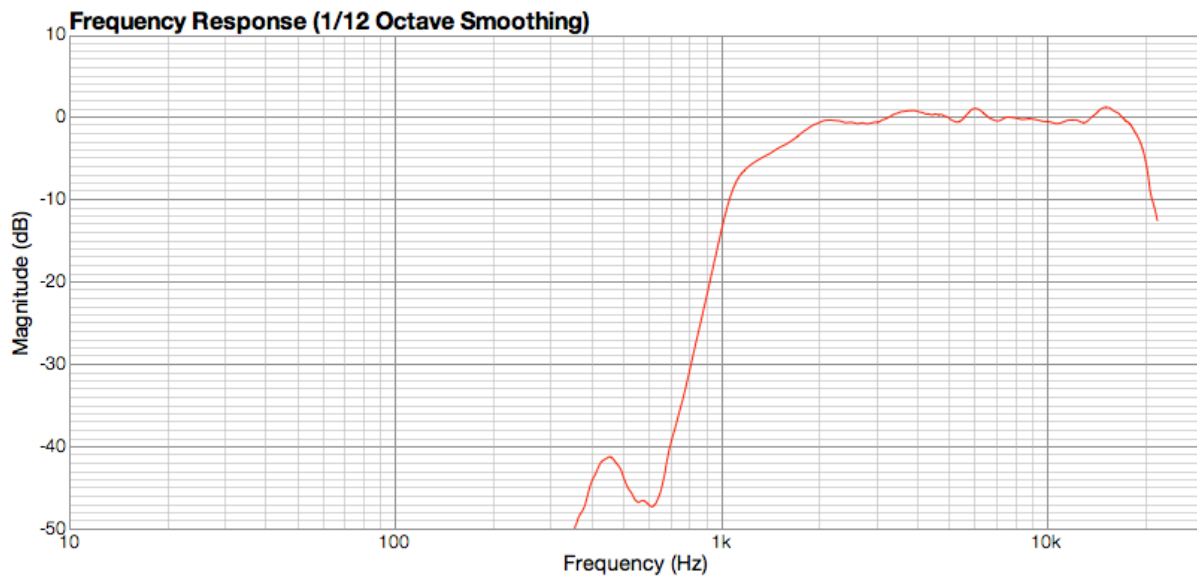
ii. .5 Woofer Response



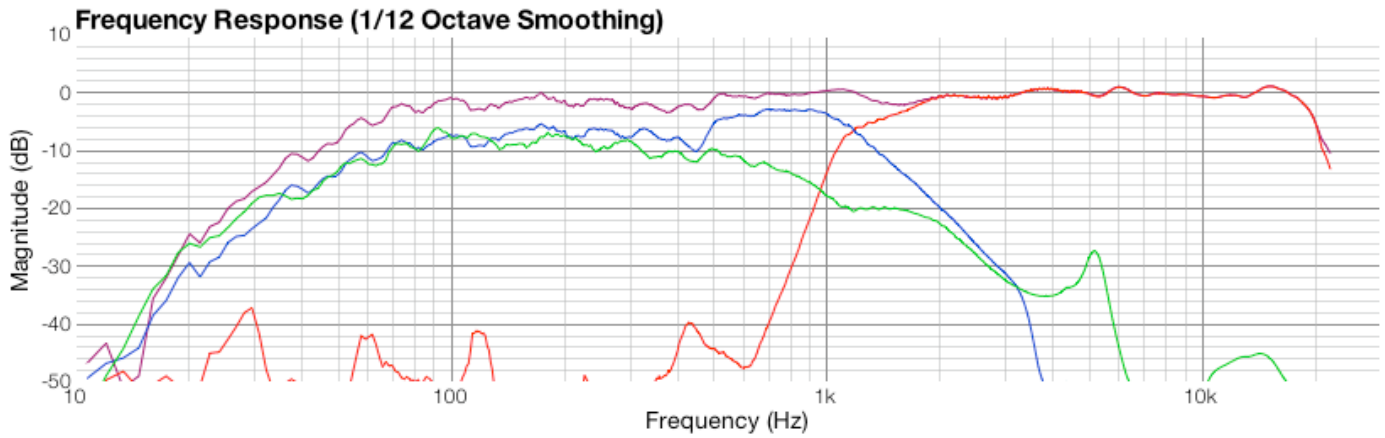
iii. Mid Woofer Response



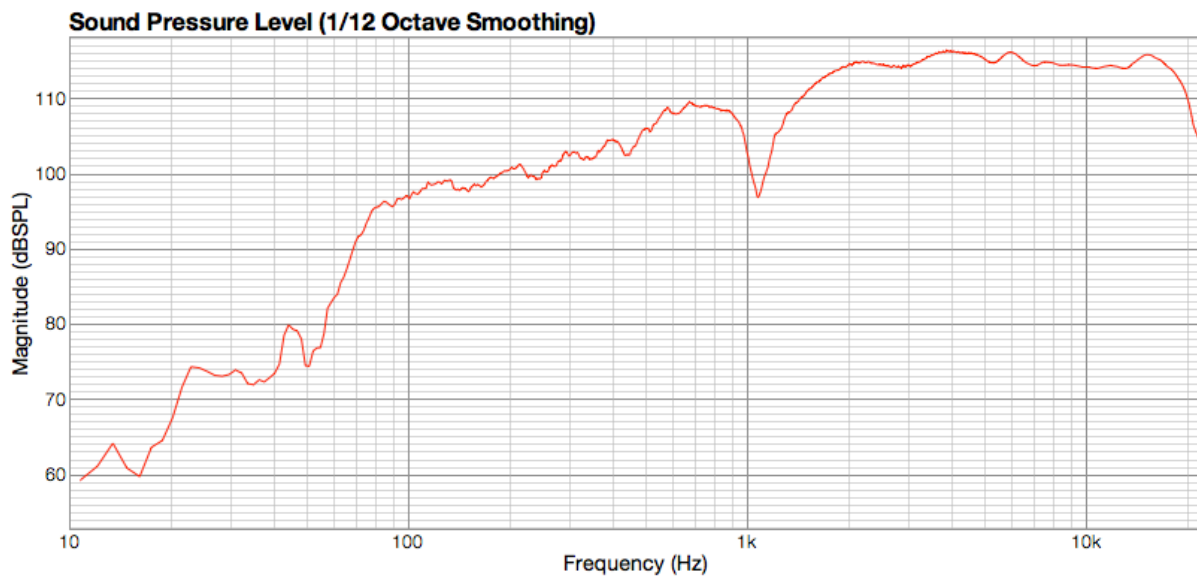
iv. Tweeter Response



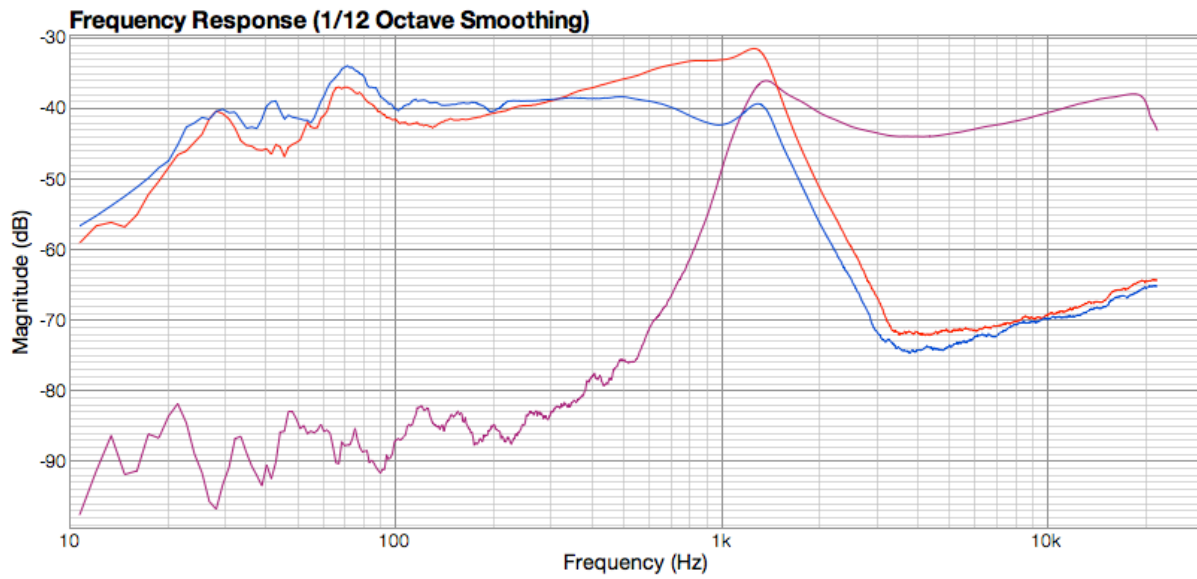
v. Everything



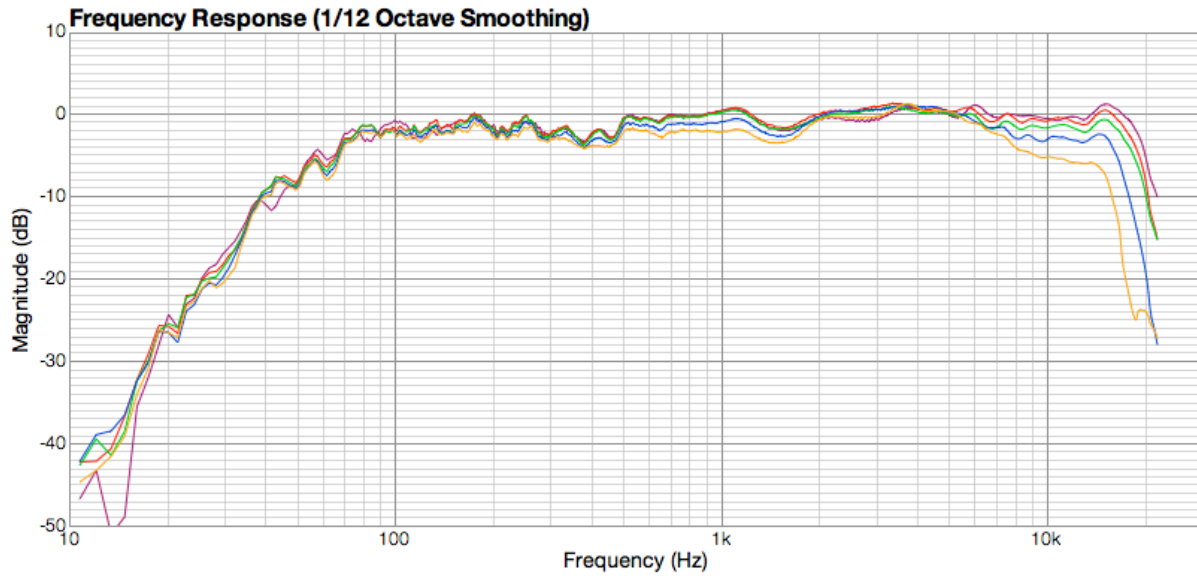
b. Mid Woofer Reverse Polarity



c. X-over Filter Response

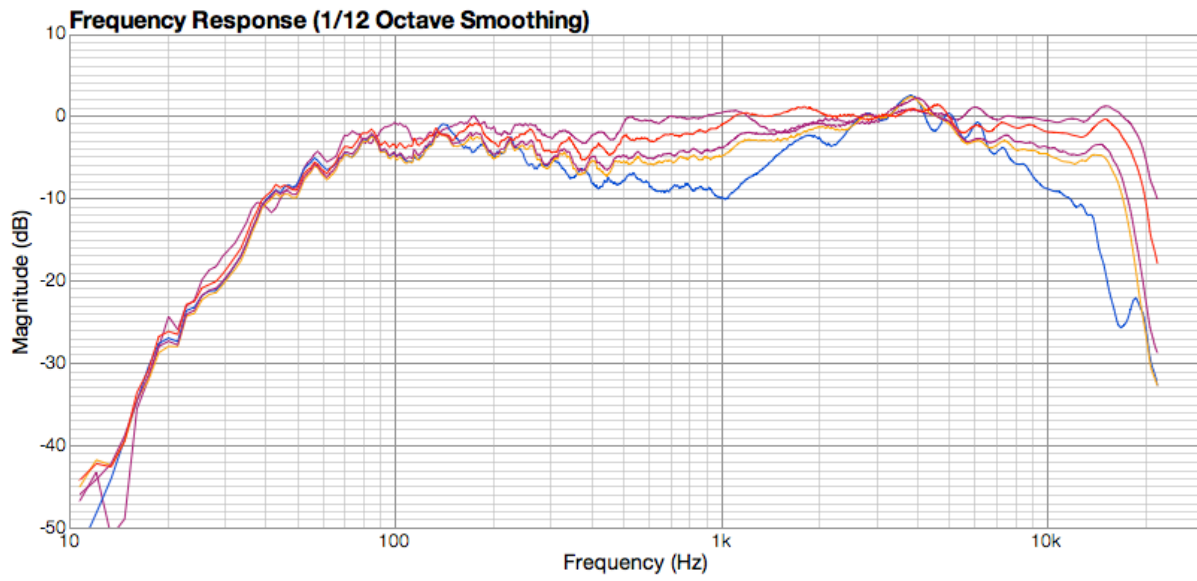


d. Horizontal Off Axis Response



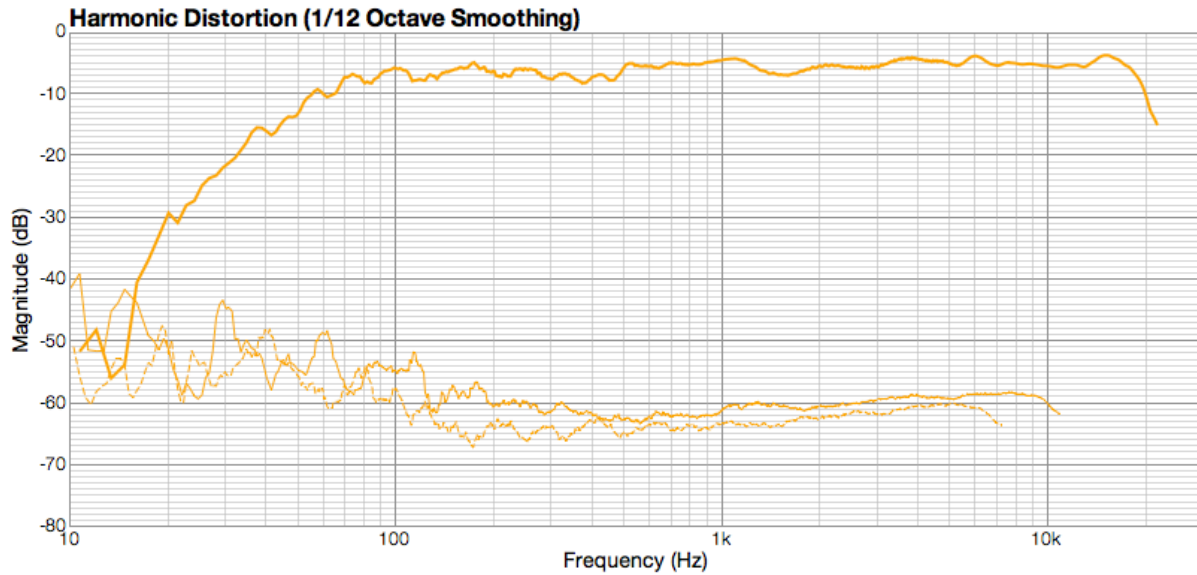
Purple: On Axis, Red: 15°, Green: 30°, Blue: 45°, Orange 60°

e. Vertical Off Axis Response

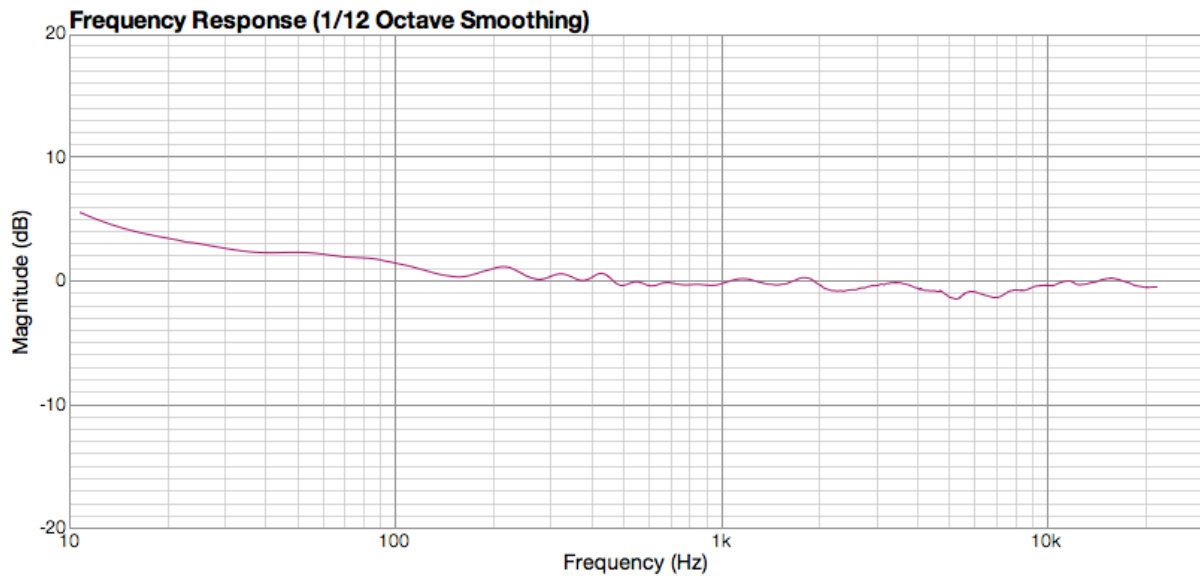


Purple: On Axis, Red: 15°, Green: 30°, Blue: 45°, Orange 60°

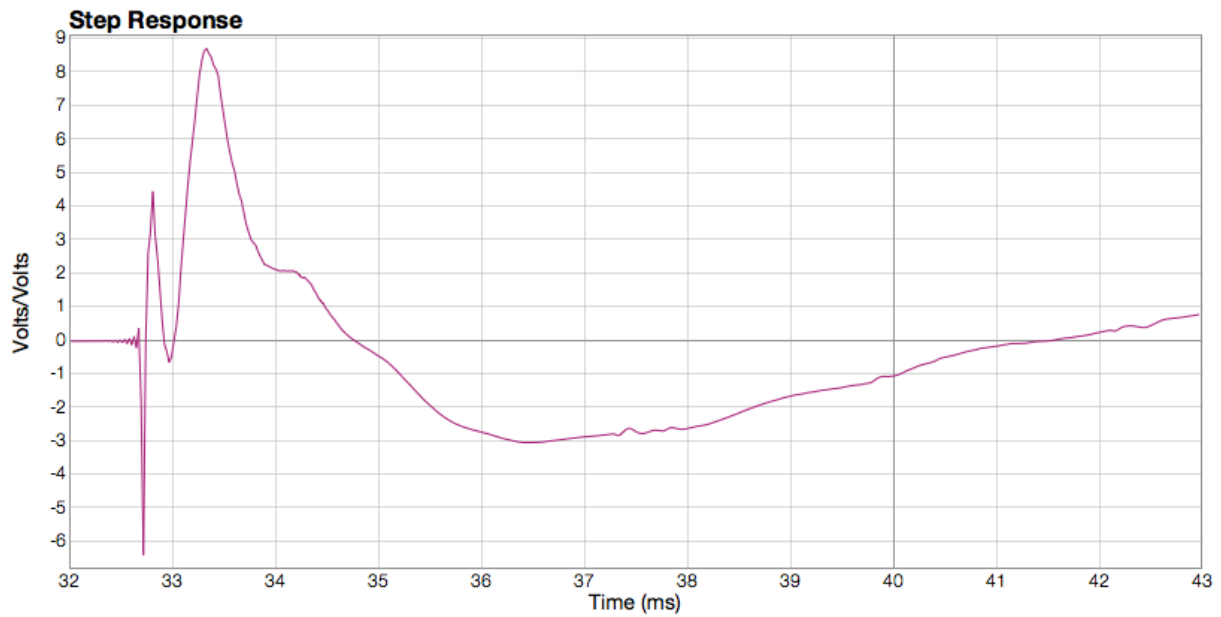
f. Harmonic Distortion



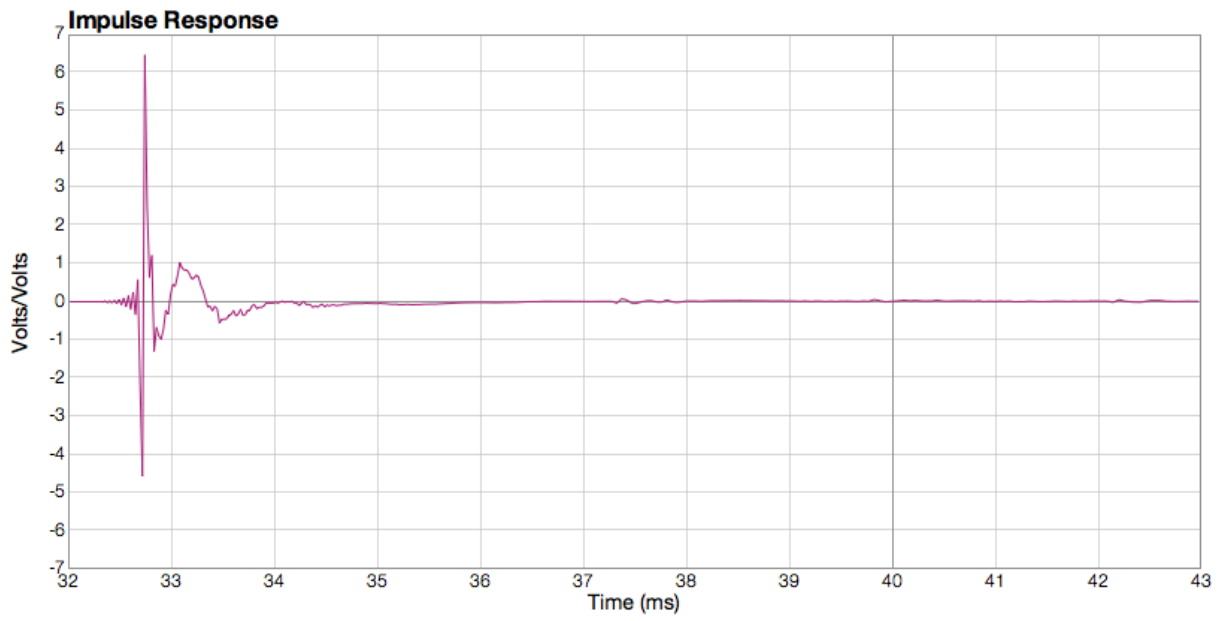
g. Left/Right Difference



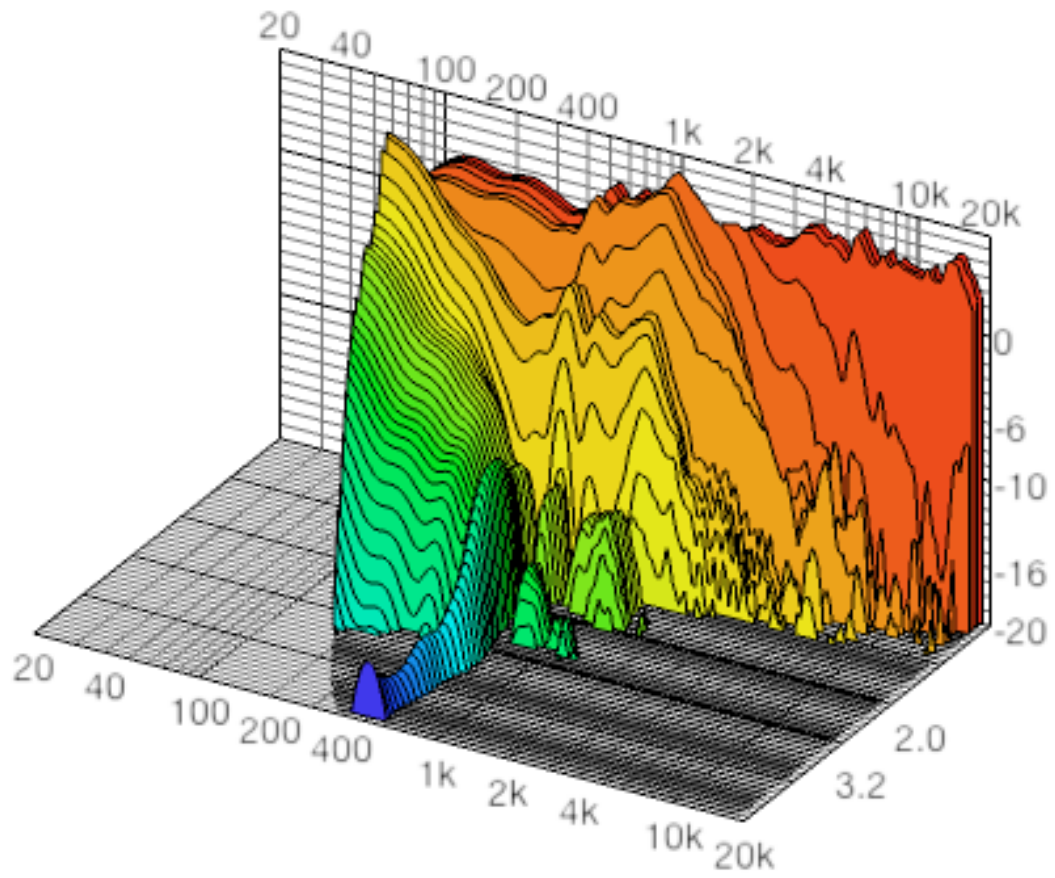
h. Step Response



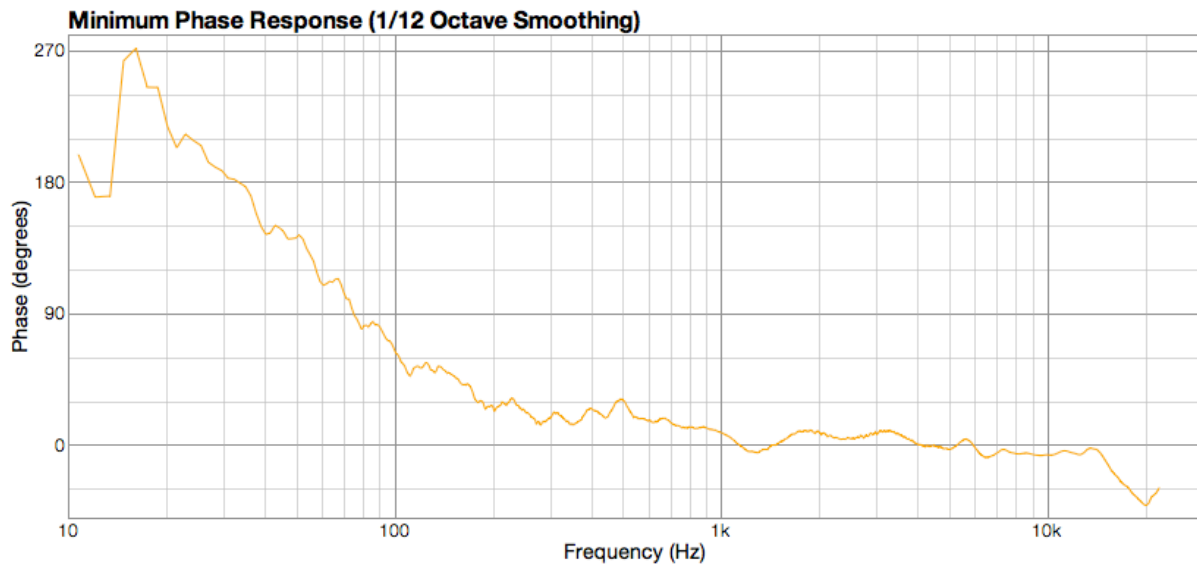
i. Impulse Response



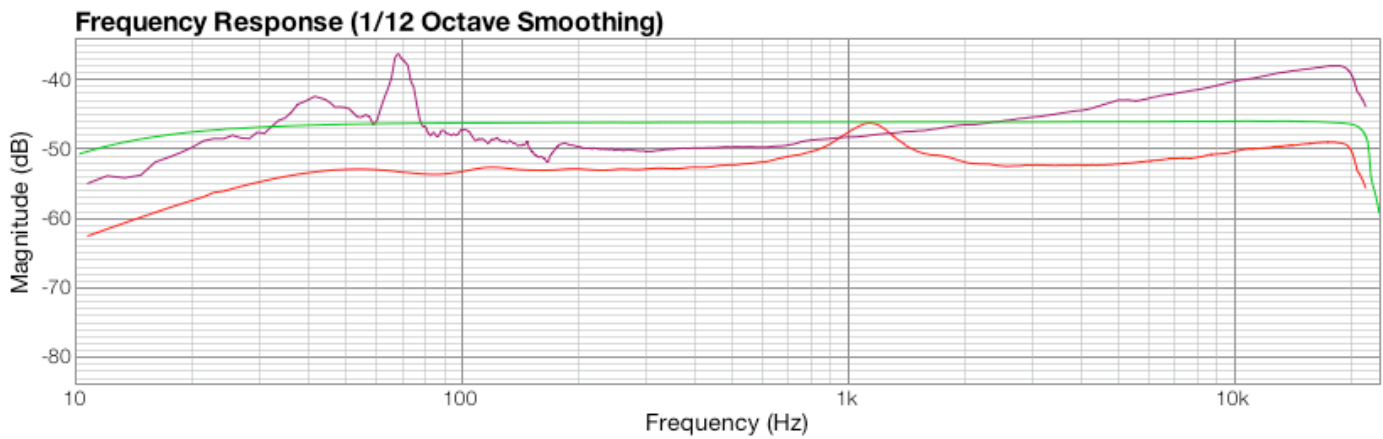
j. Waterfall Plot



k. Minimum Phase Response



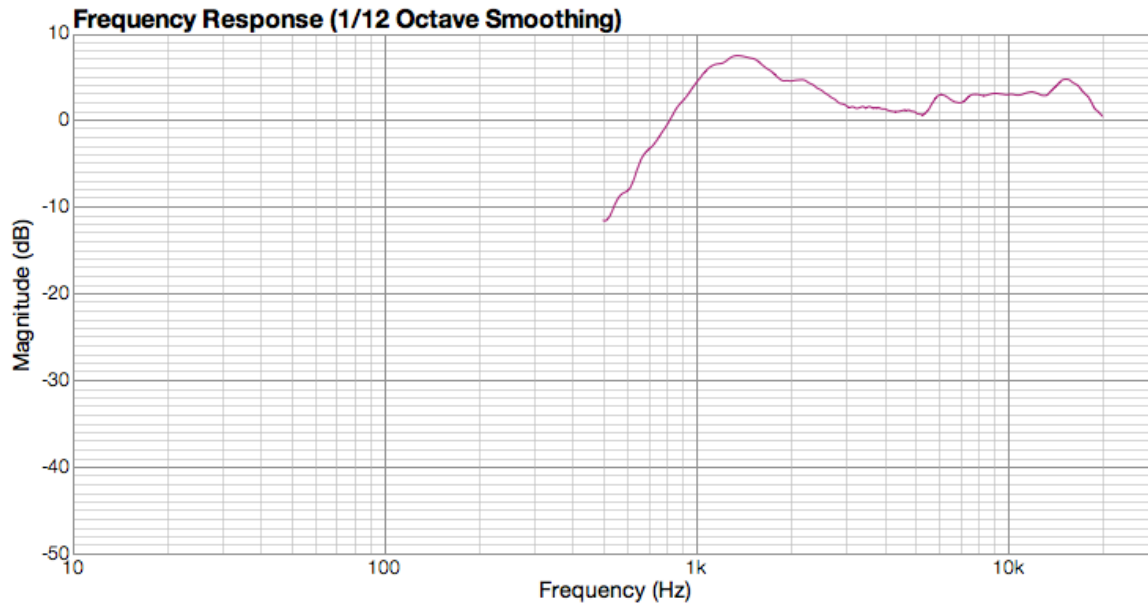
l. Woofer/Tweeter Impedance Plot



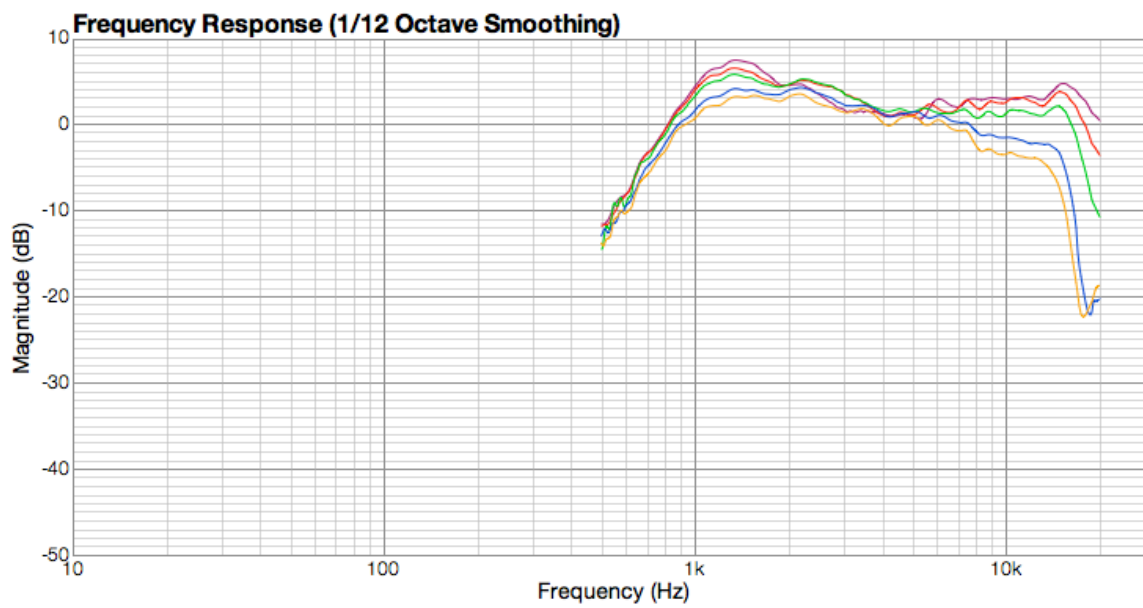
Purple: Woofer Impedance, Red: Tweeter Impedance, Green: 8 Ohm Resistor

2. Tweeter Performance

a. Frequency Response

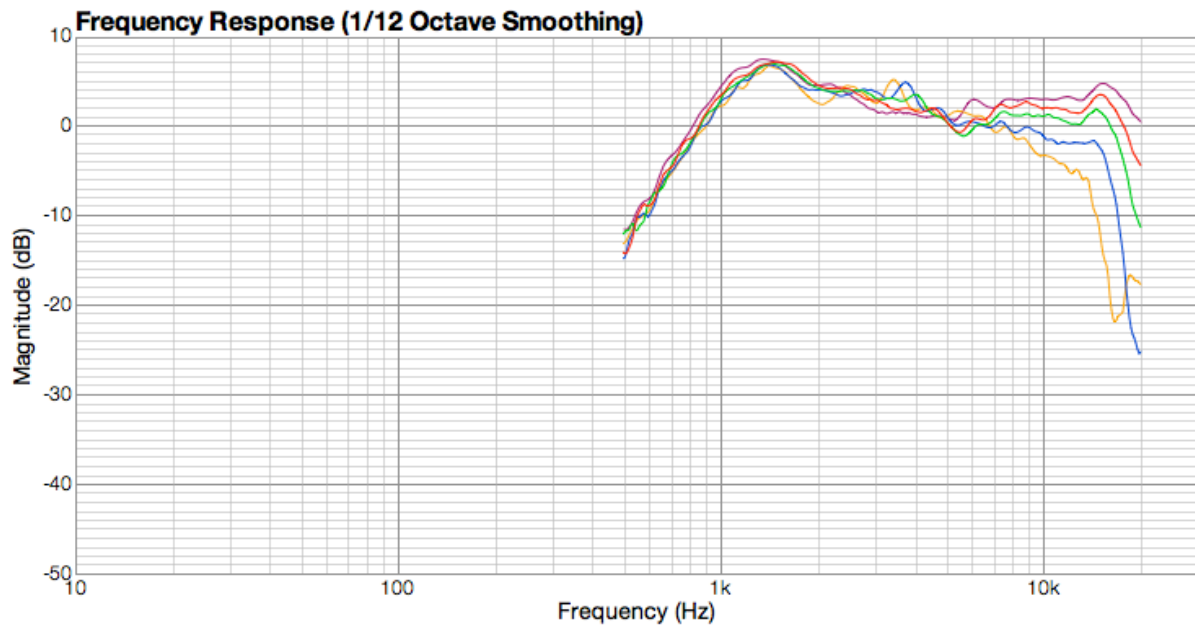


b. Horizontal Off Axis Response



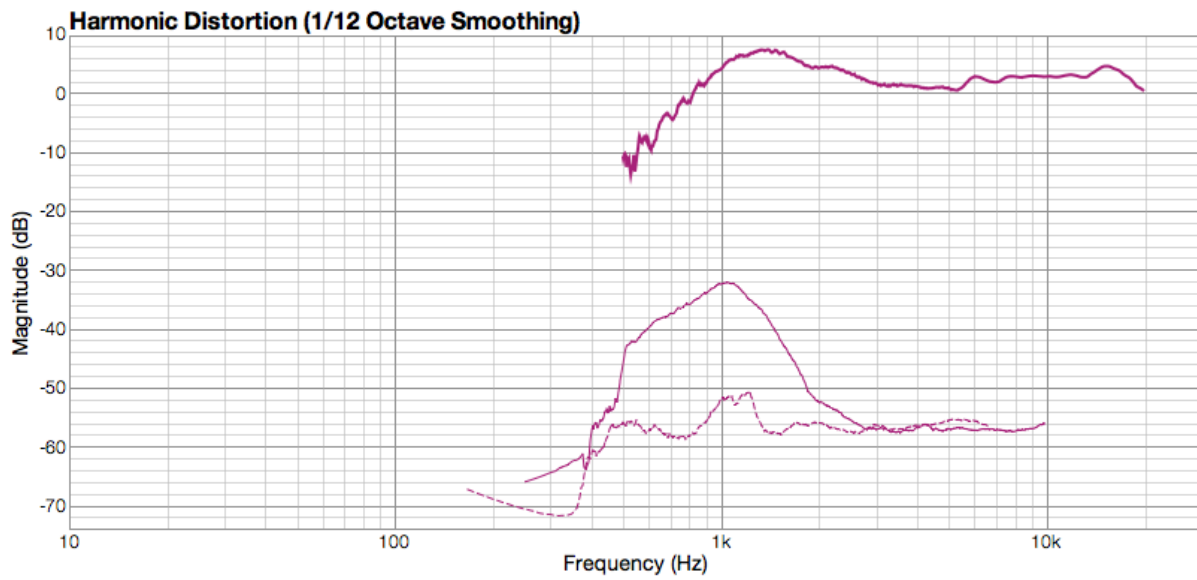
Purple: On Axis, Red: 15°, Green: 30°, Blue: 45°, Orange 60°

c. Vertical Off Axis Response

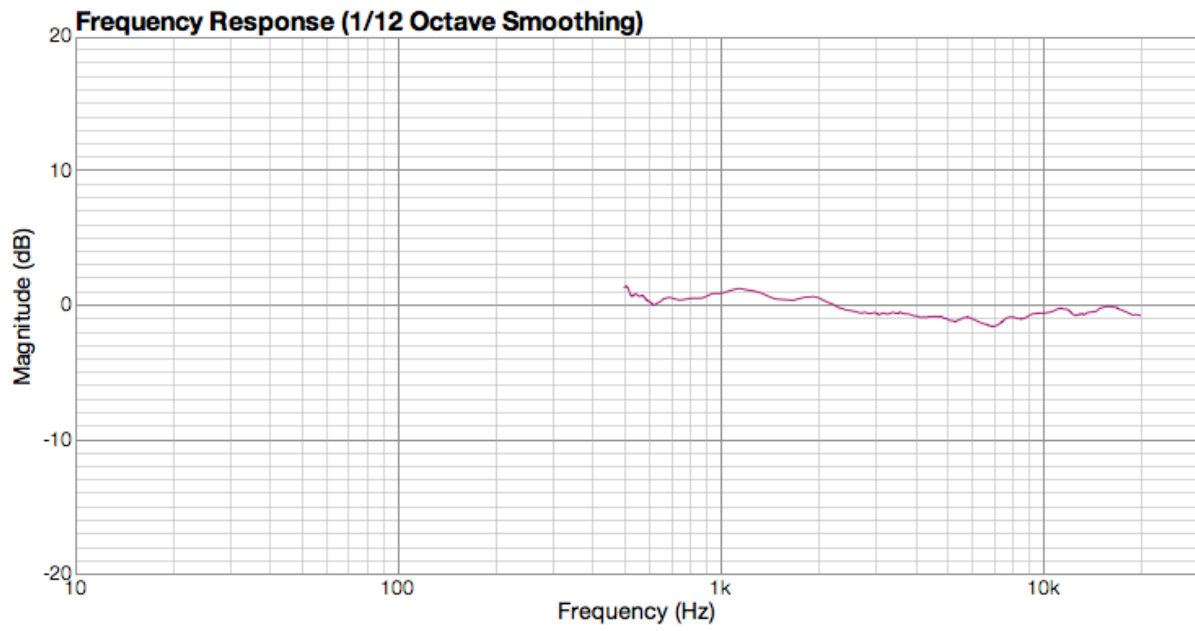


Purple: On Axis, Red: 15°, Green: 30°, Blue: 45°, Orange 60°

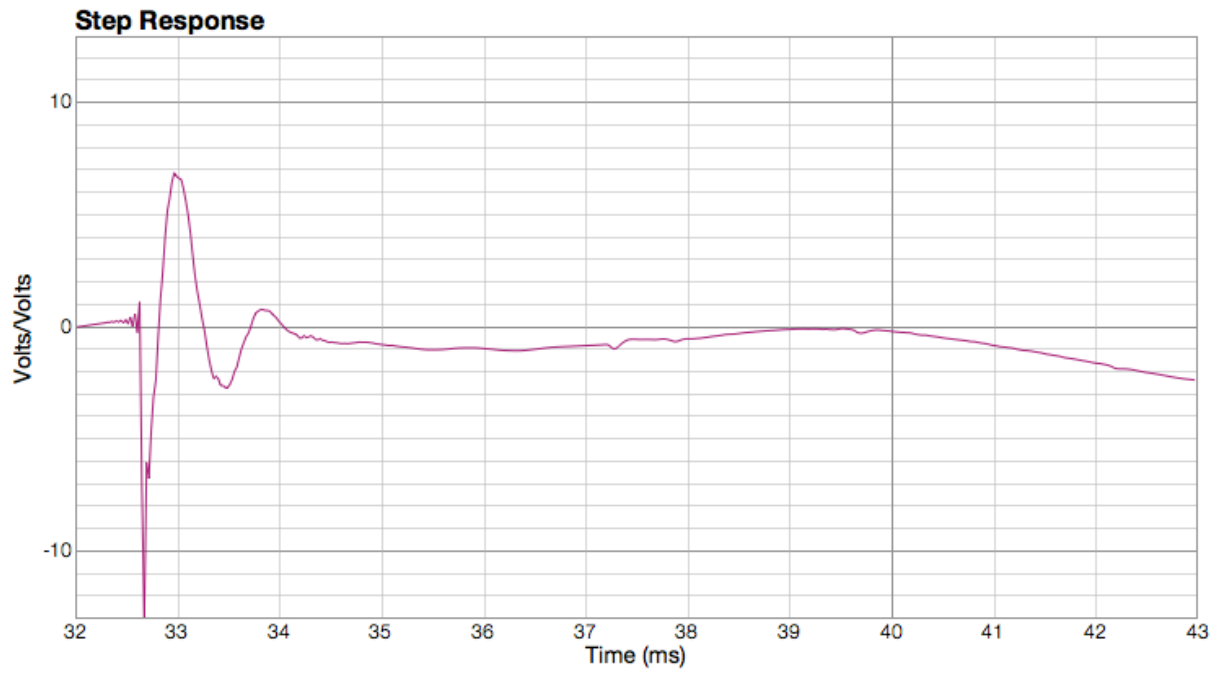
d. Harmonic Distortion



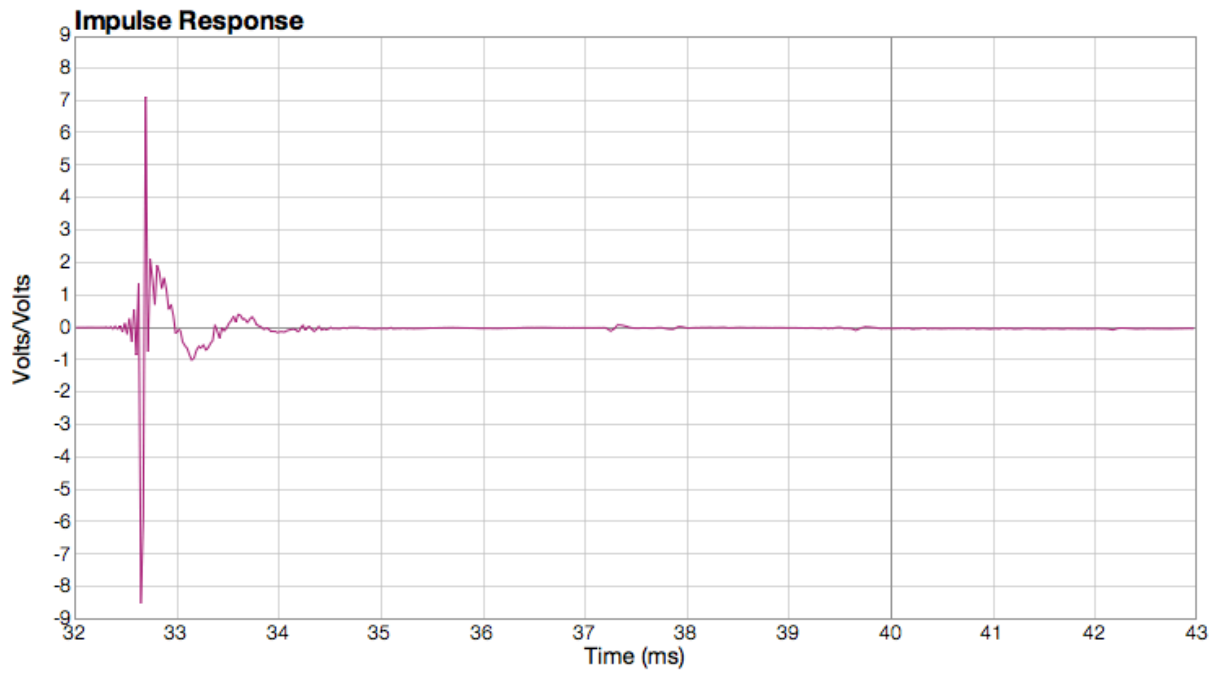
e. Left/Right Difference



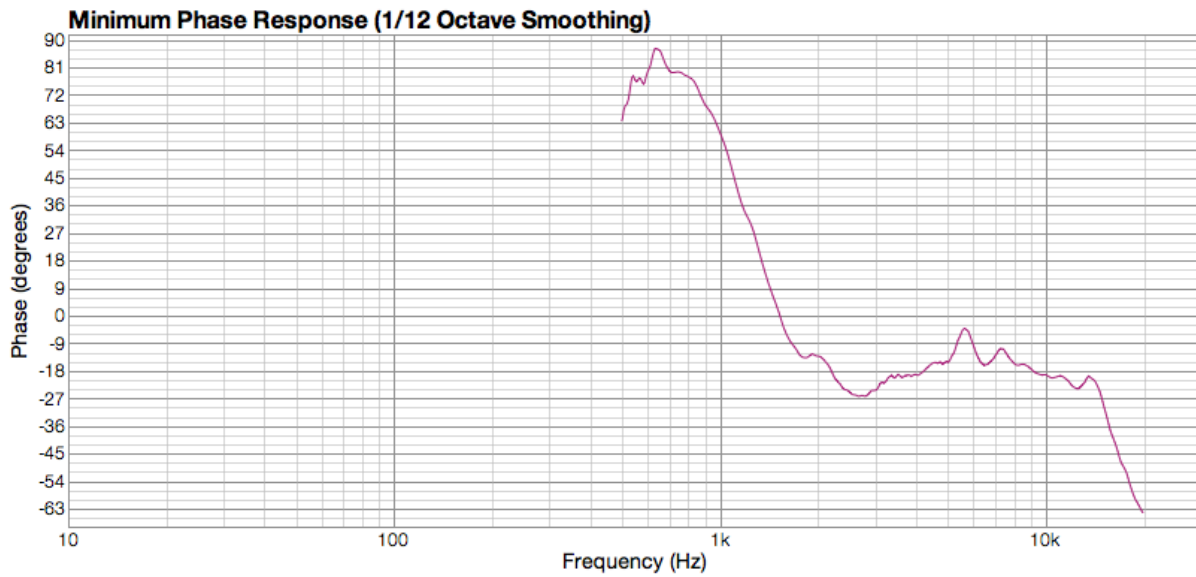
f. Step Response



g. Impulse Response

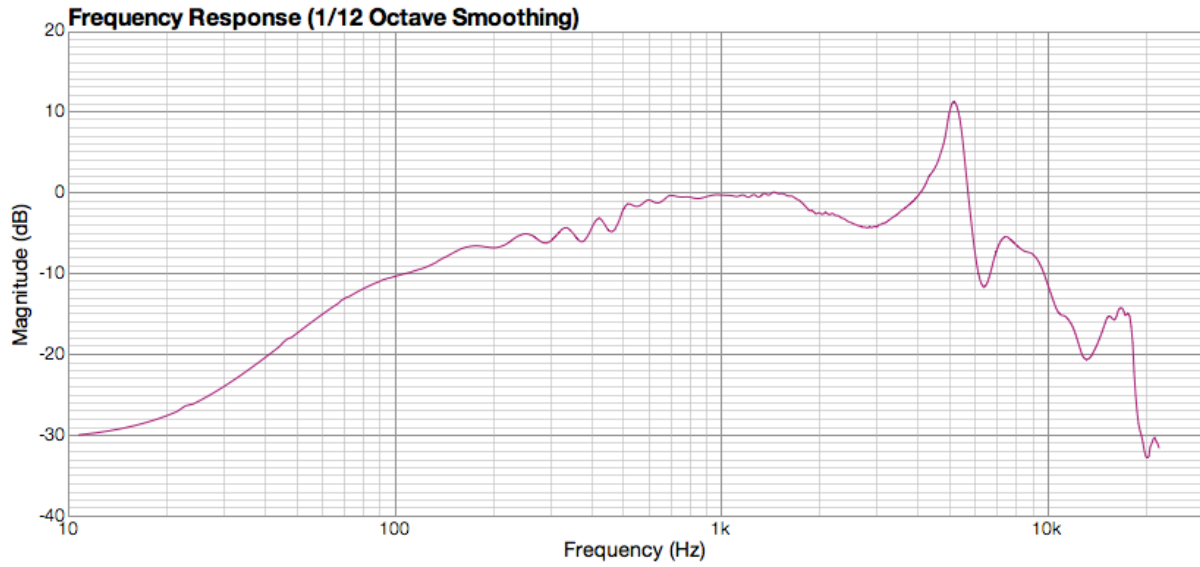


h. Minimum Phase Response

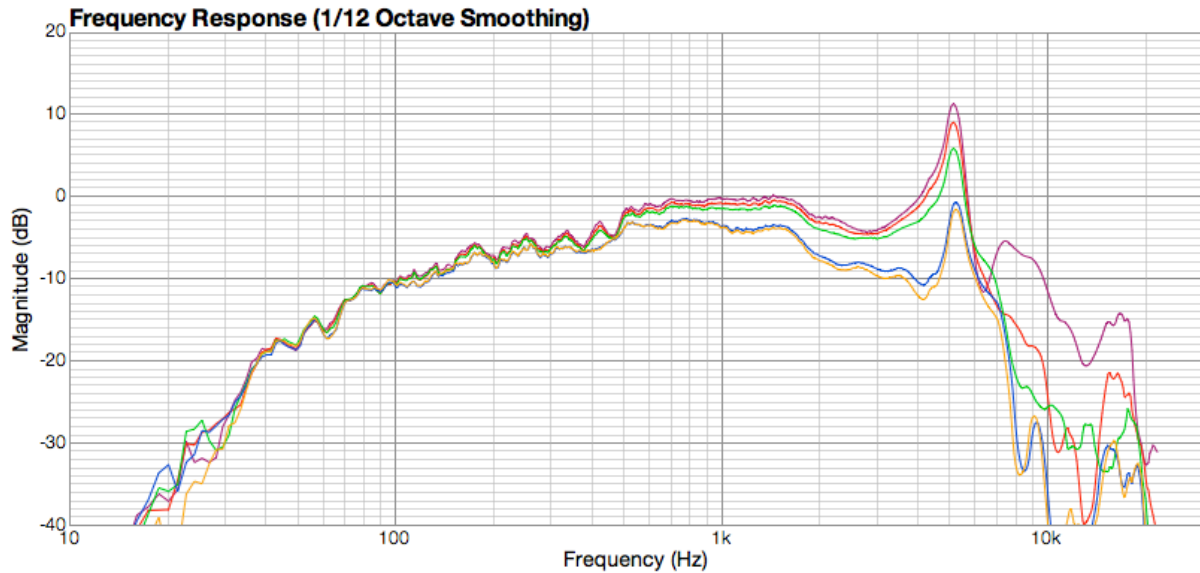


3. Woofer Performance

a. Frequency Response

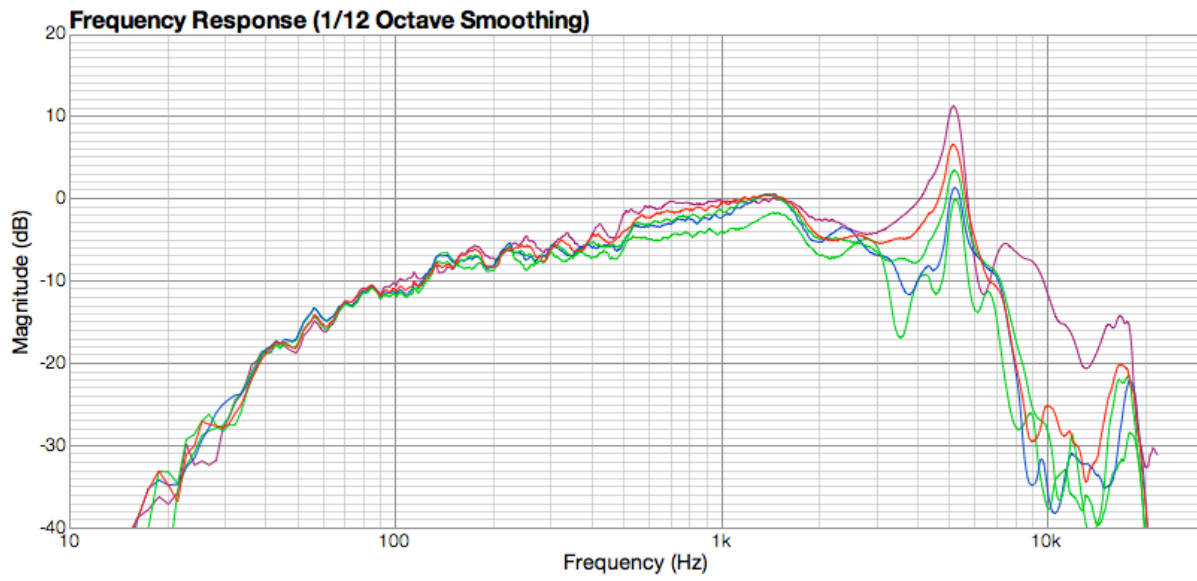


b. Horizontal Off Axis Response



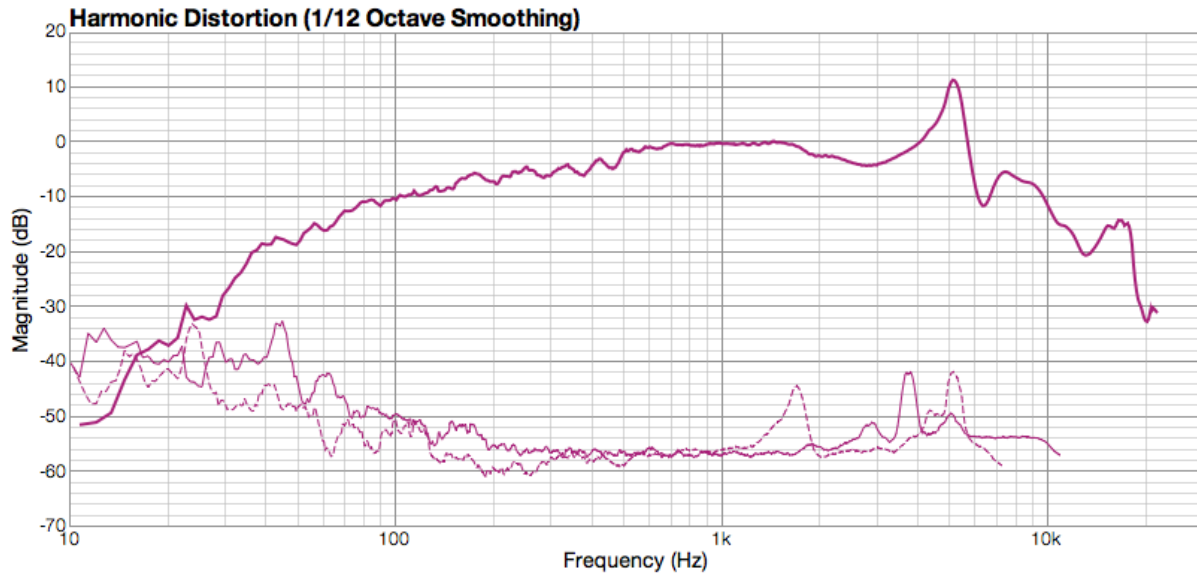
Purple: On Axis, Red: 15°, Green: 30°, Blue: 45°, Orange 60°

c. Vertical Off Axis Response

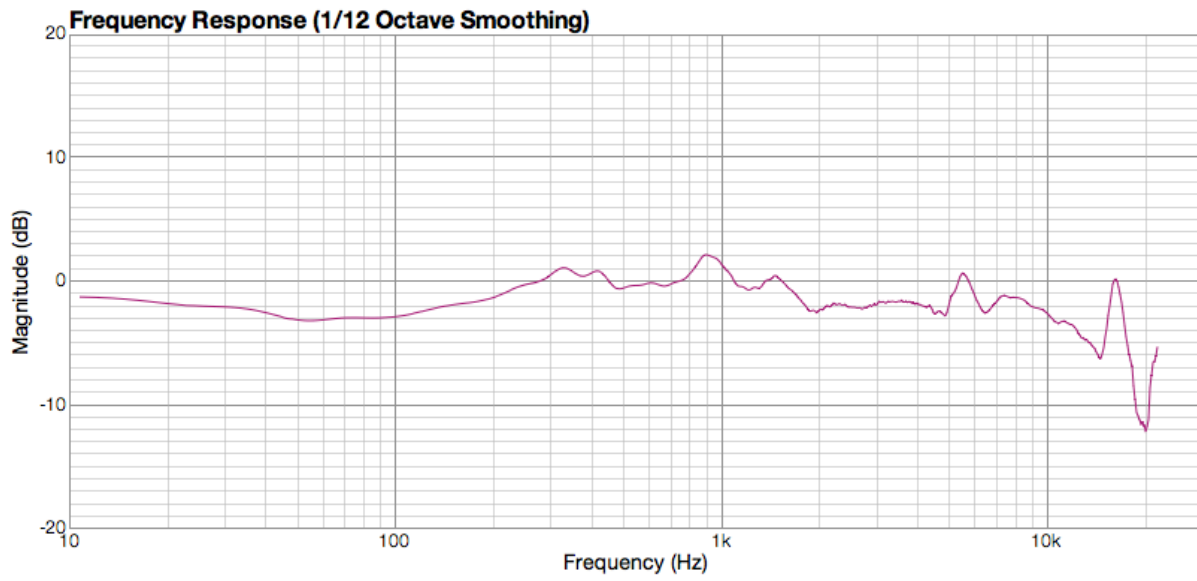


Purple: On Axis, Red: 15°, Green: 30°, Blue: 45°, Orange 60°

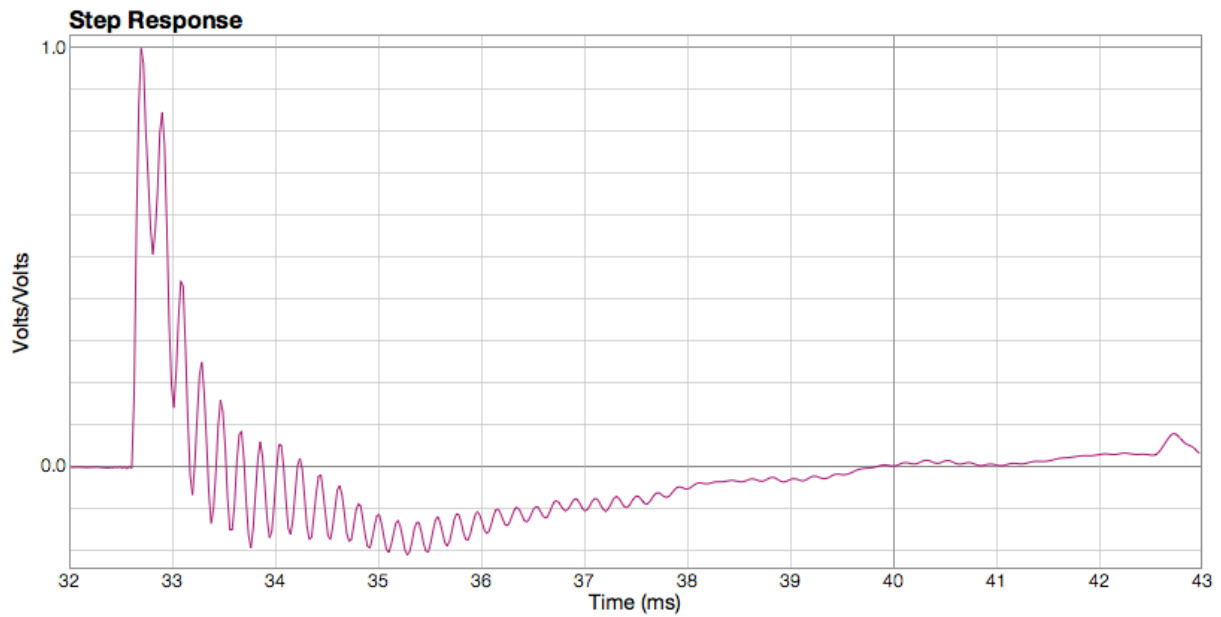
d. Harmonic Distortion



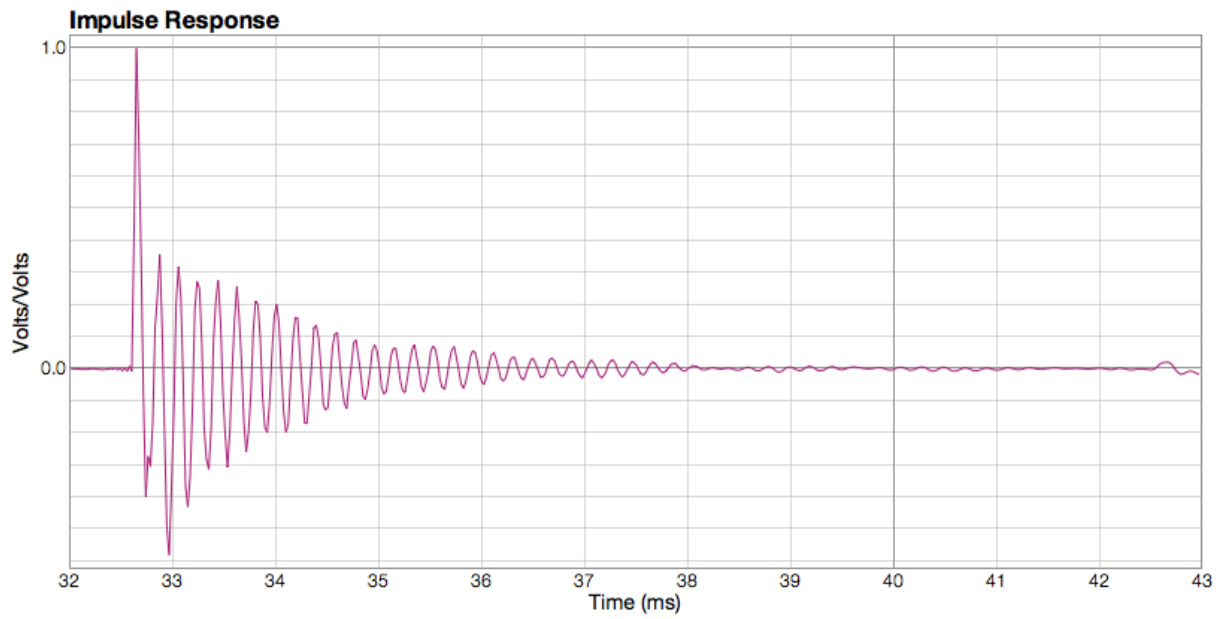
e. Left/Right Difference



f. Step Response



g. Impulse Response



h. Minimum Phase Response

