Final Testing Report
FA 4740
Chloé Laban

**Initial Testing and Crossover Configuration**

The image below is the first full frequency sweep that I took of my speaker. My crossover was a 4th order Linkweitz-Riley at 1K. The obvious problems I saw that needed fixing were the high-end leap beginning at 3.5K, and my mid-range from 1K-3.5K needed smoothing. I started with the mid-range.
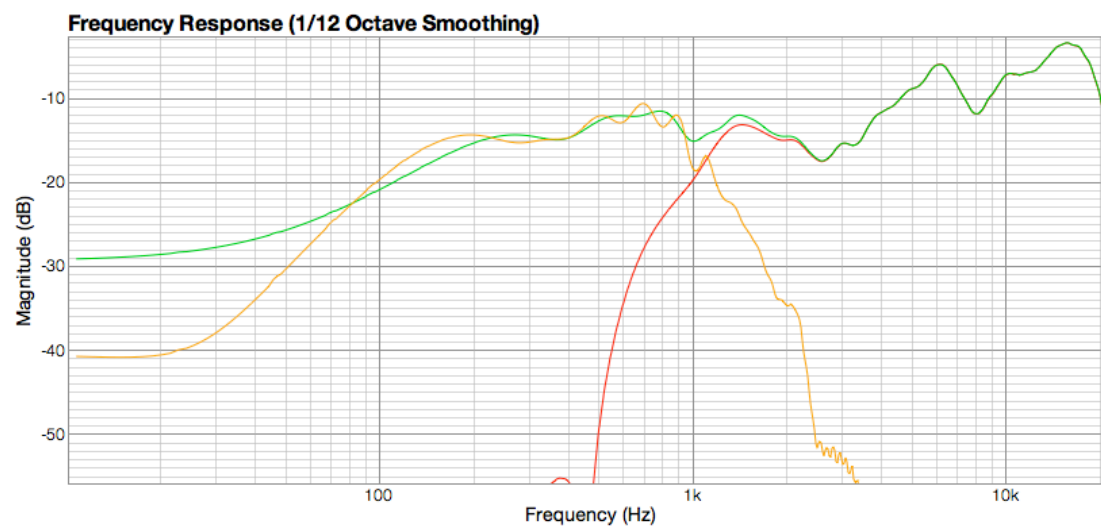

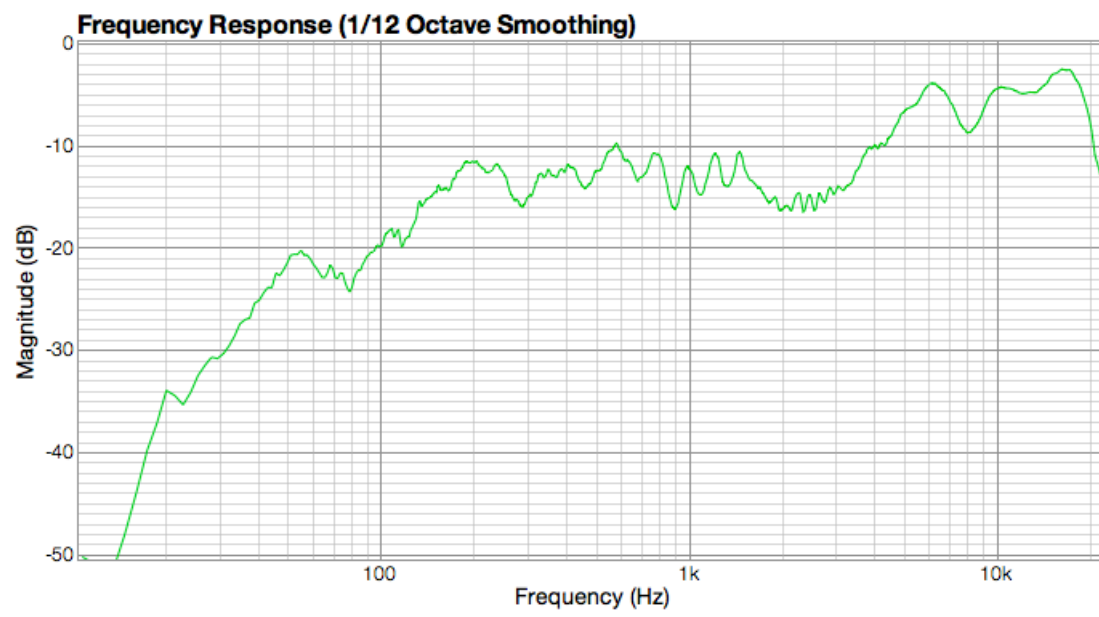I moved the tweeters crossover to 1.7K. The result was a slight smoothing of my mid-range:
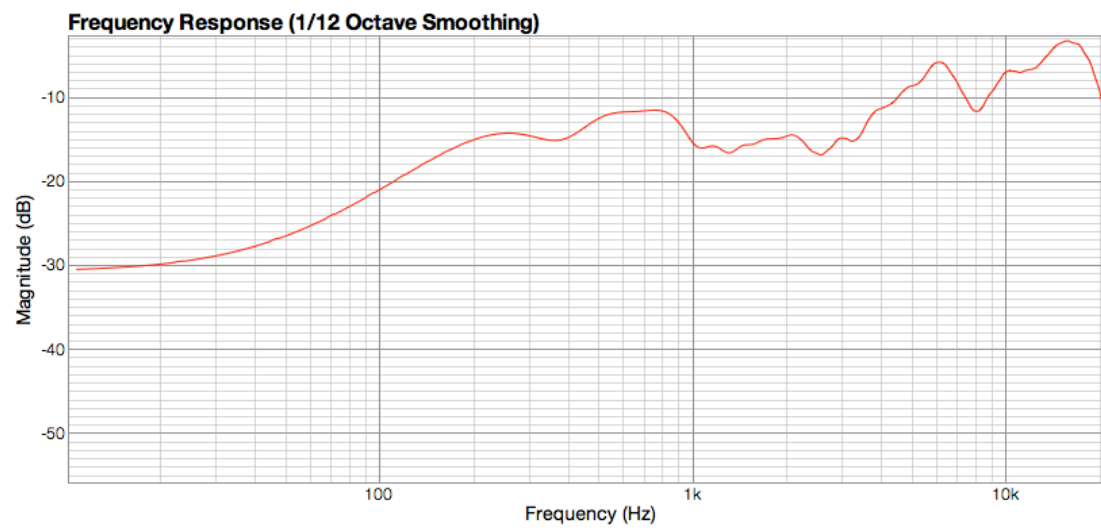
Next, I tried moving my woofer's crossover point down to 800 Hz, and the tweeter's to 1.5K. This resulted in the slight boost peaking at 2K to rise 1 dB, and the first peak in the high end to drop about 2 dB.
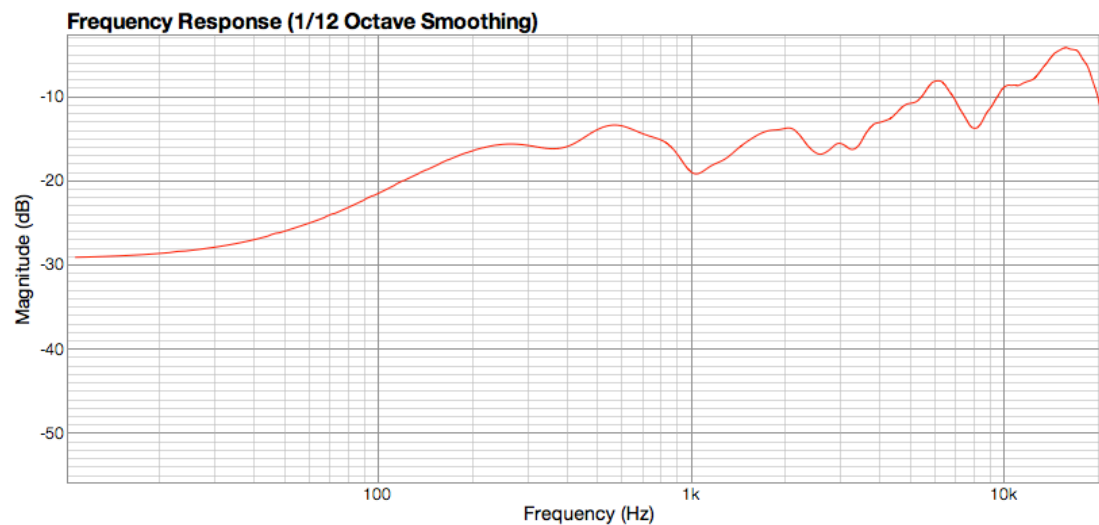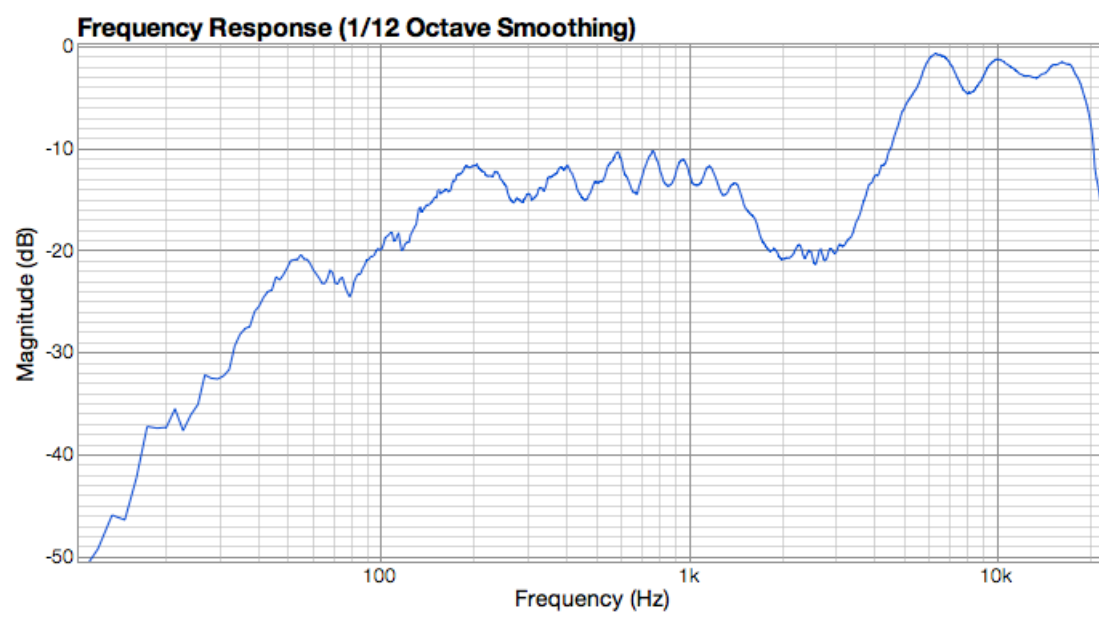

I decided to change my woofer's crossover from a 4th order Linkweitz-Riley, to a 2nd order, but keep the tweeter at a 4th order. I also moved the tweeter's crossover point to 1.2K.
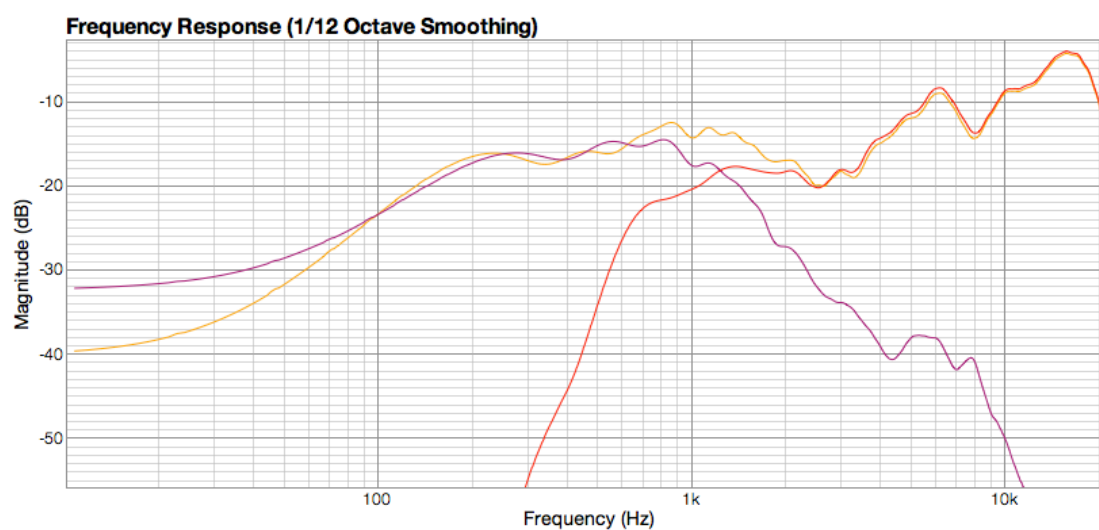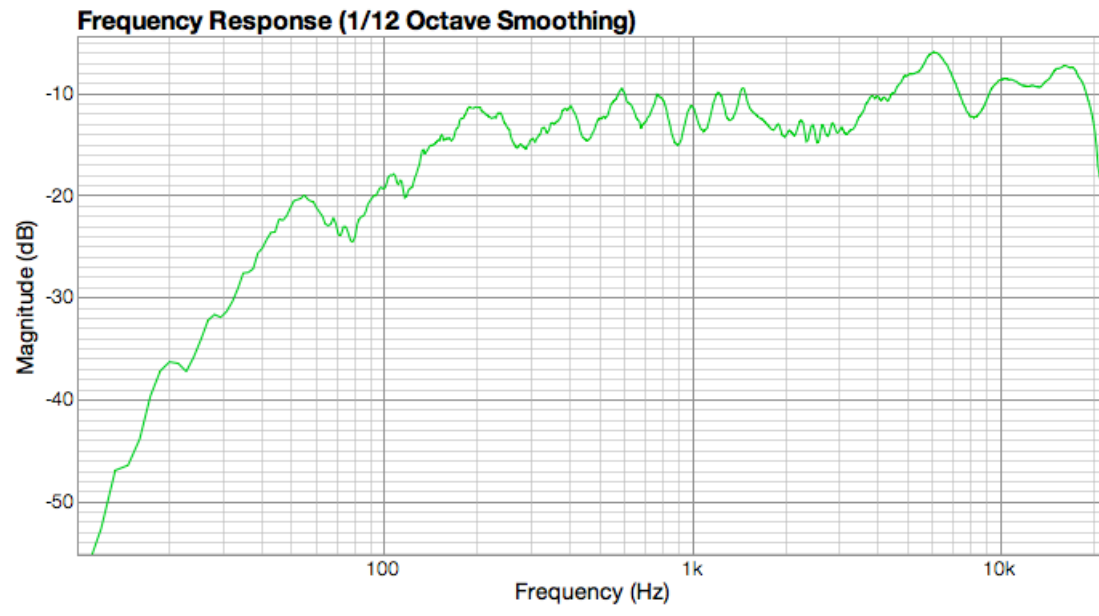
I decided to begin my high shelf filter at this point, hoping it would both bring down the high-end and elevate the dip at 2.5K. My first filter used a 6-ohm resistor and 5.1uF capacitor.
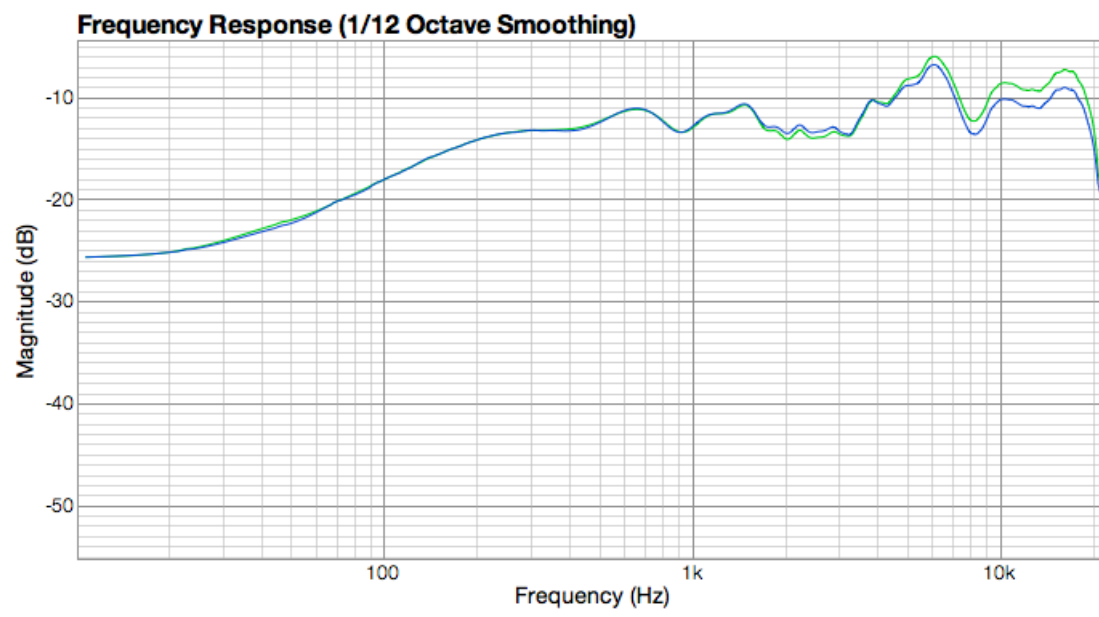
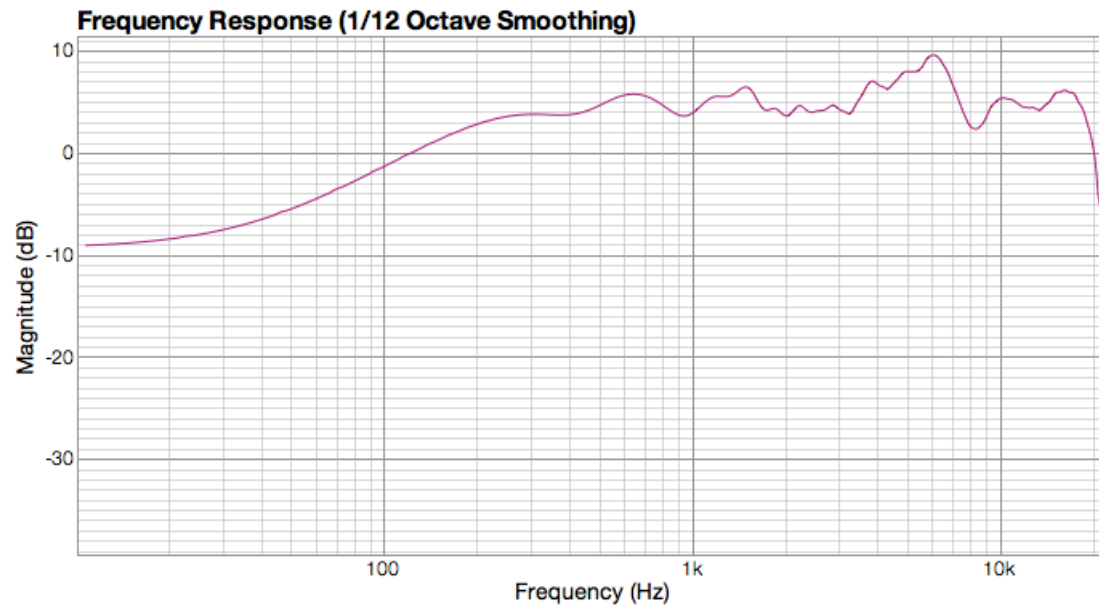**Frequency Response (1/12 Octave Smoothing)**

25-ohm, .06uF:

Frequency Response (1/12 Octave Smoothing)

4-ohm, .22uF:

Frequency Response (1/12 Octave Smoothing)

6-ohm, .22uF: this graph shows the change from a 4-ohm resistor to a 6-ohm resistor.

Frequency Response (1/12 Octave Smoothing)

9-ohm, .22uF:
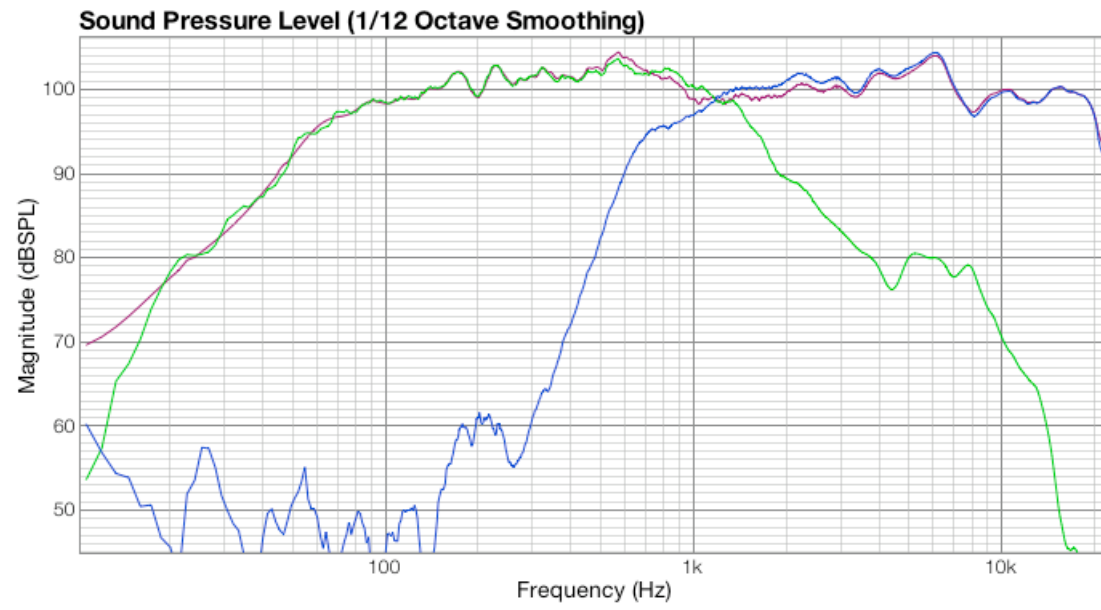

Frequency Response (1/12 Octave Smoothing)

After many attempts at creating a notch filter to take out peak at 6K, I abandoned the idea because it wasn't really solving that problem and it was creating too many other ones. The graph below shows the frequency response with the notch filter (yellow) and without (pink).
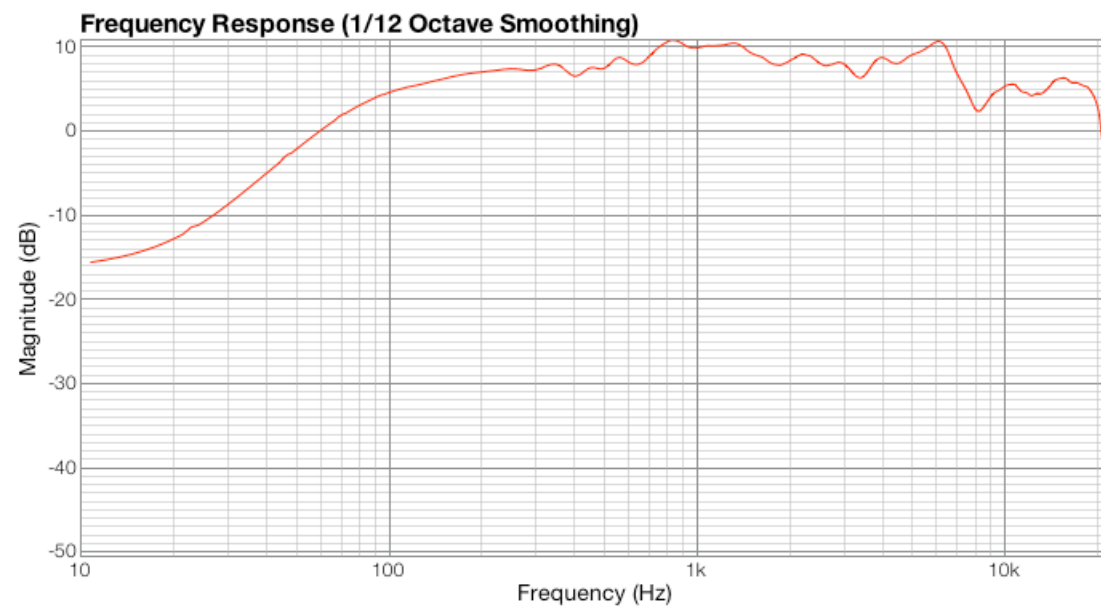

Frequency Response (1/12 Octave Smoothing)
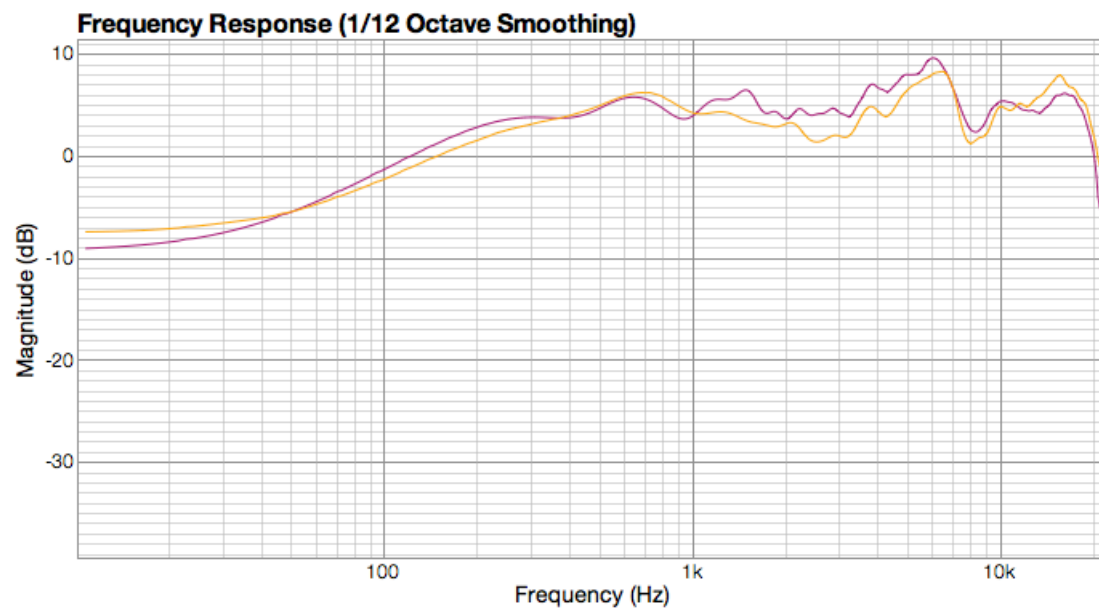
Final Test Data

1. Overall Loudspeaker Performance

a. Frequency Response w/drivers

Sound Pressure Level (1/12 Octave Smoothing)

b. Reverse Polarity

Frequency Response (1/12 Octave Smoothing)

c. X-over Filter Response

Frequency Response (1/12 Octave Smoothing)

d. Horizontal off-axis

Frequency Response (1/12 Octave Smoothing)

e. Vertical off-axis

Frequency Response (1/12 Octave Smoothing)

f. Difference

Frequency Response (1/12 Octave Smoothing)
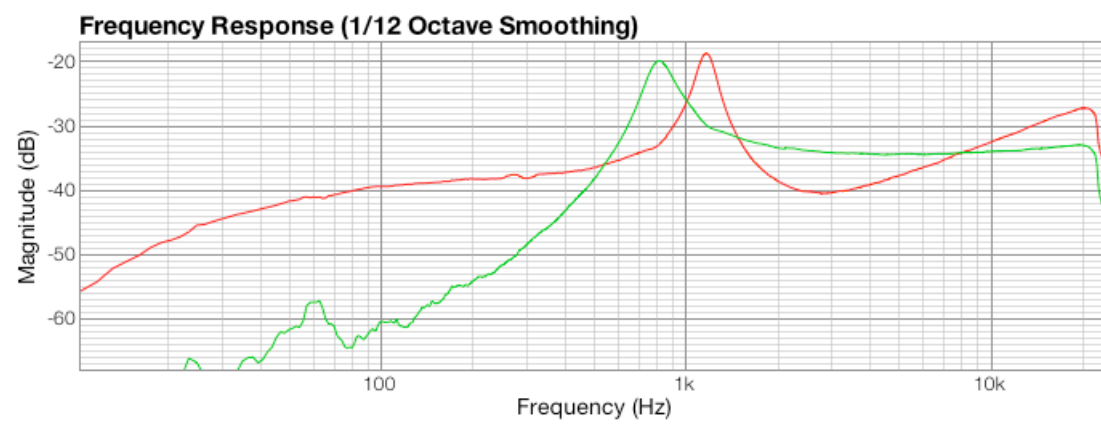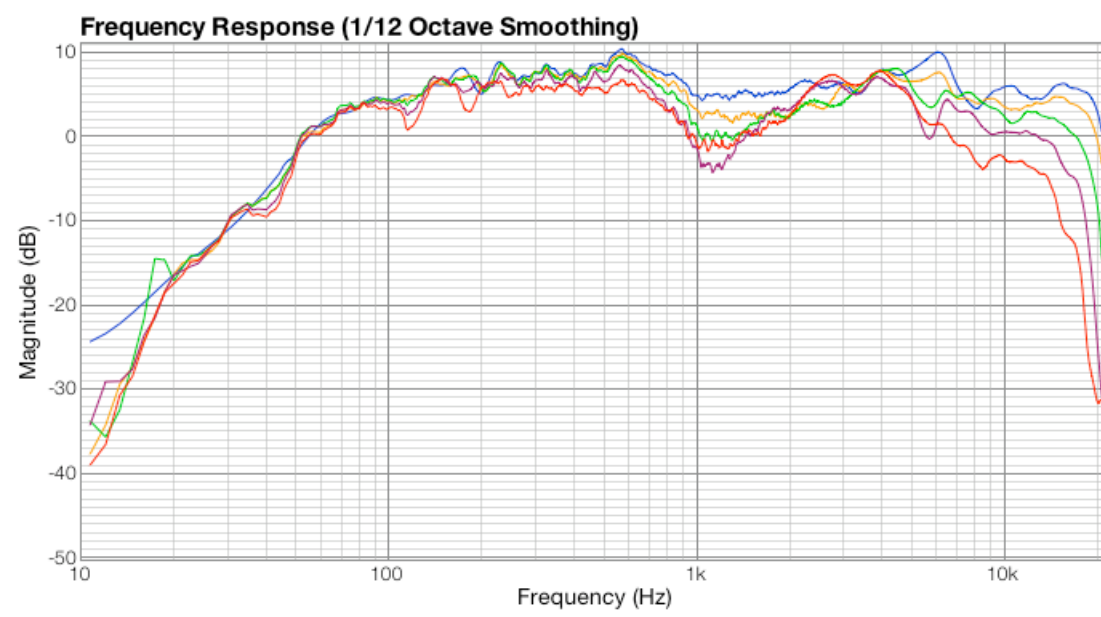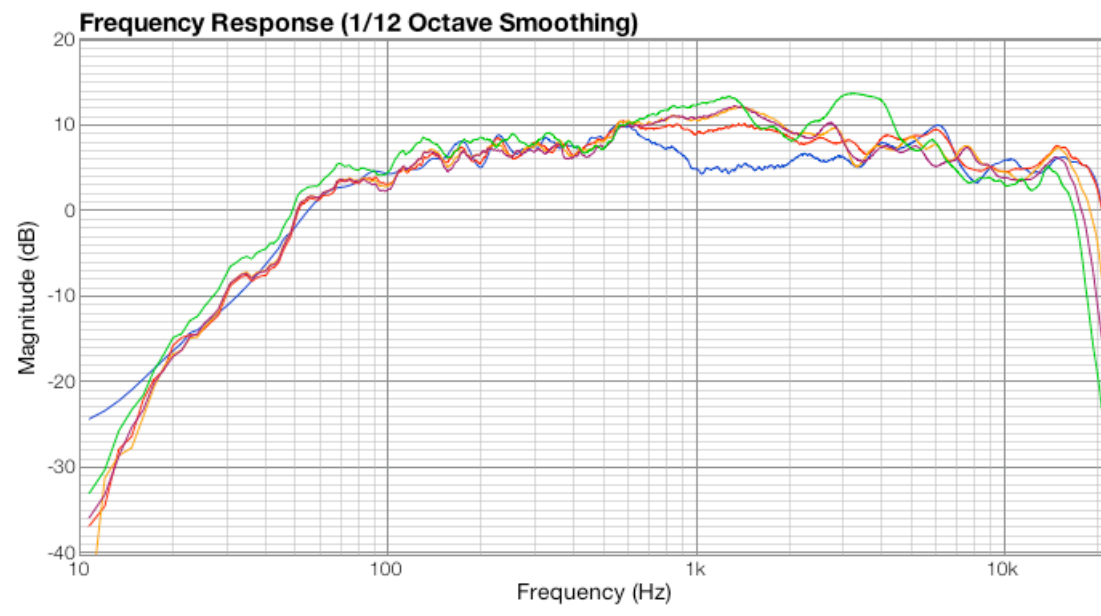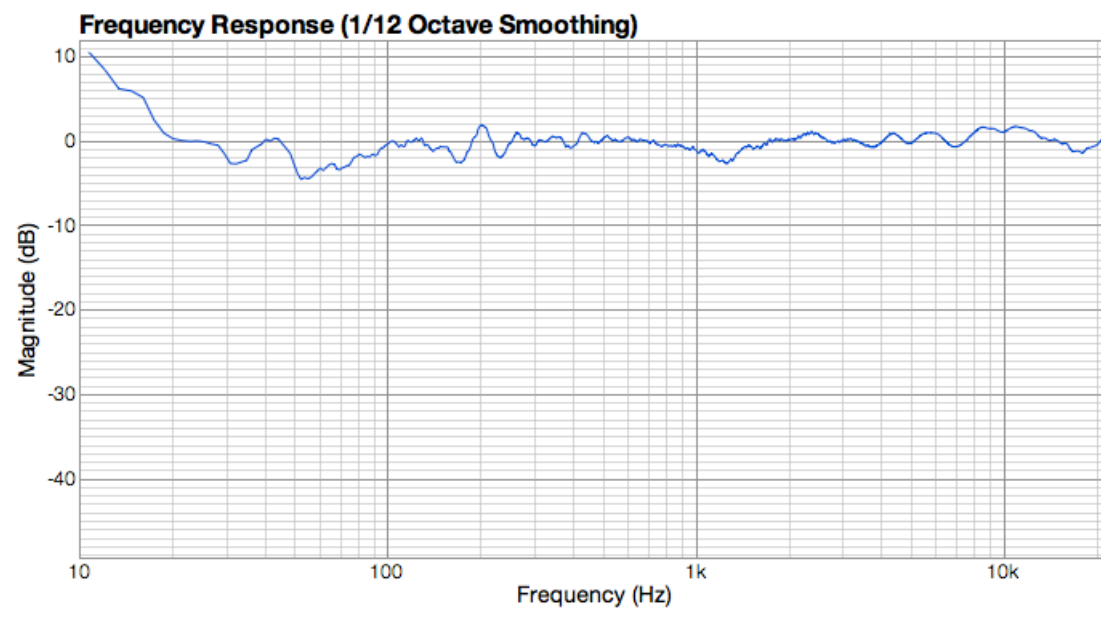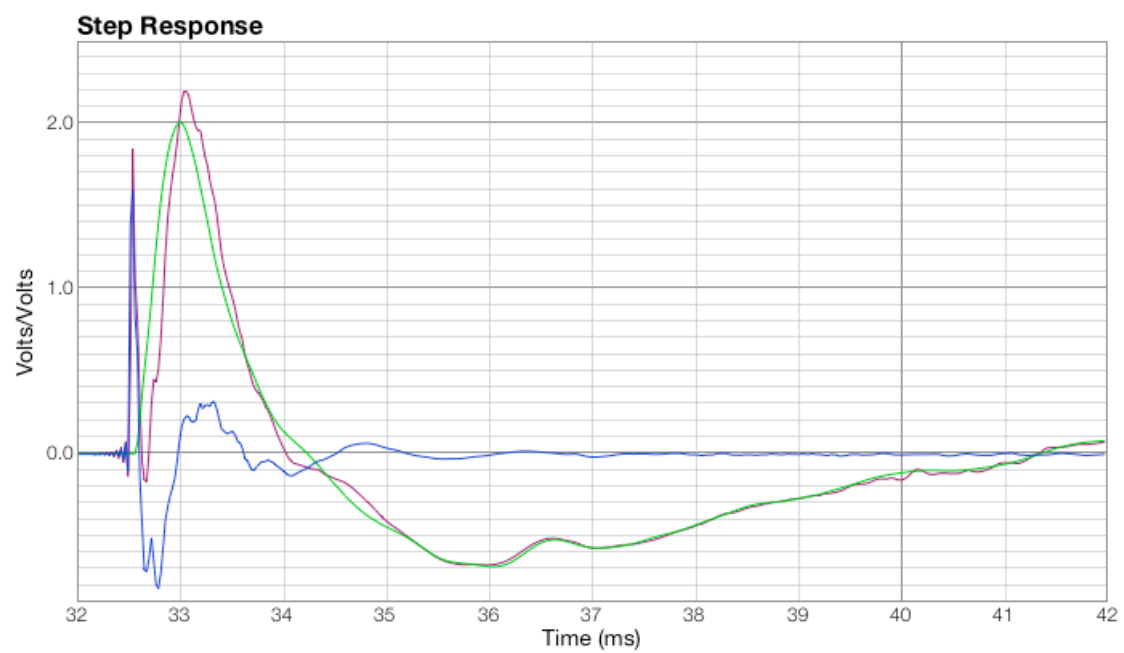
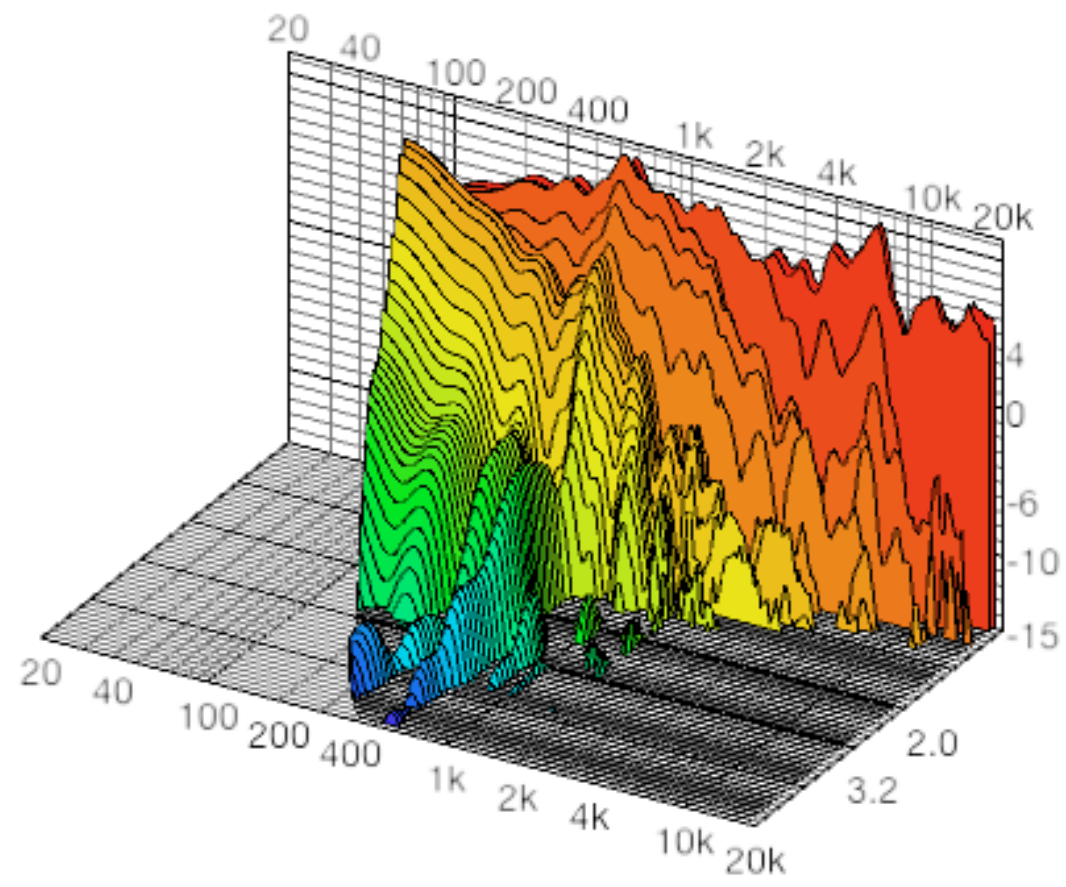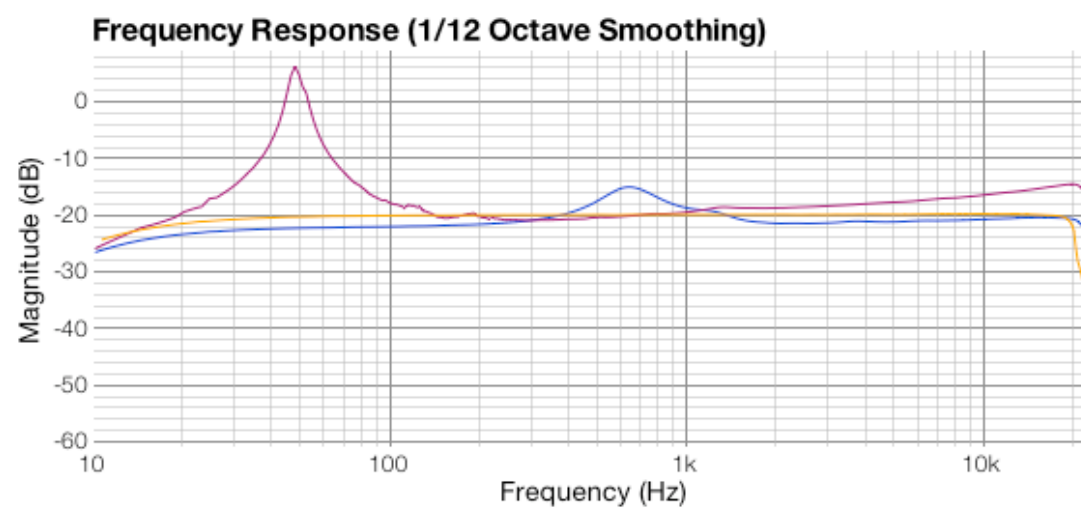## g. Step response

h. Impulse response
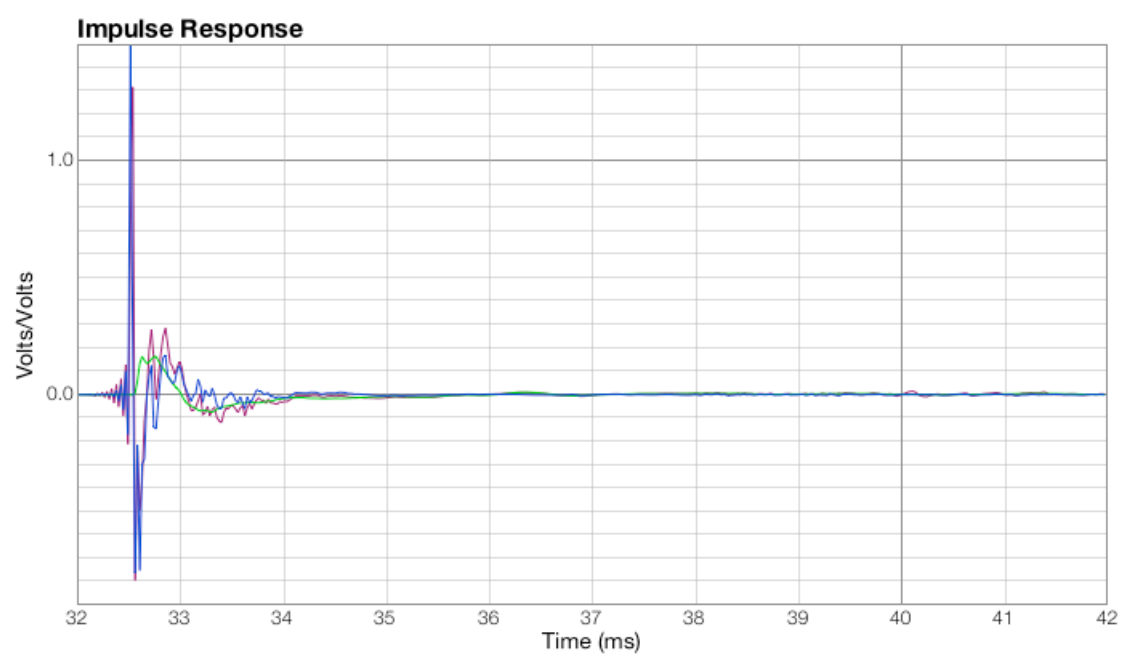
i. Waterfall

j. Minimum Phase/Impedance

k. Harmonic Distortion

Harmonic Distortion (1/12 Octave Smoothing)
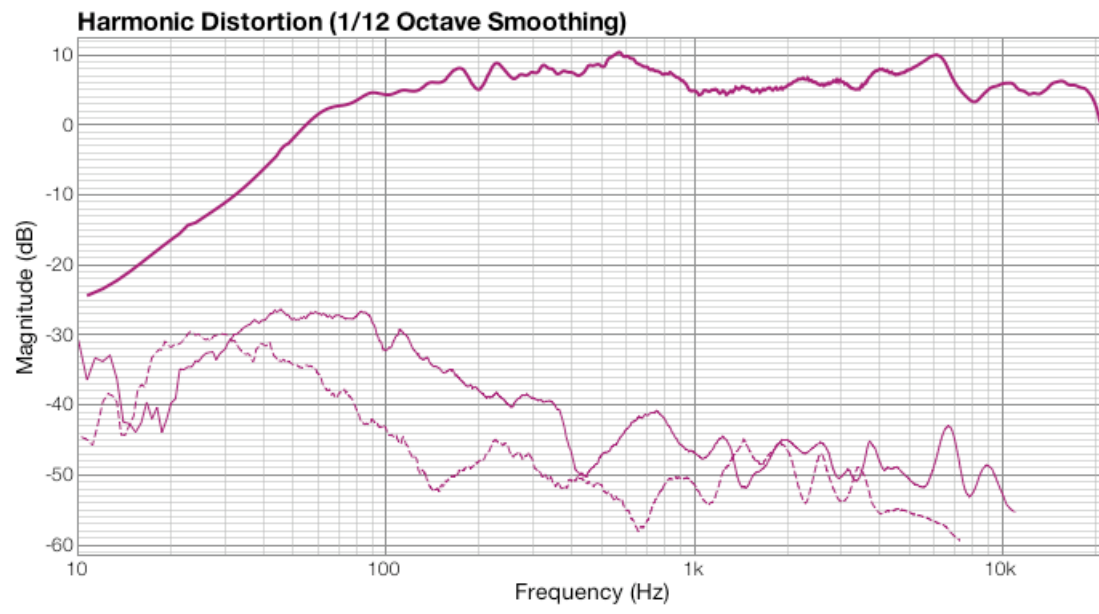
2. Tweeter Performance

a. Frequency Response
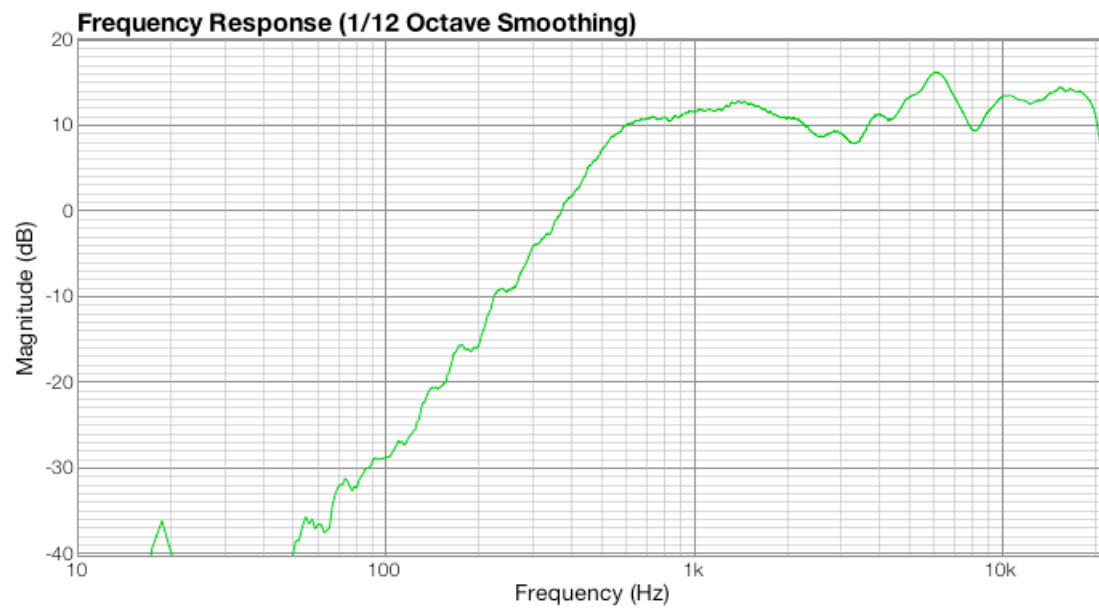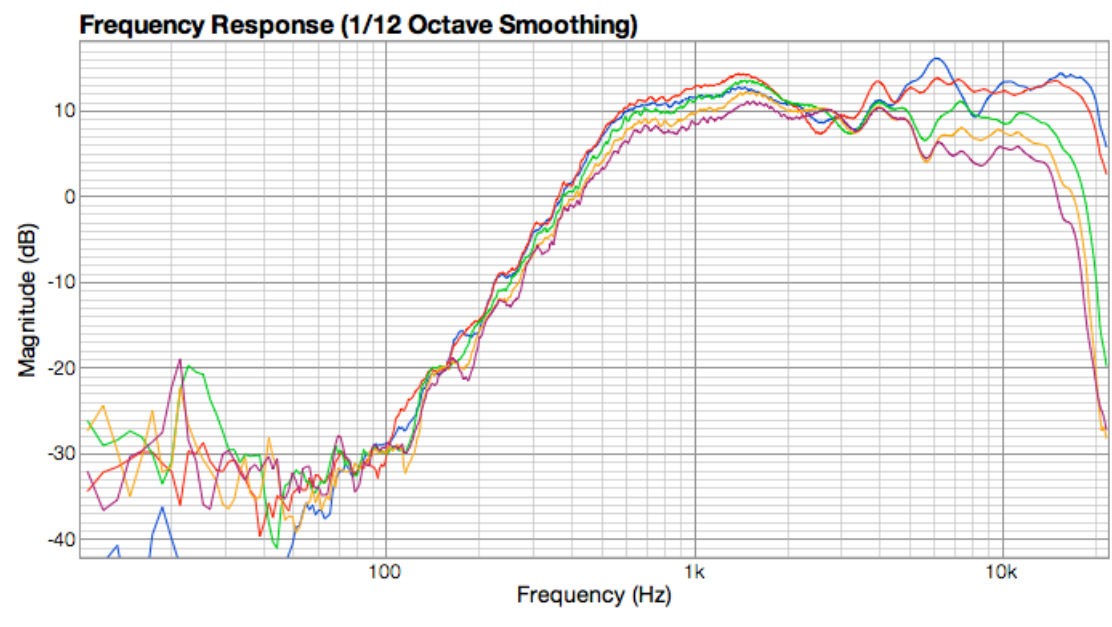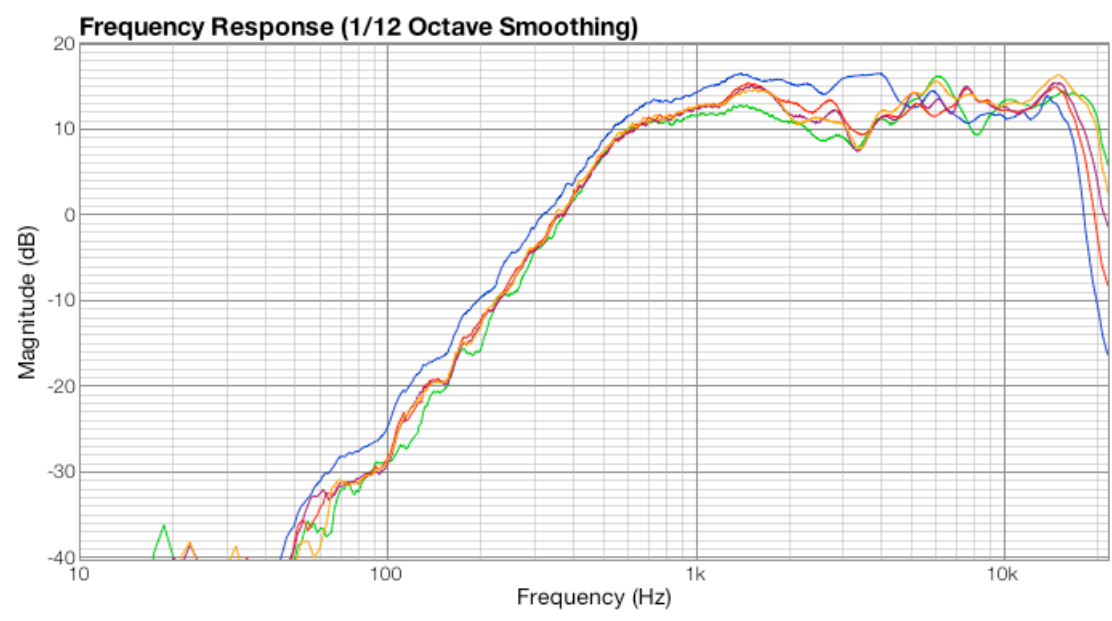
Frequency Response (1/12 Octave Smoothing)

b. Horizontal off-axis

Frequency Response (1/12 Octave Smoothing)

c. Vertical off-axis

Frequency Response (1/12 Octave Smoothing)

d. Difference

Frequency Response (1/12 Octave Smoothing)
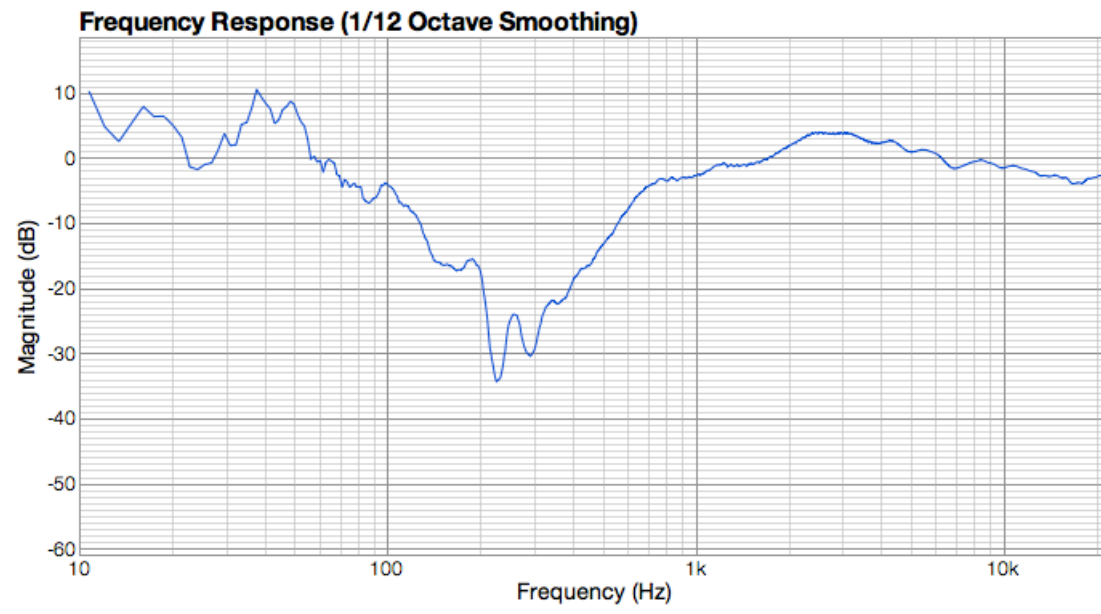
e. Step Response
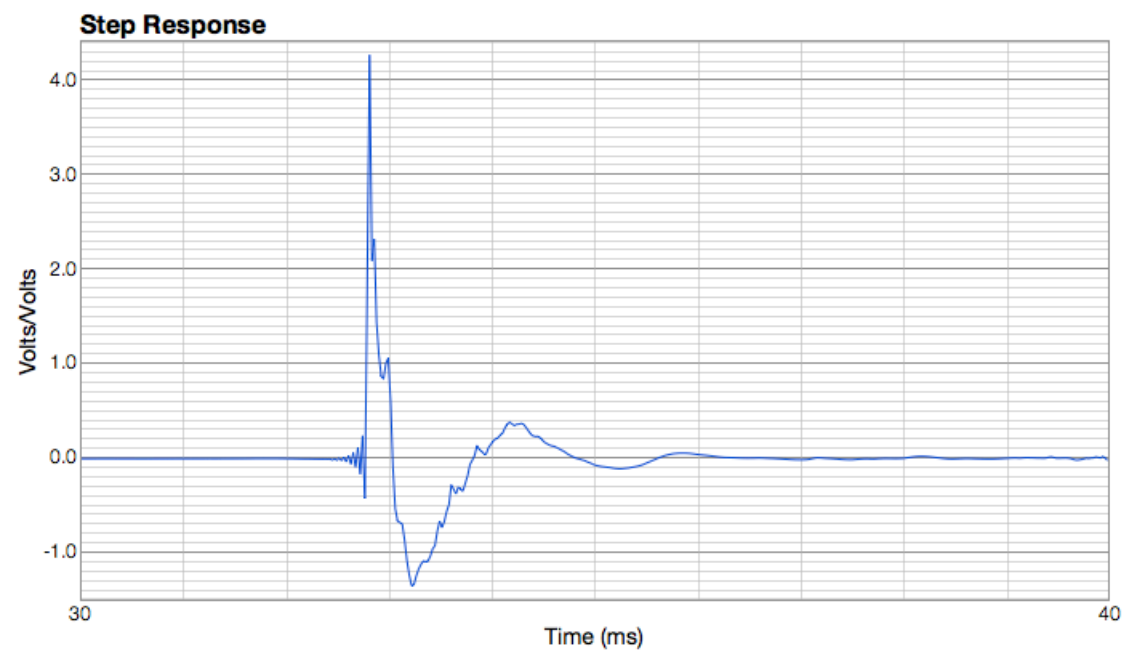
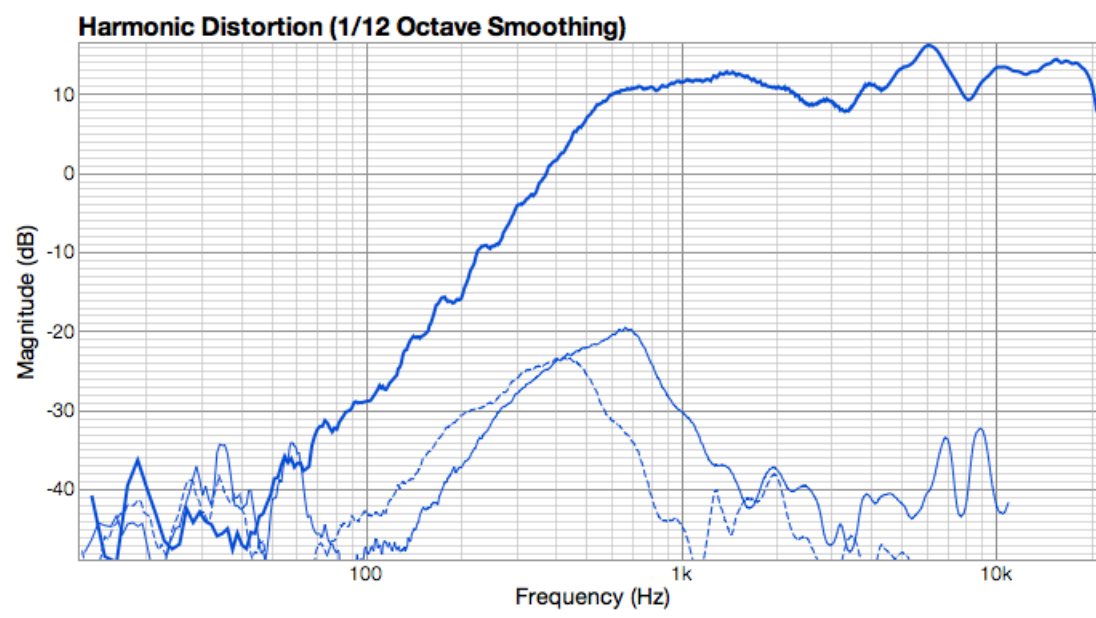**Step Response**
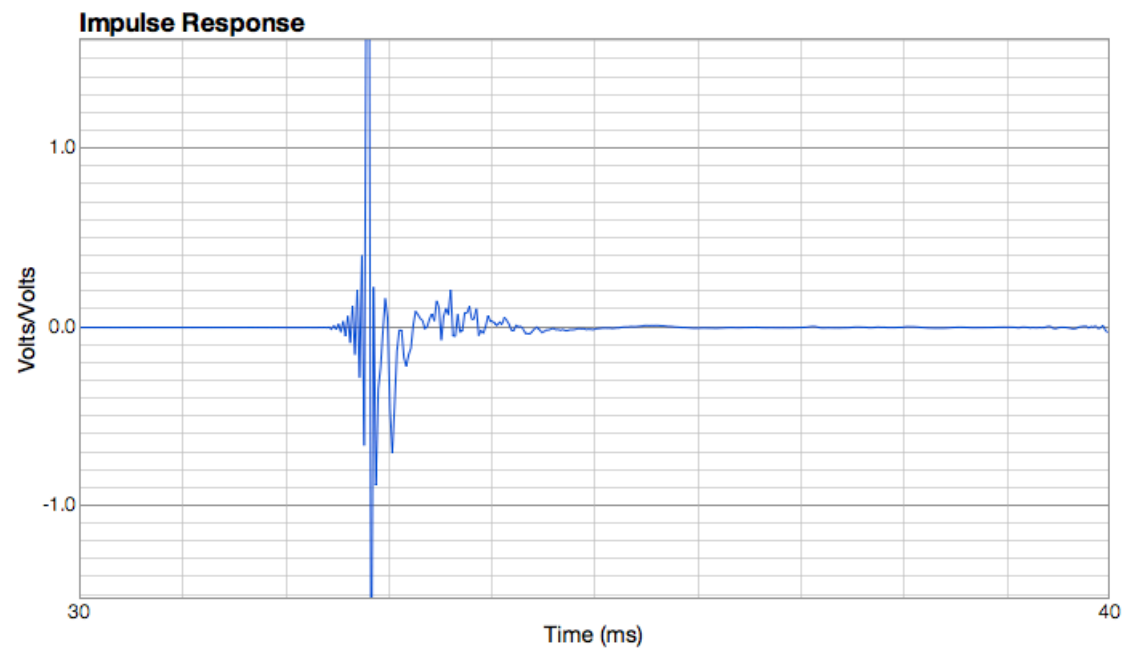
f. Impulse Response
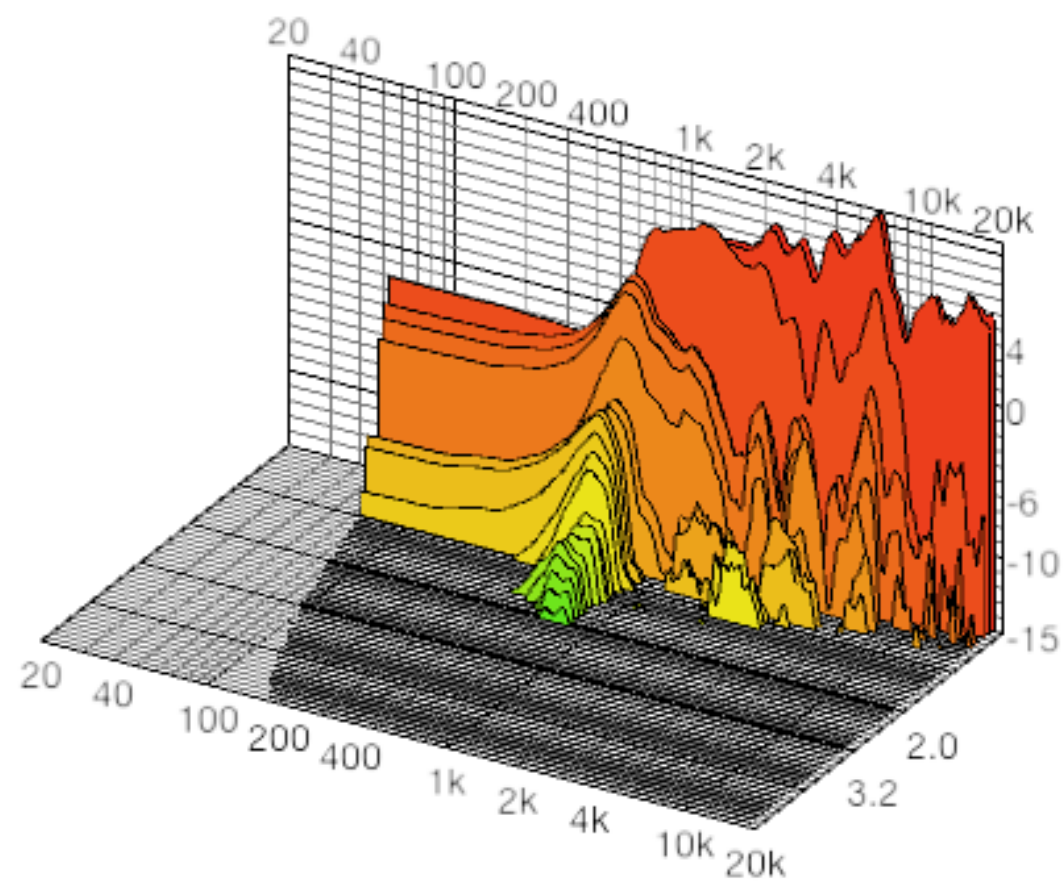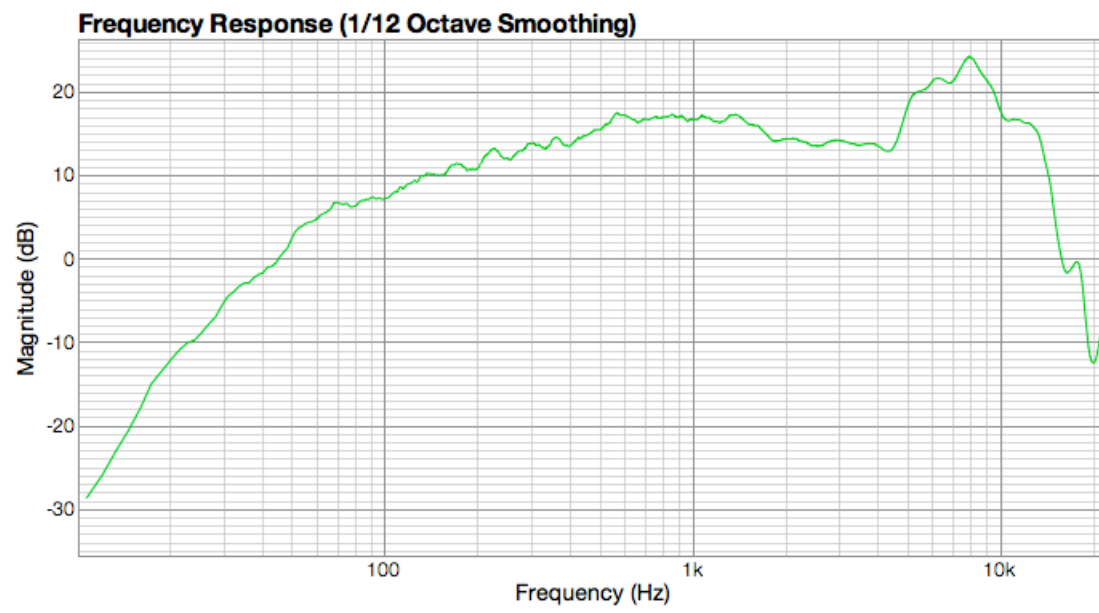

g. Waterfall

h. Minimum Phase/Impedance
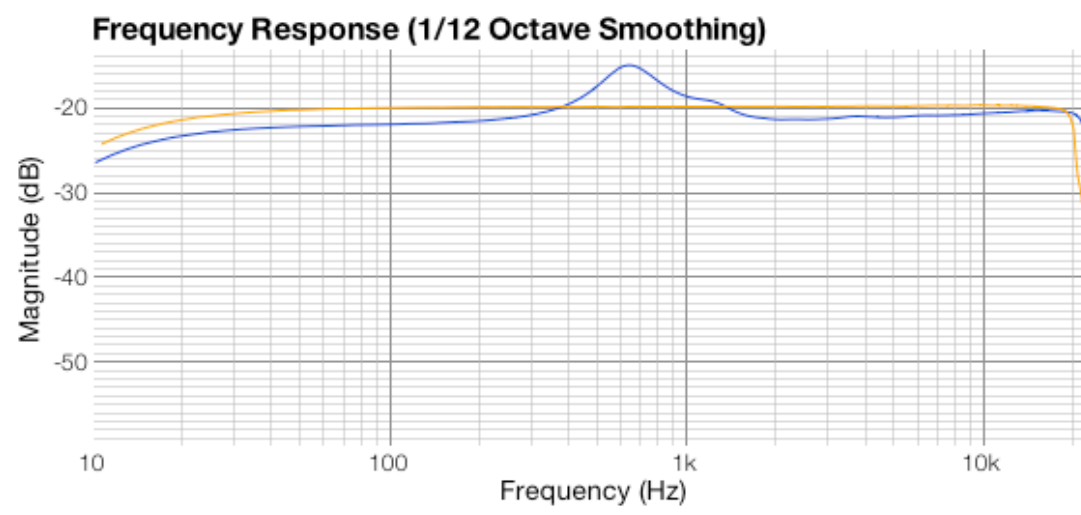
i. Harmonic Distortion

3. Woofer Performance

a. Frequency Response
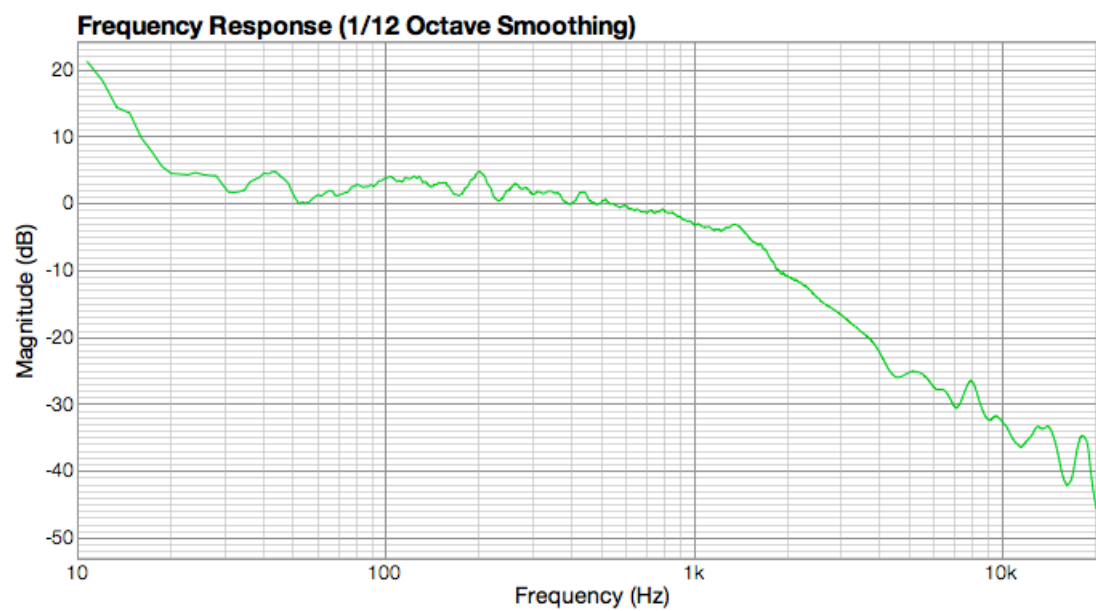
Frequency Response (1/12 Octave Smoothing)

b. Horizontal off-axis

Frequency Response (1/12 Octave Smoothing)

c. Vertical off-axis

Frequency Response (1/12 Octave Smoothing)

d. Difference

Frequency Response (1/12 Octave Smoothing)

e. Step Response
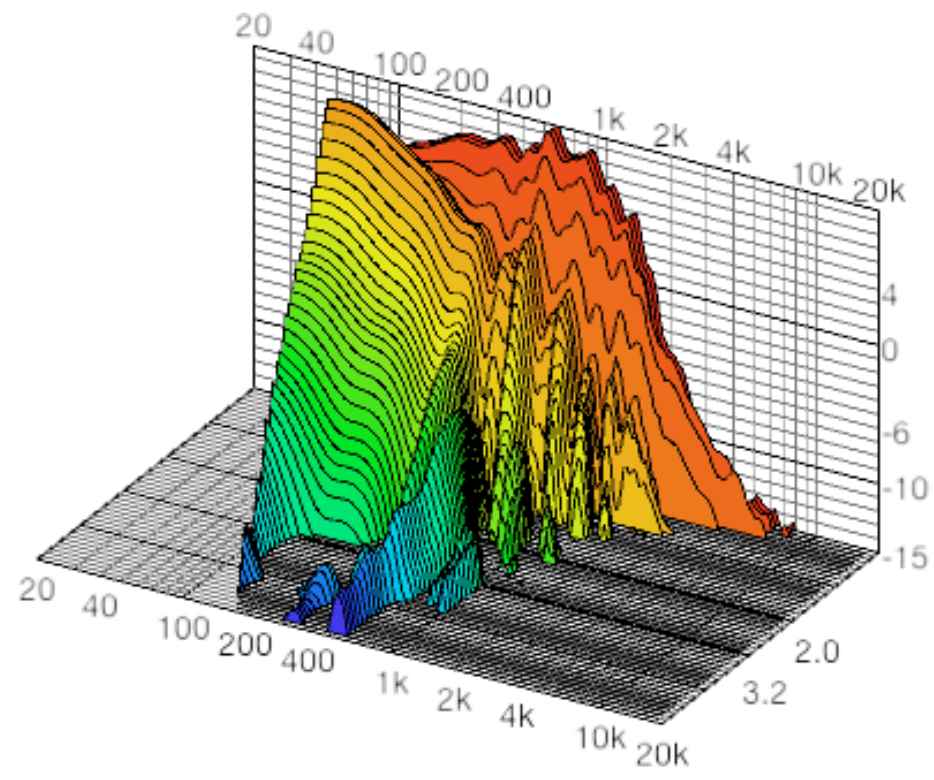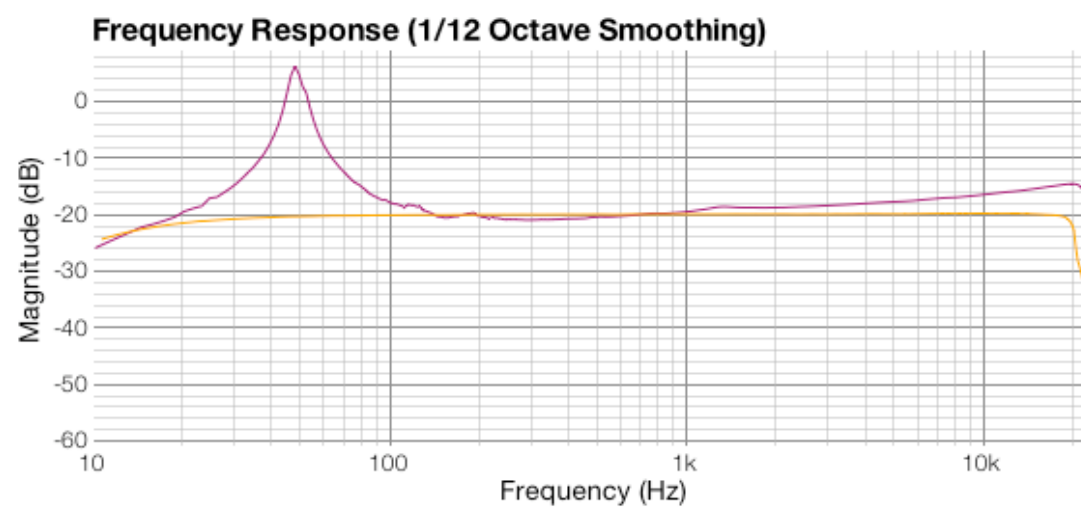

Step Response

f. Impulse Response

Impulse Response

g. Waterfall

h. Minimum Phase/Impedance

i. Harmonic Distortion

Harmonic Distortion (1/12 Octave Smoothing)