

Soma Sonus

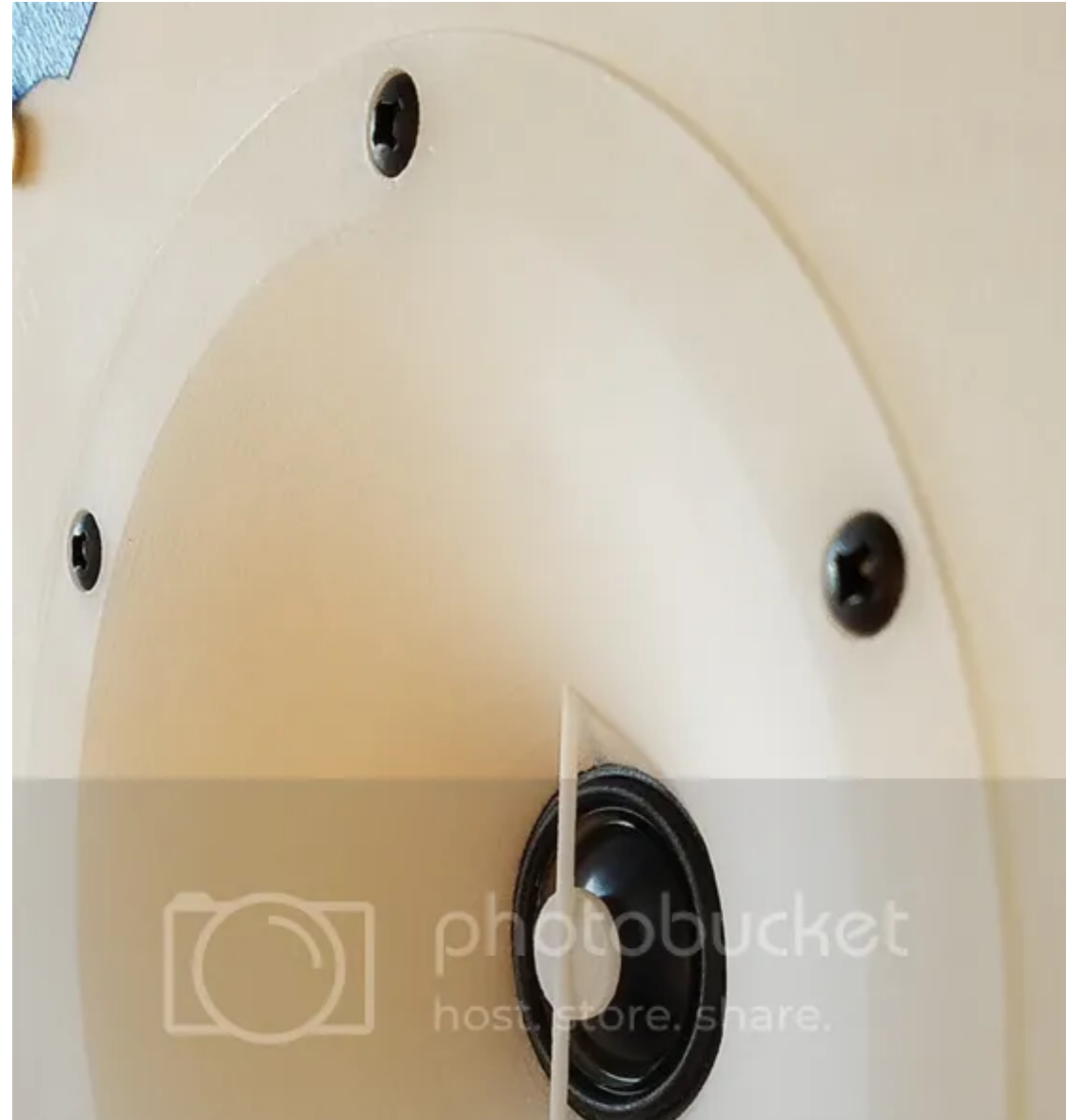
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Waveguide Study

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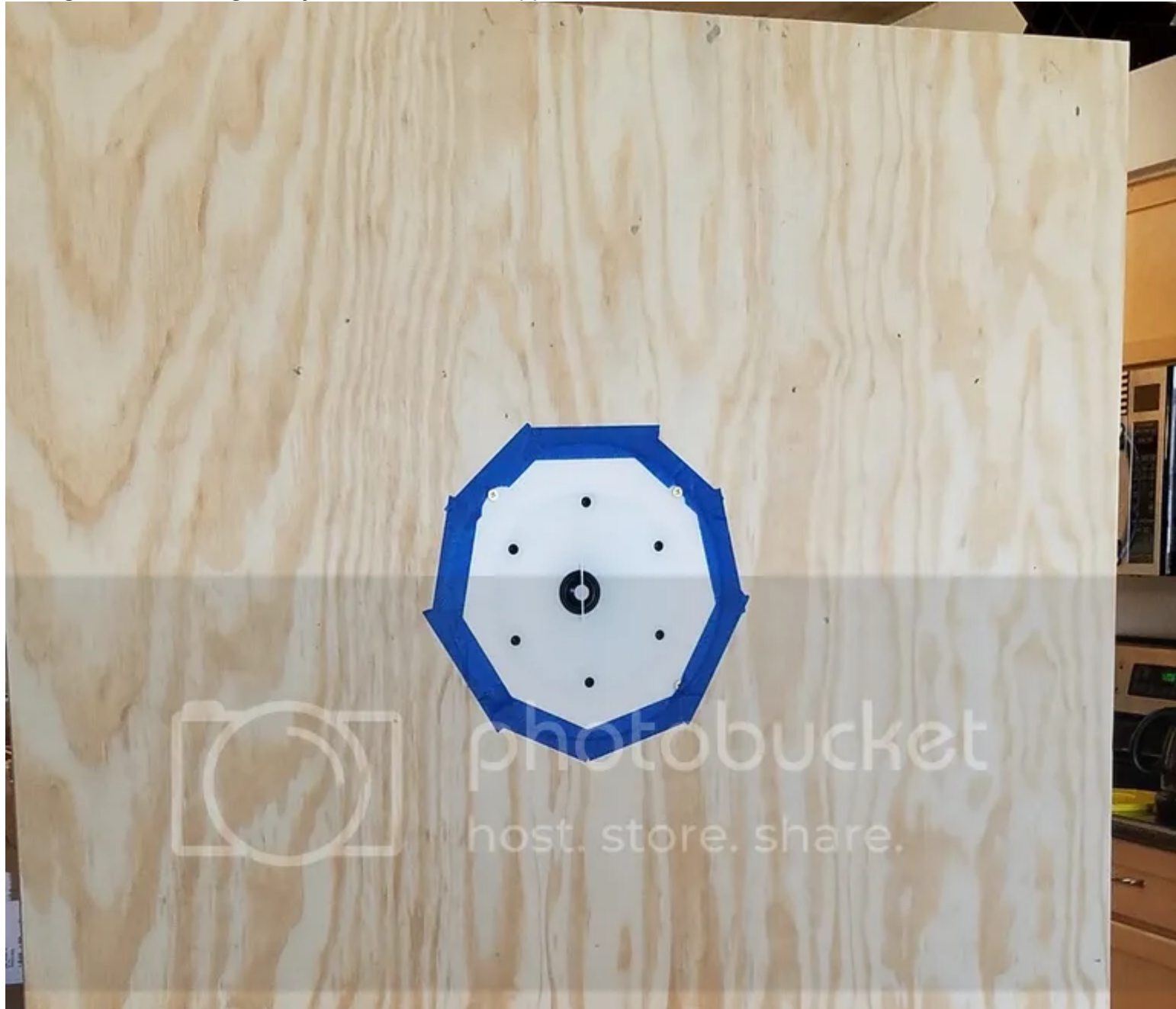
6/12/17: initial post

6/17/17: phase shield experiments

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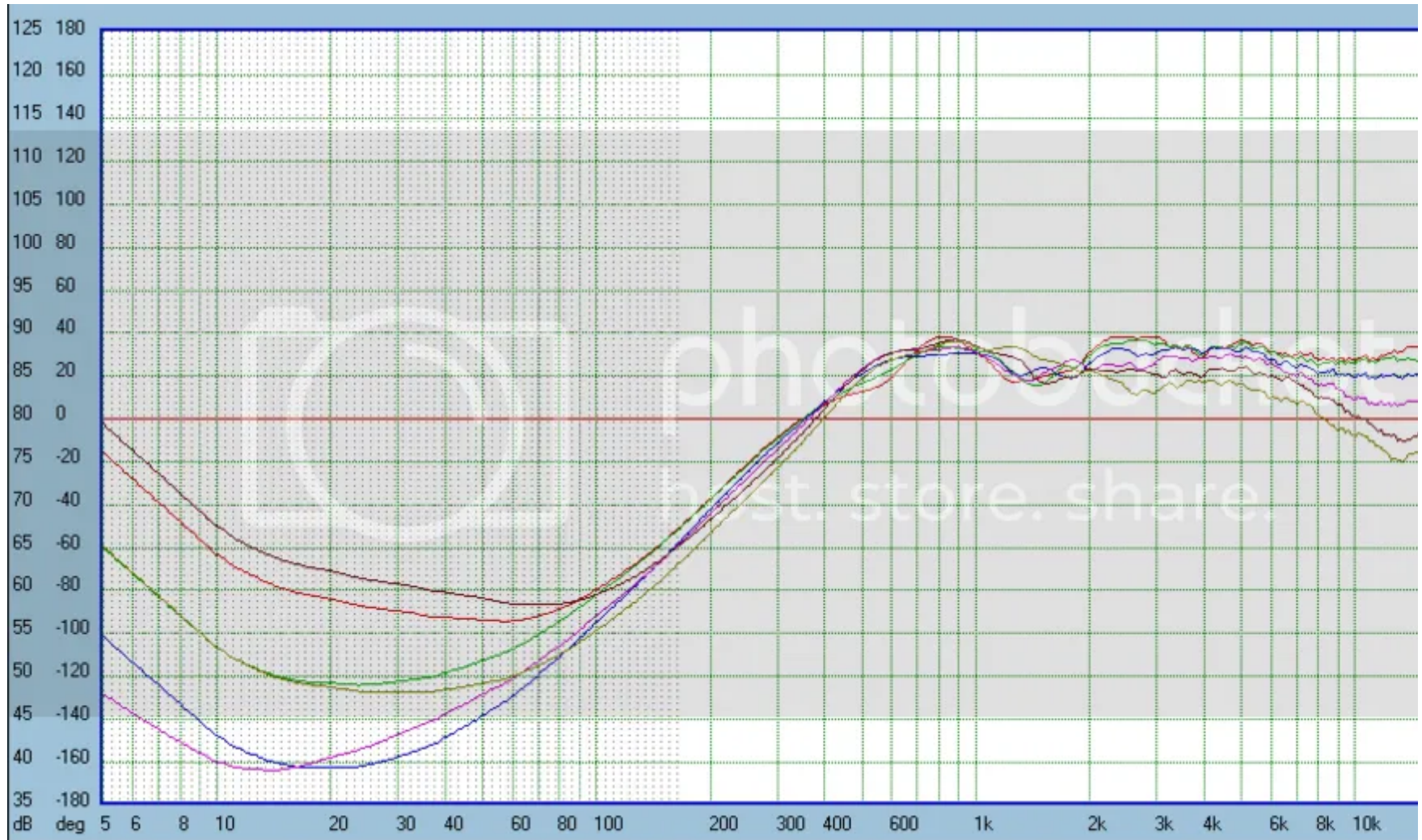
The following is an attempt to design high performing waveguides for some popular tweeters. The intent is for the final designs to be freely available as an .stl file, which the end user can 3D print or CNC into wood as they have access to. The first tweeter will be the [SB Acoustics SB26ADC](#) aluminum dome for its low response, low distortion, and ease of attaching to a waveguide. After that I would *like* to move on to the Satori BE dome, and Transducer Labs ceramic and BE domes. I will start with a 5" diameter mouth waveguide, then vary depth, flare radius, whether the mouth meets the baffle tangent or not, with/without phase shield, and anything else that seems worthwhile to pursue. After some "best practices" are found, I'll scale up to 8" and see if those best practices hold. If they do it should be relatively simple to predict the performance of middles sizes, so should only take a single prototype to verify that. These first waveguides are printed using a laser to sinter powdered nylon. The dimensional accuracy is excellent, but leaves finish similar to 100-200 grit sandpaper.

All waveguides are 5" diameter mouth. The rest of the info is listed below. Since I don't have my big baffle anymore I tried to optimize this one as best I could to minimize diffraction, but it appears to show up pretty strongly below 4khz. IF the waveguides are doing their job, this should disappear. Here is the test baffle:

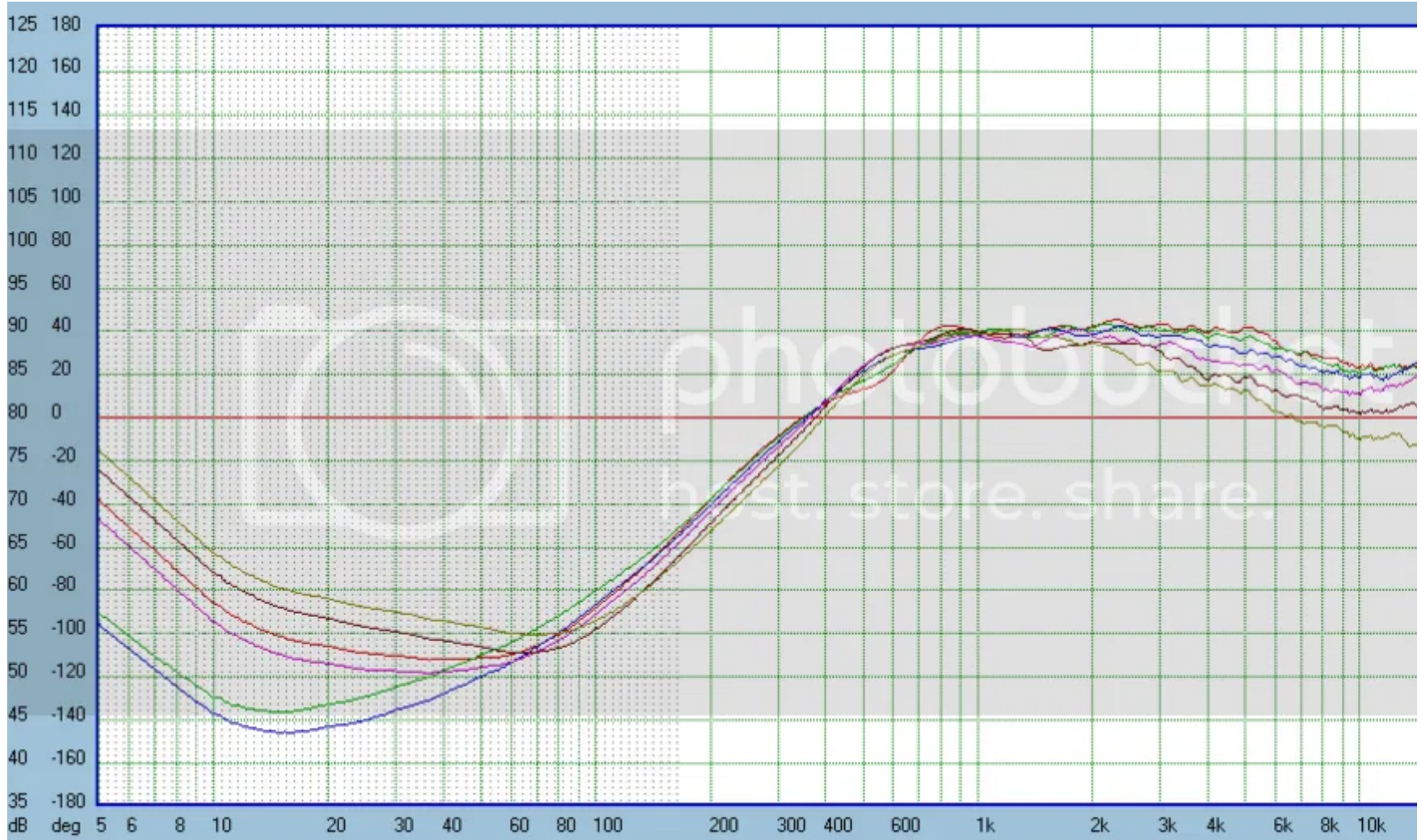




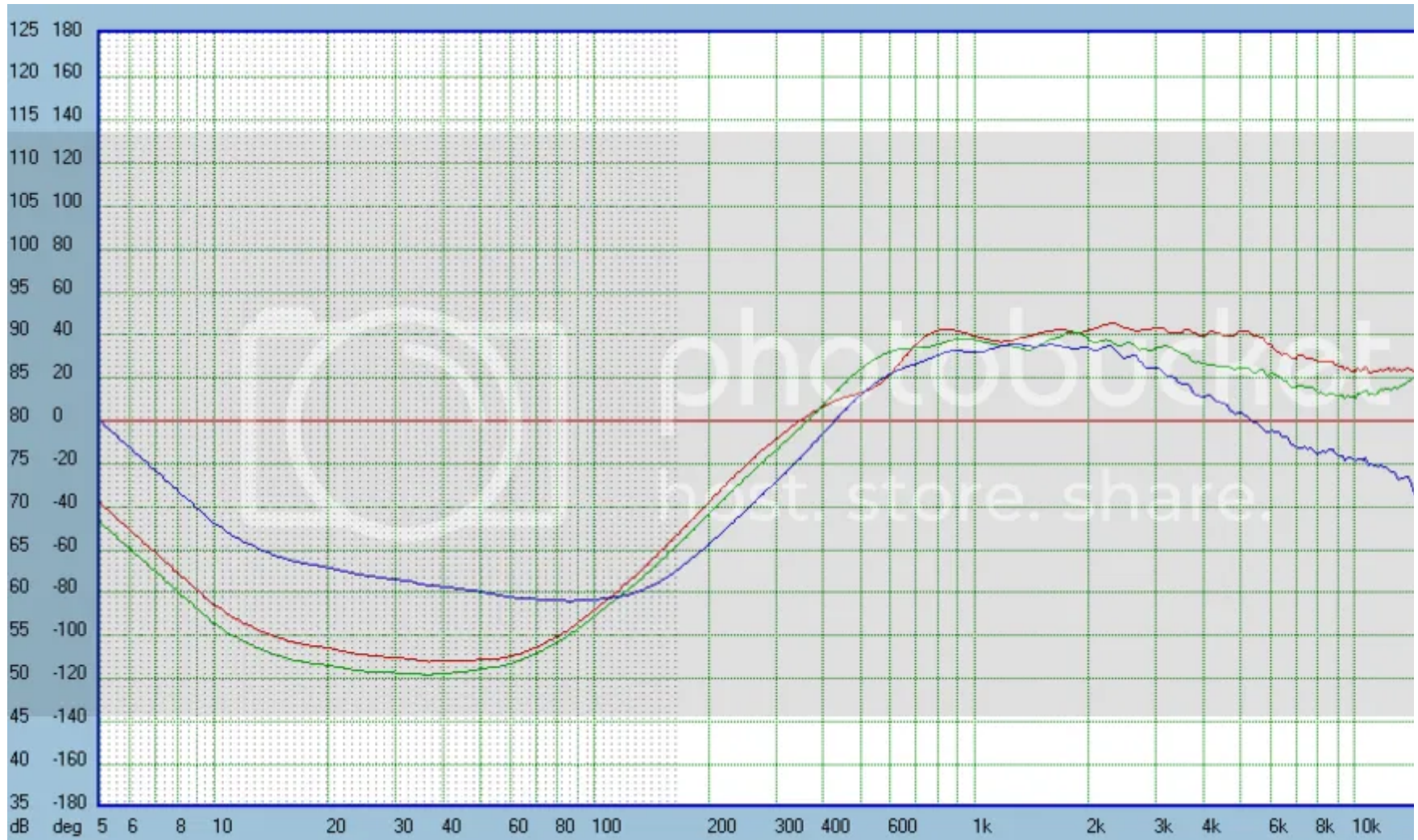
Flat baffle for reference, 0-10-20-30-40-50:



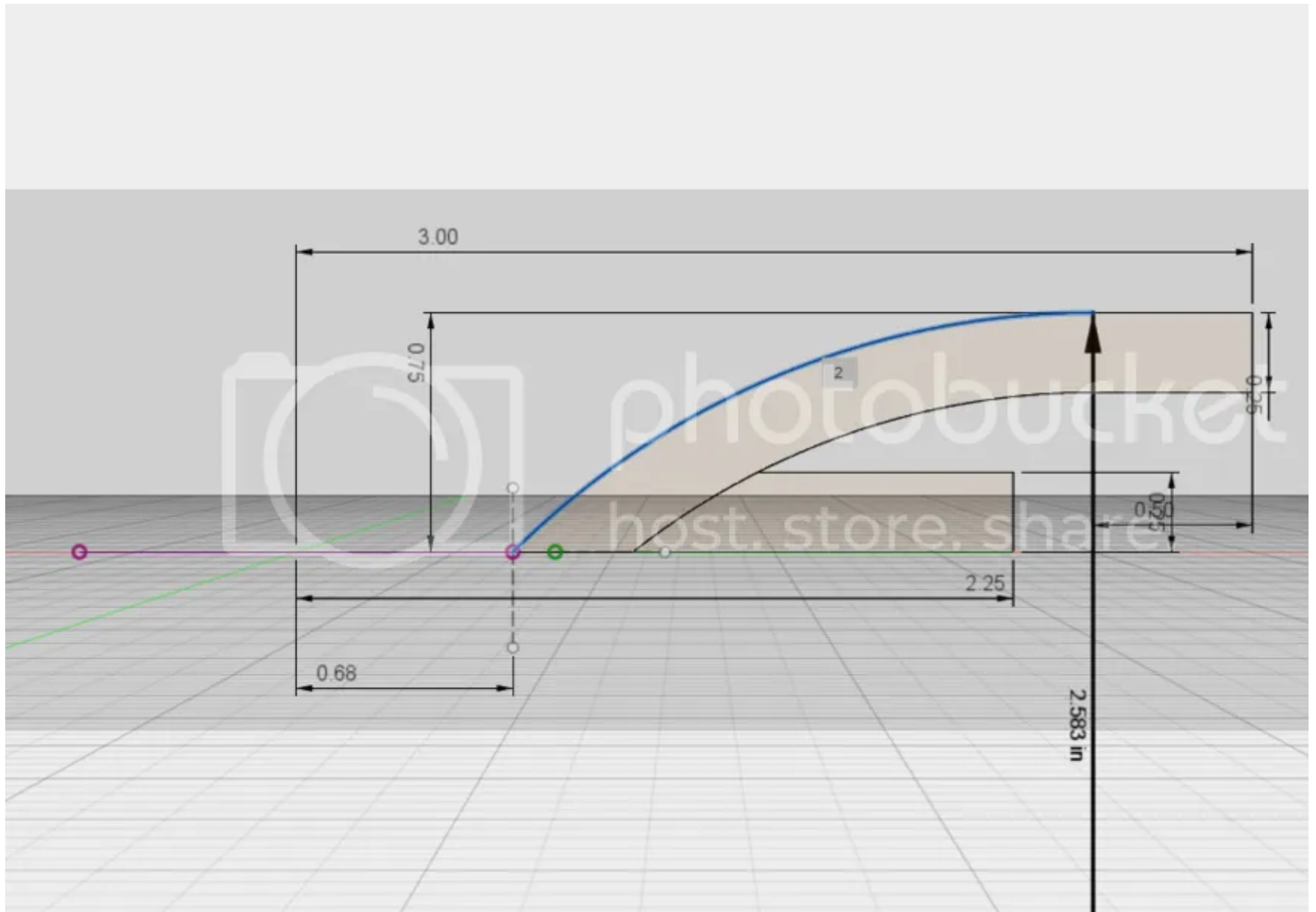
3/4" deep, tangent mouth, 0-10-20-30-40-50:



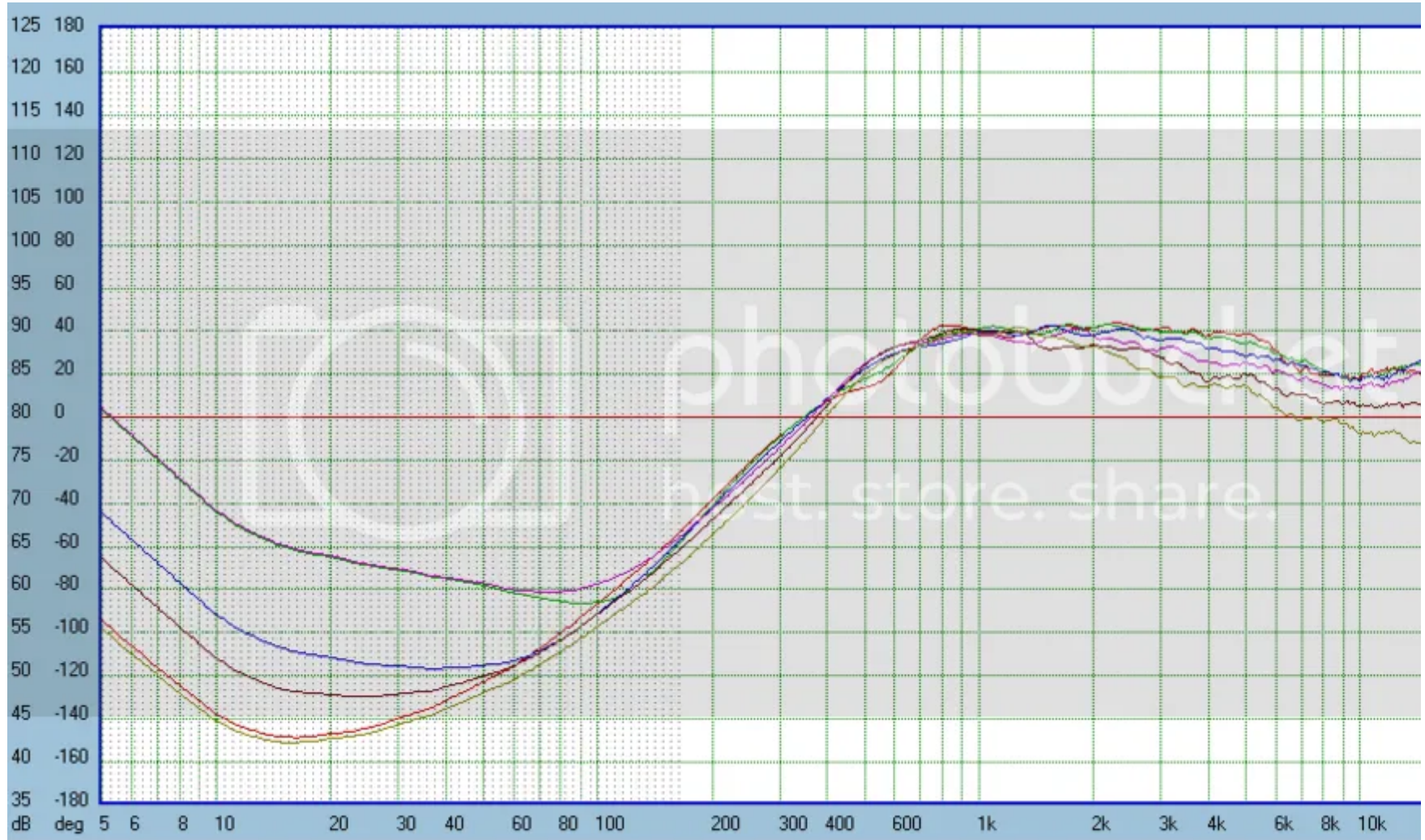
0-30-60:



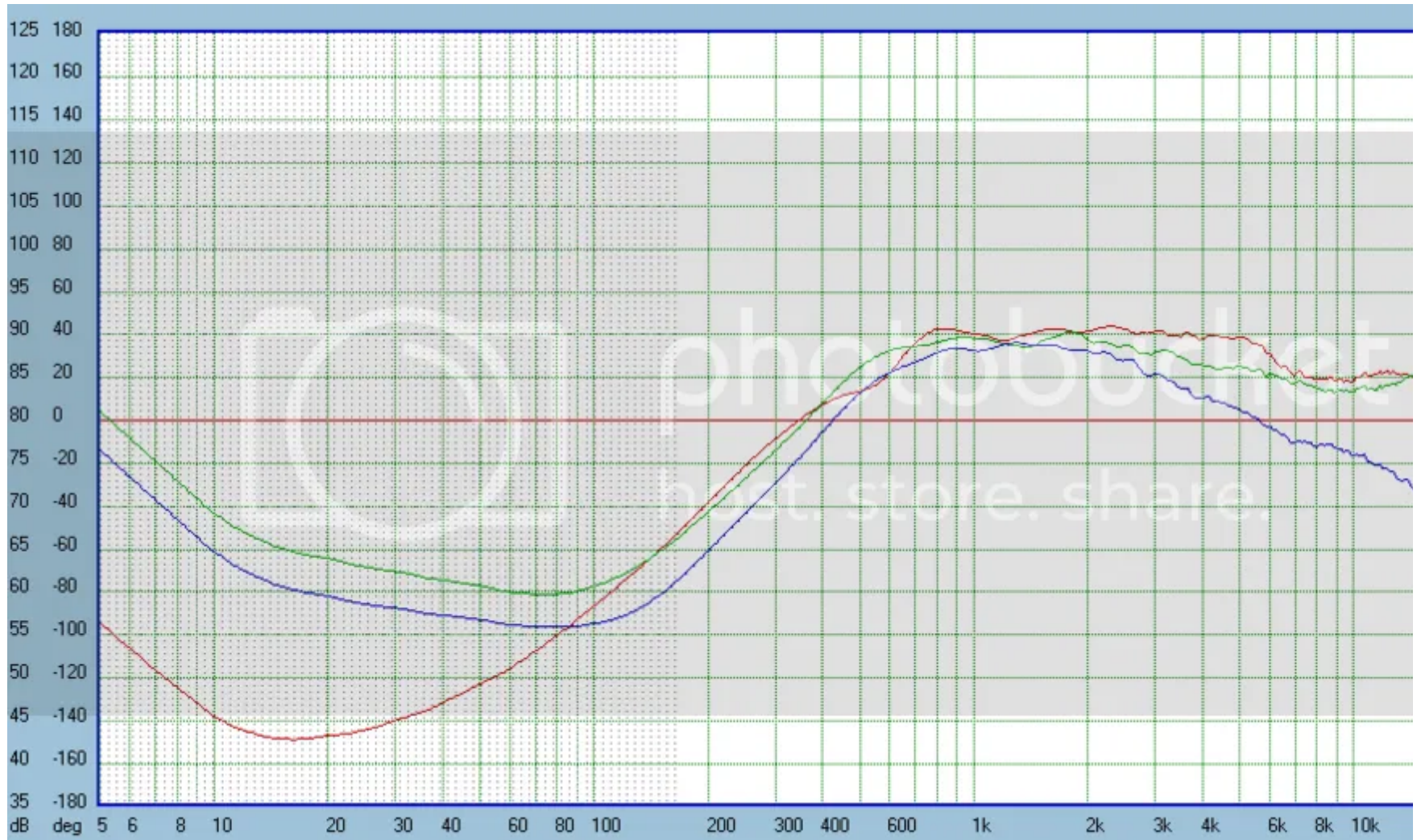
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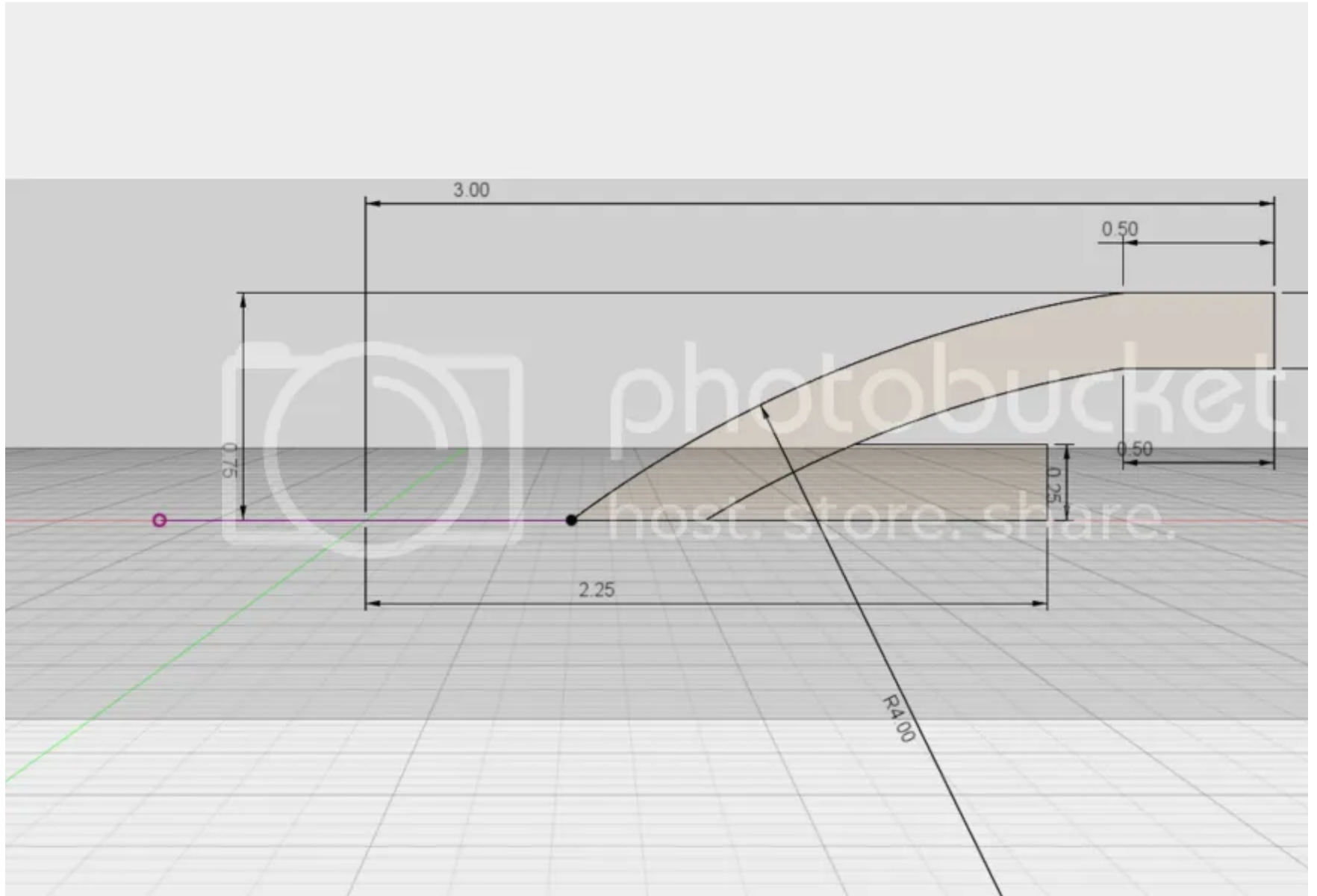
3/4" deep, non-tangent mouth, 0-10-20-30-40-50:



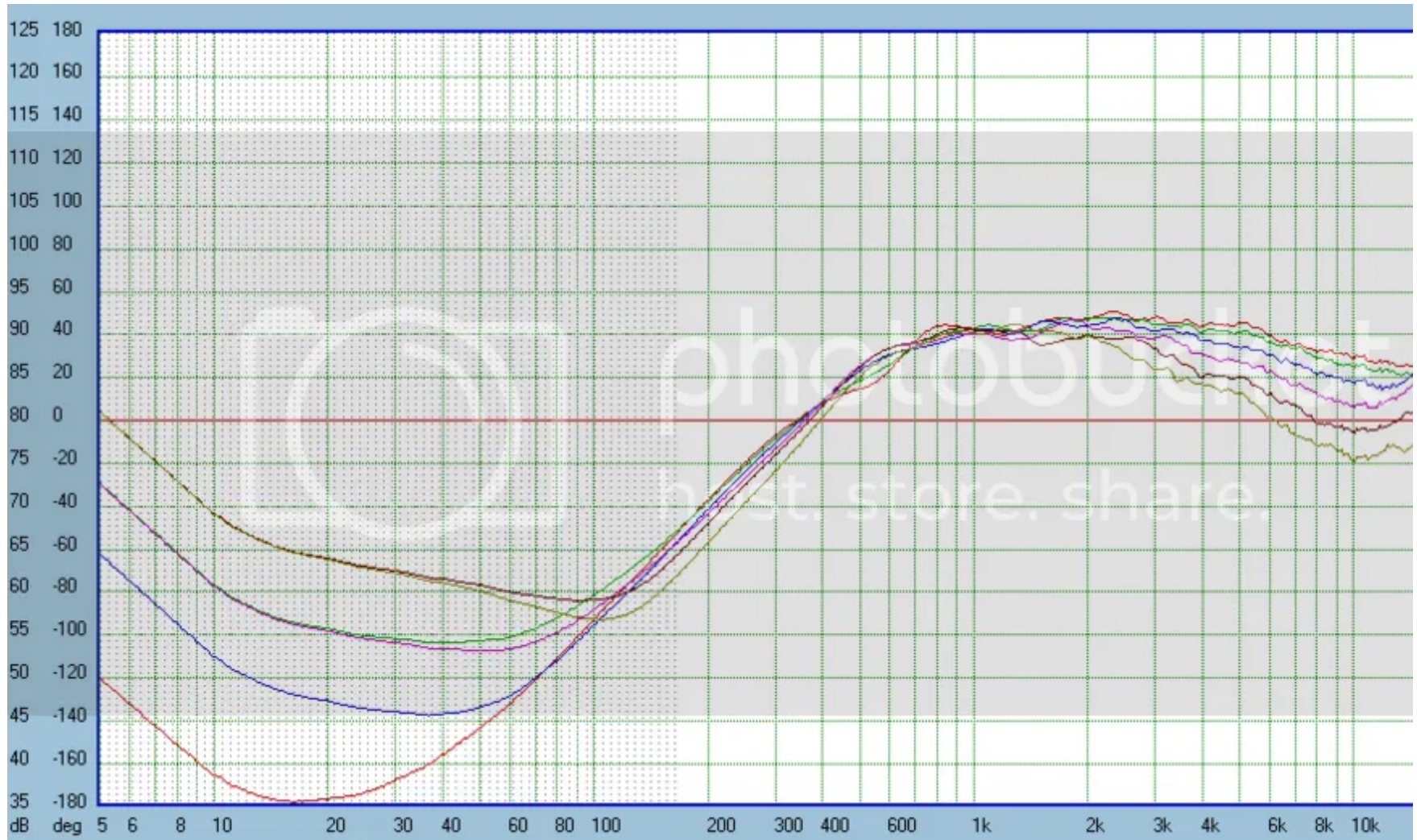
0-30-60:



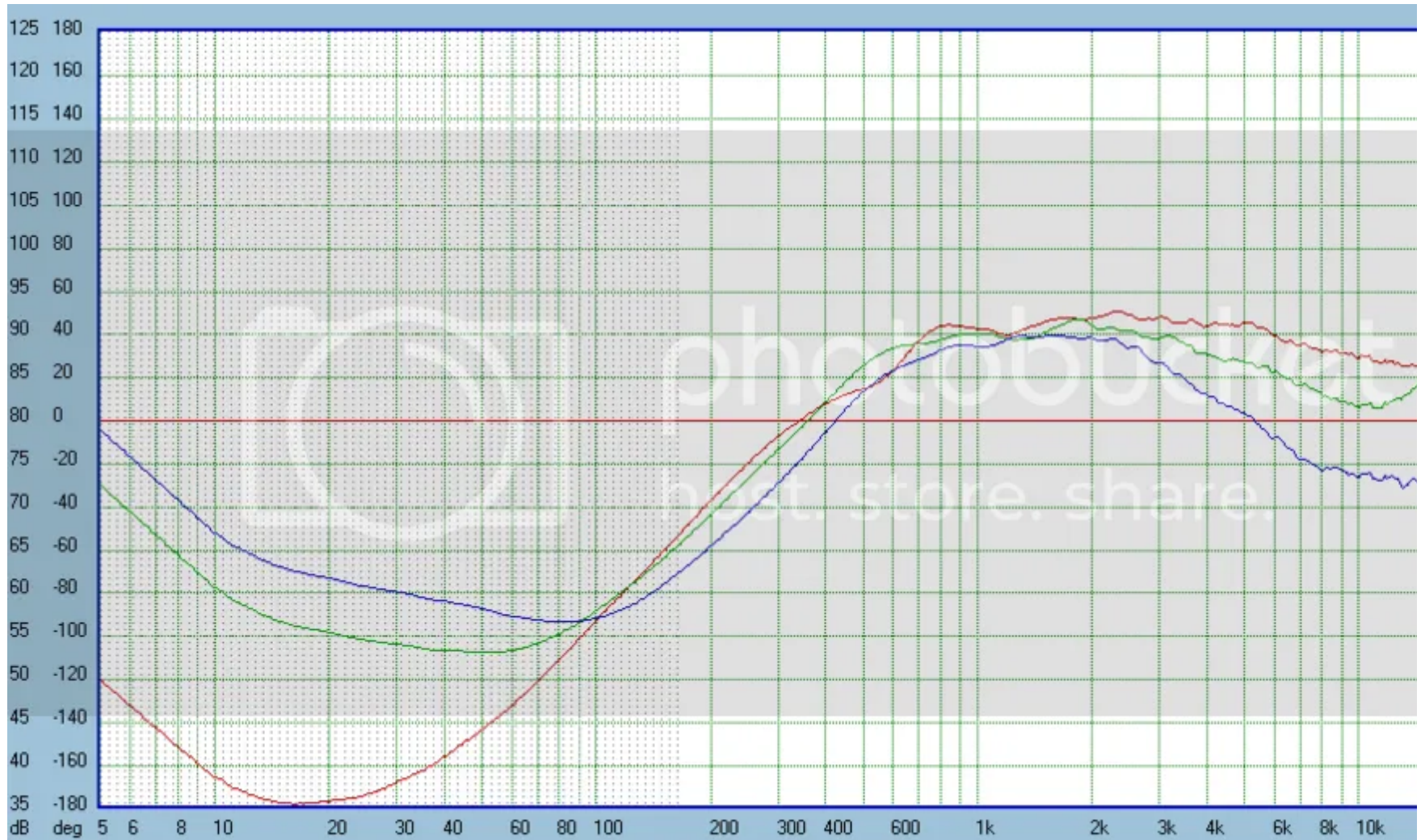
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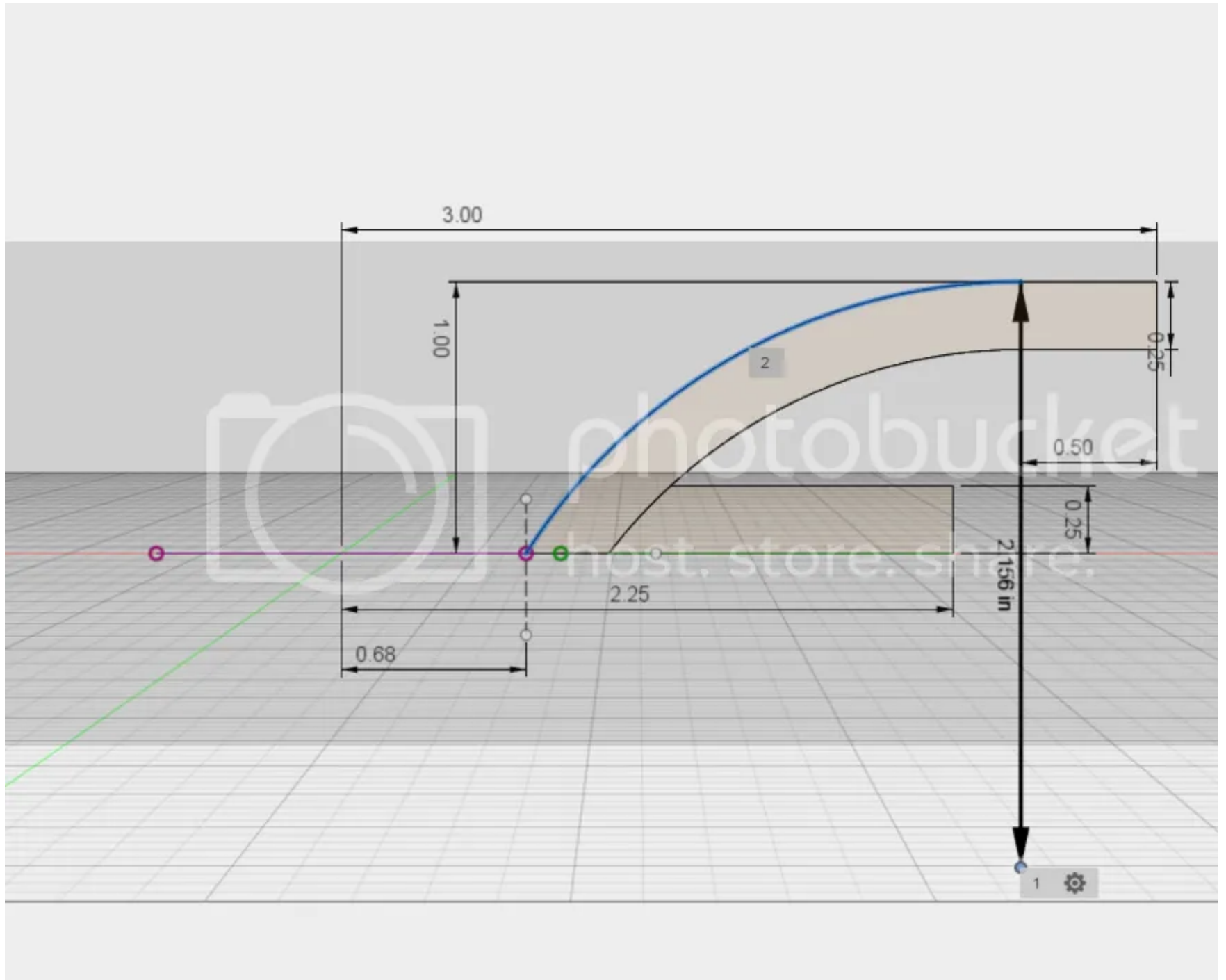
1" deep, tangent mouth, 0-10-20-30-40-50:



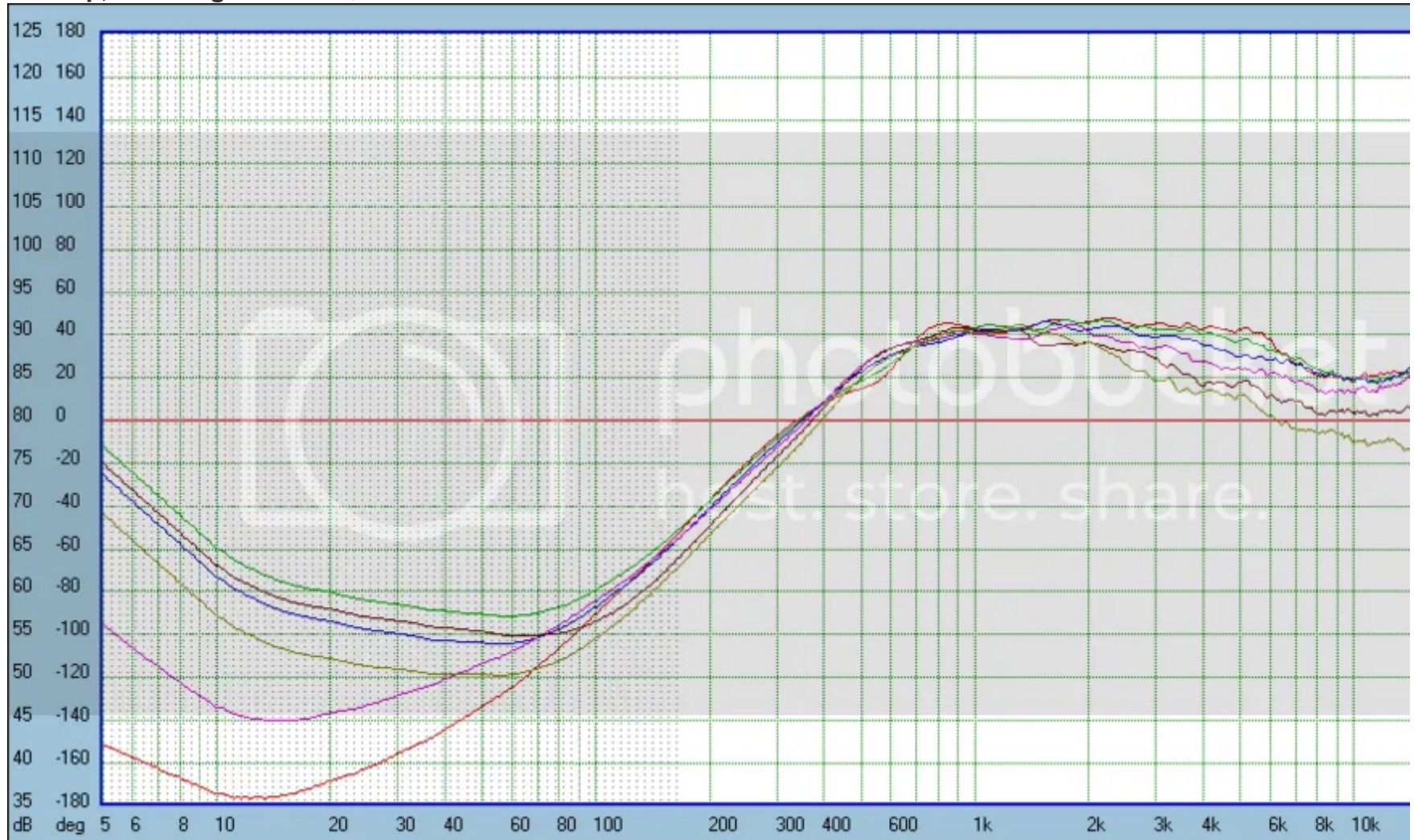
0-30-60:



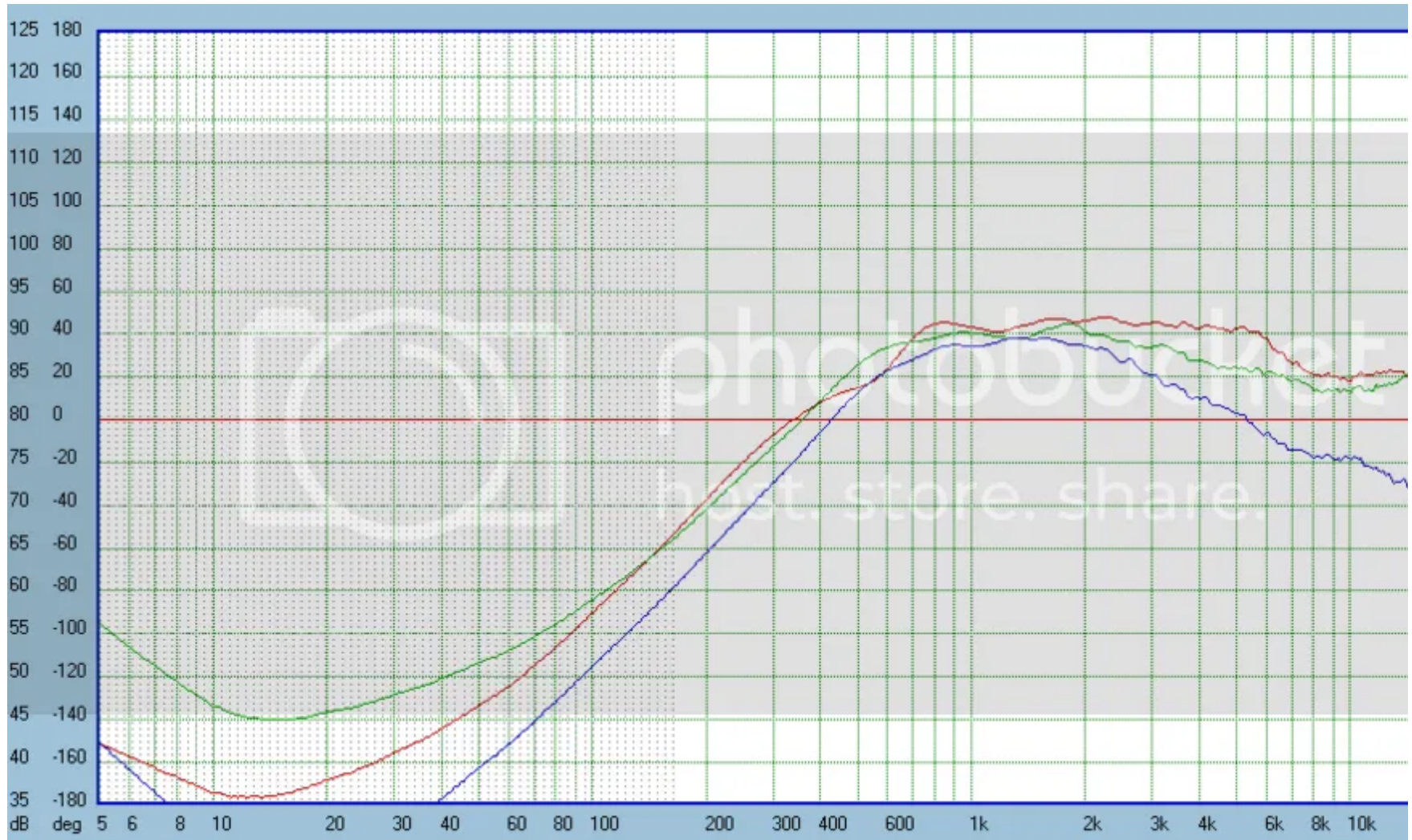
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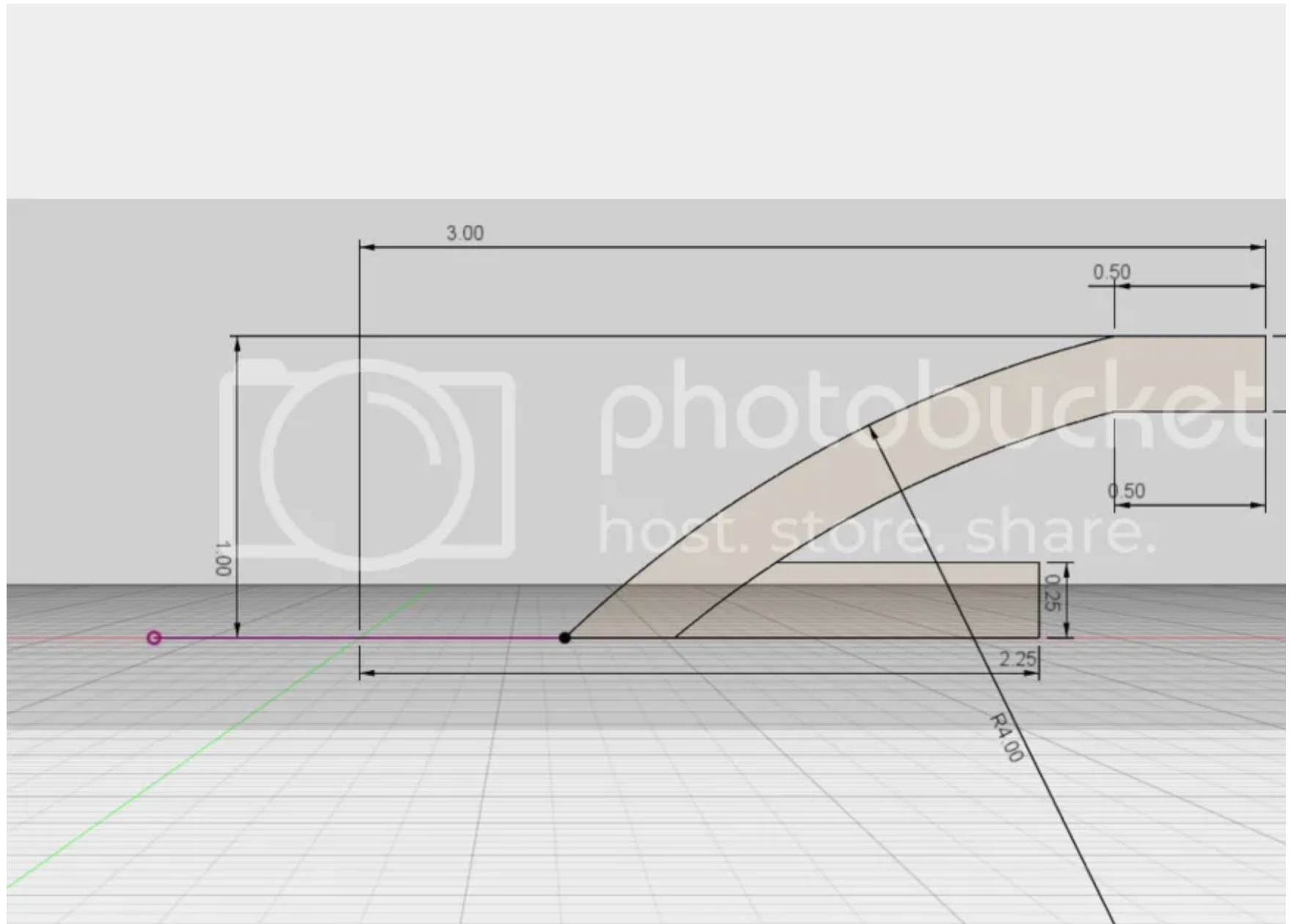
1" deep, non-tangent mouth, 0-10-20-30-40-50:



0-30-60:



profile:

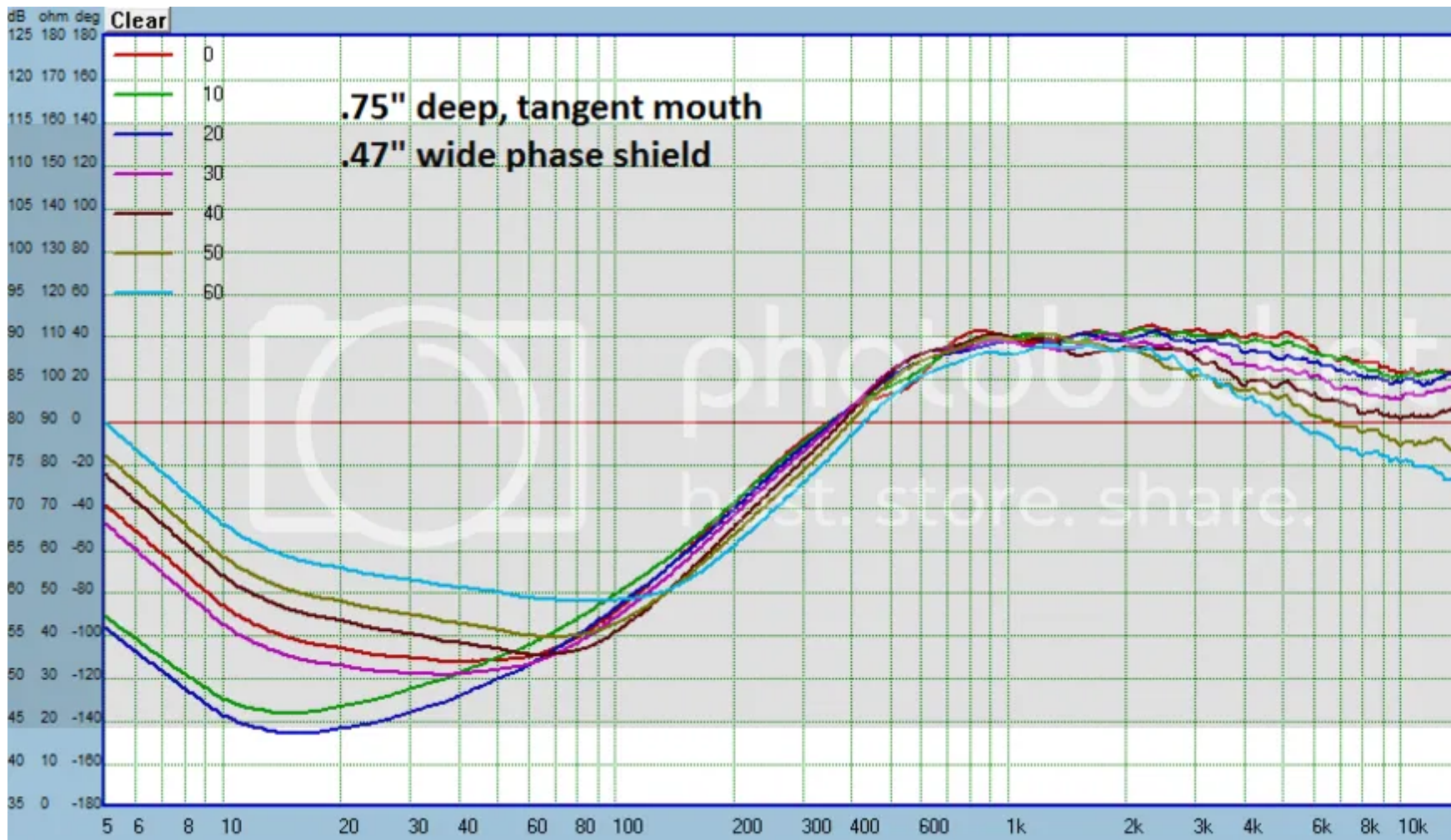


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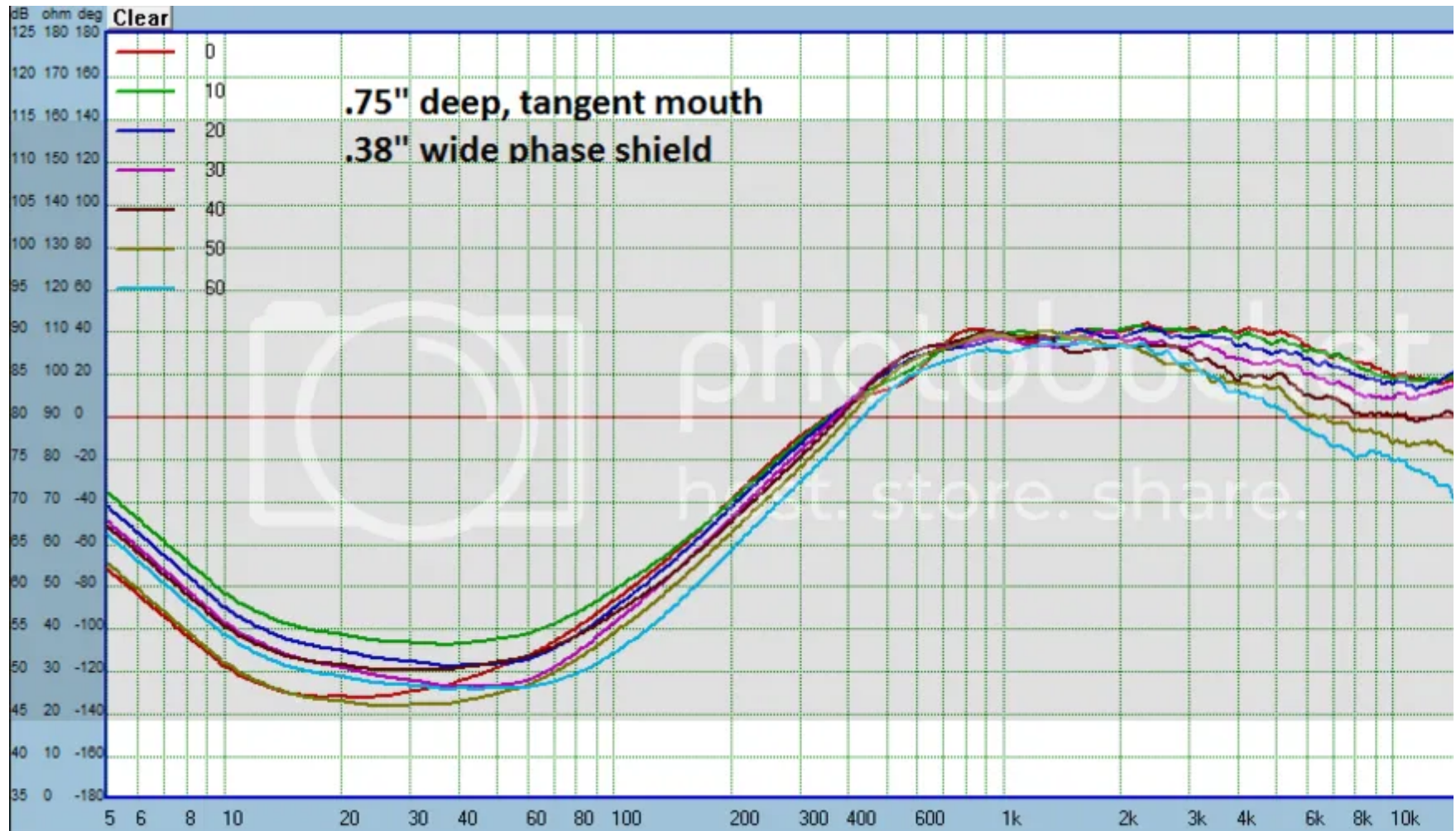
I've been doing some experiments with the phase shields and they have huge impact on the top end. First played with spacing from the dome, SB26ADC was about 3/32" from the factory. My guides were closer, about 1/16" away. So I

checked farther out, about 1/8", and badly impacted the top octave, moving large nulls down into the 10-20kHz range. Sorry I forgot to save the measurements! Bottom line, closer is better, although 1/16" is probably as close as I want to get.

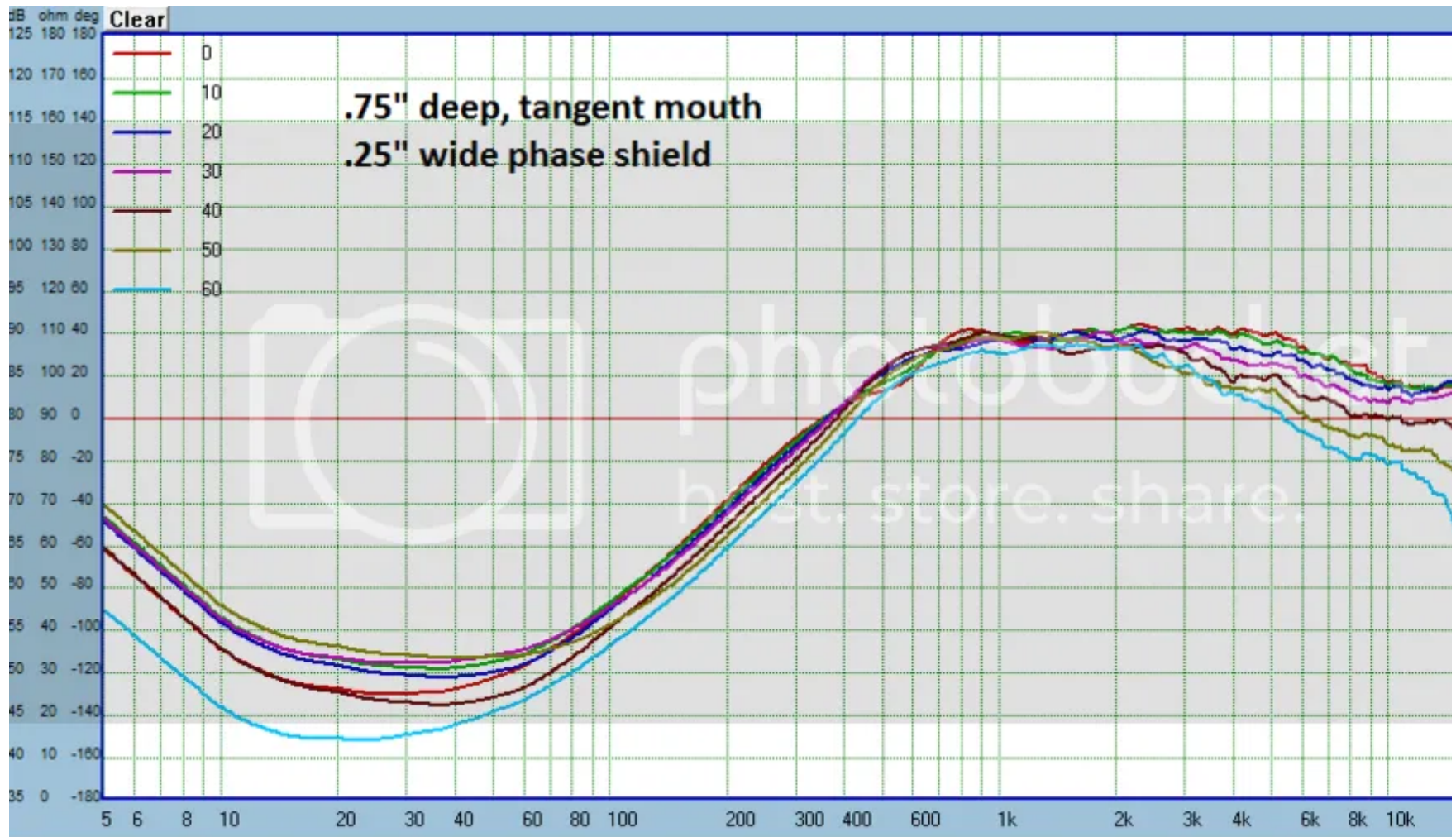
Next experiment was to change the size of the phase shield. SB26ADC was .47" and that is what mine are. Using a hobby knife I started whiddling down and measuring. Here are the results, first using the .75" deep, tangent mouth guide. For reference from above, the original .47" wide phase shield:



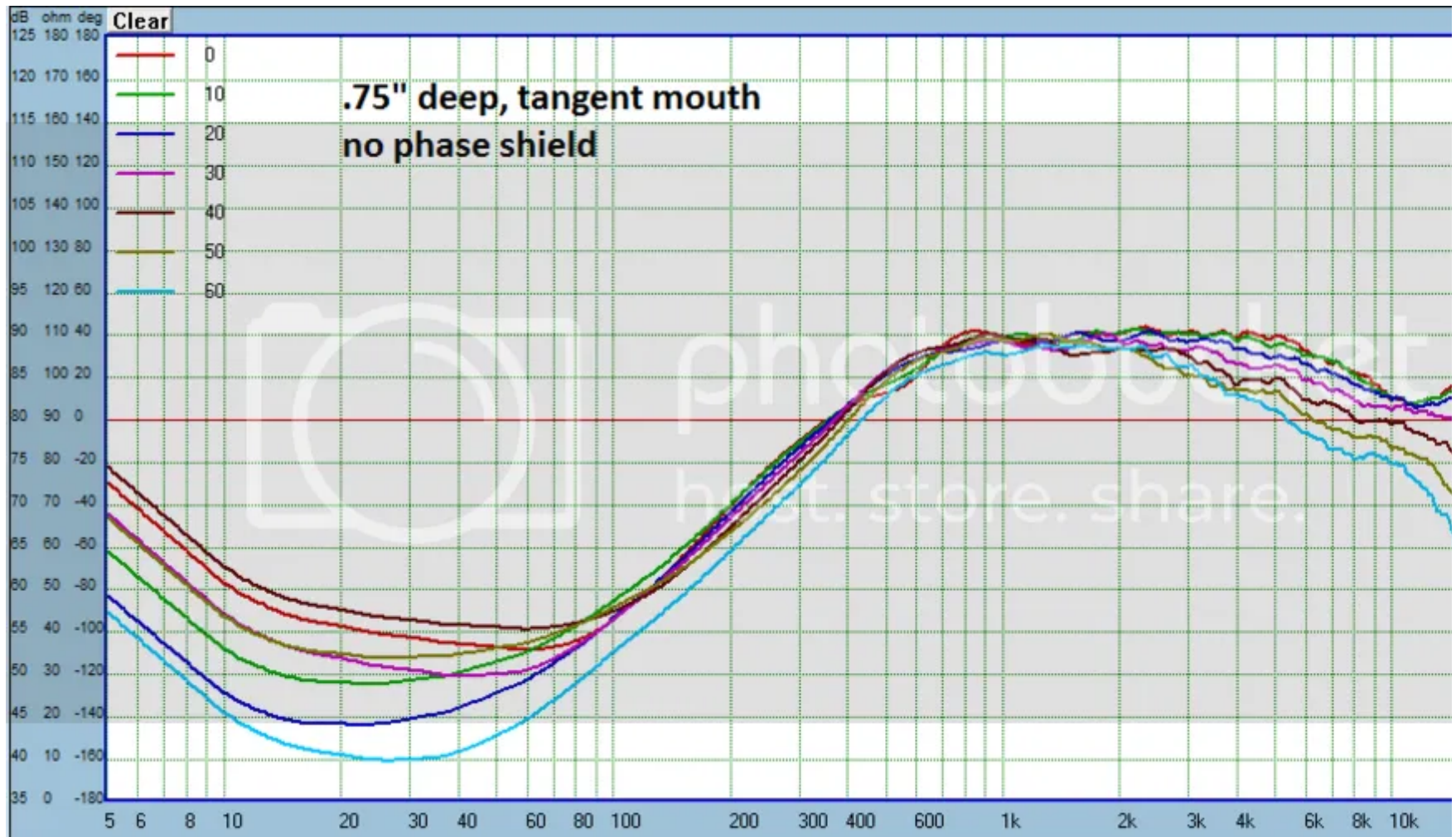
Then at approximately .38" phase shield:



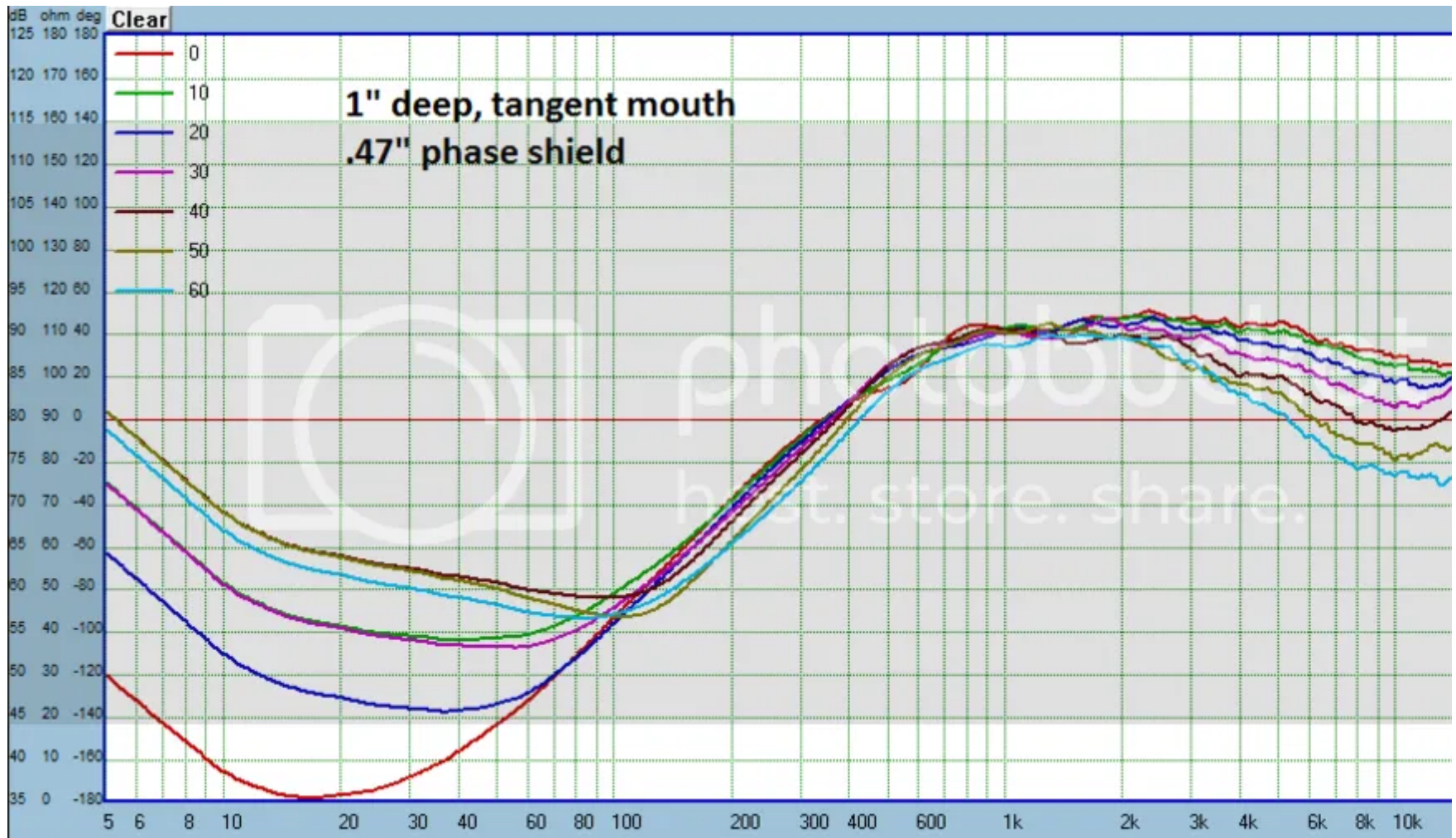
Finally down to approx. .25" wide phase shield:

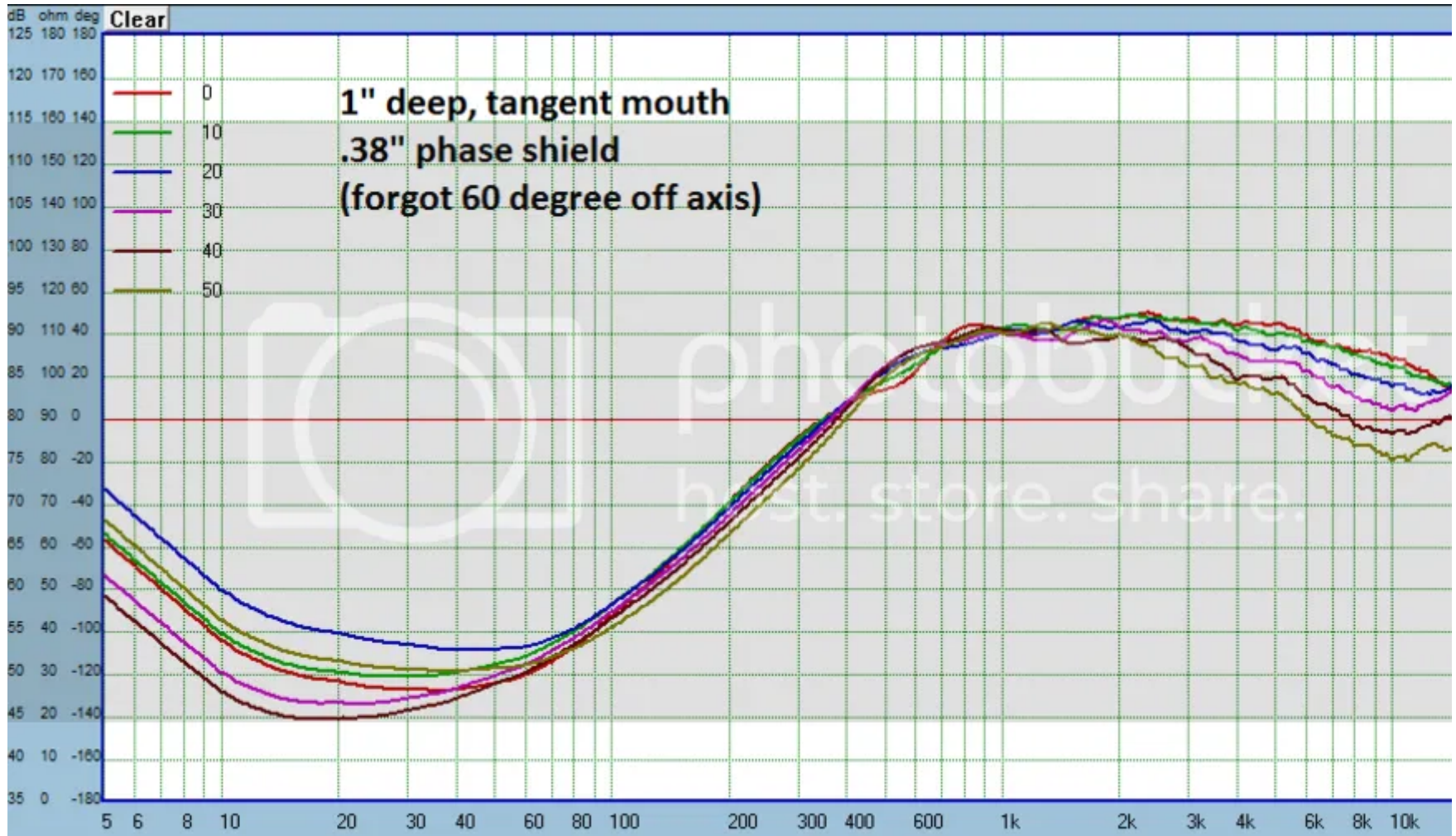


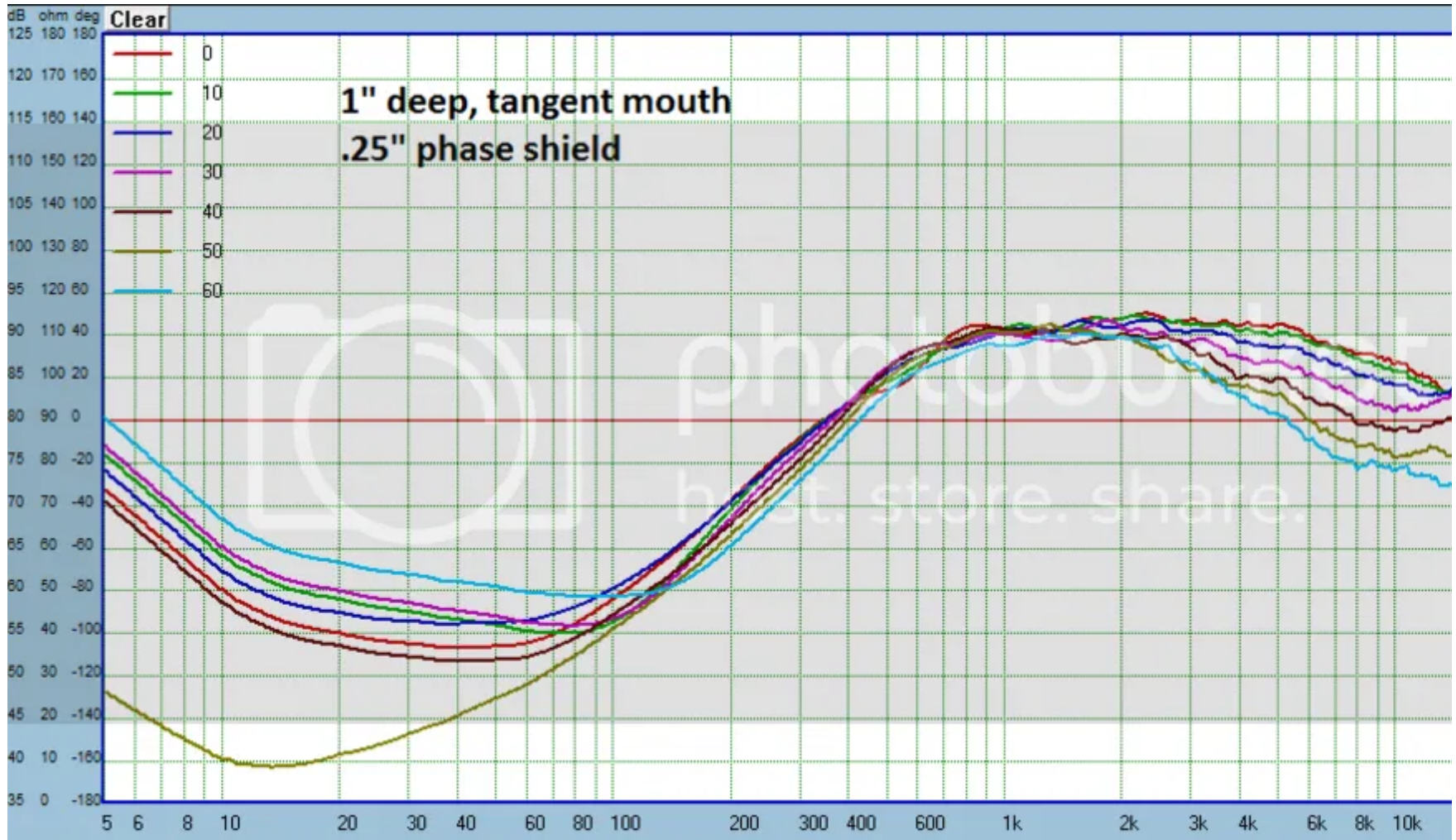
And finally, no phase shield:

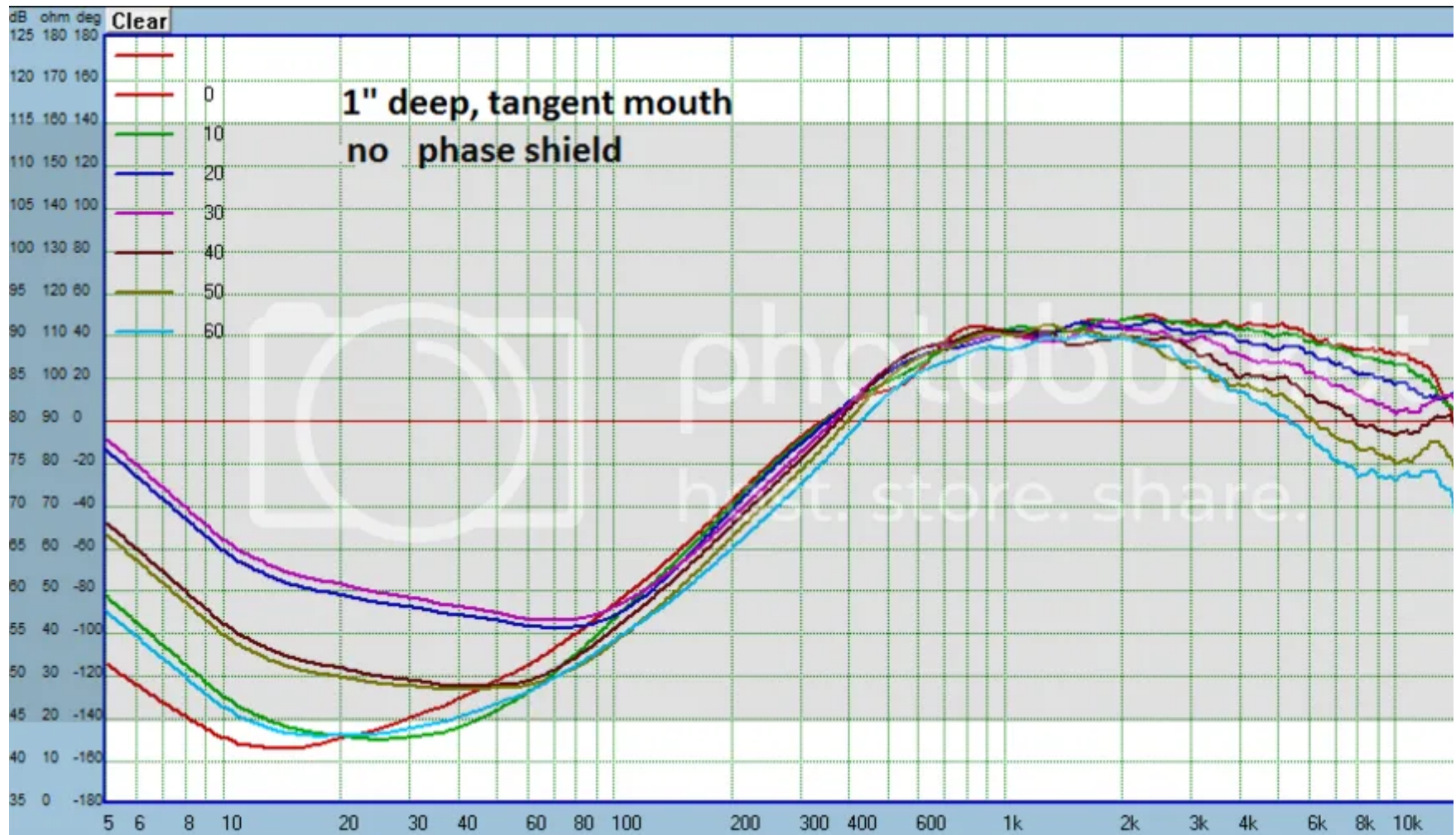


Here is the same series using the 1" deep, tangent mouth waveguide:



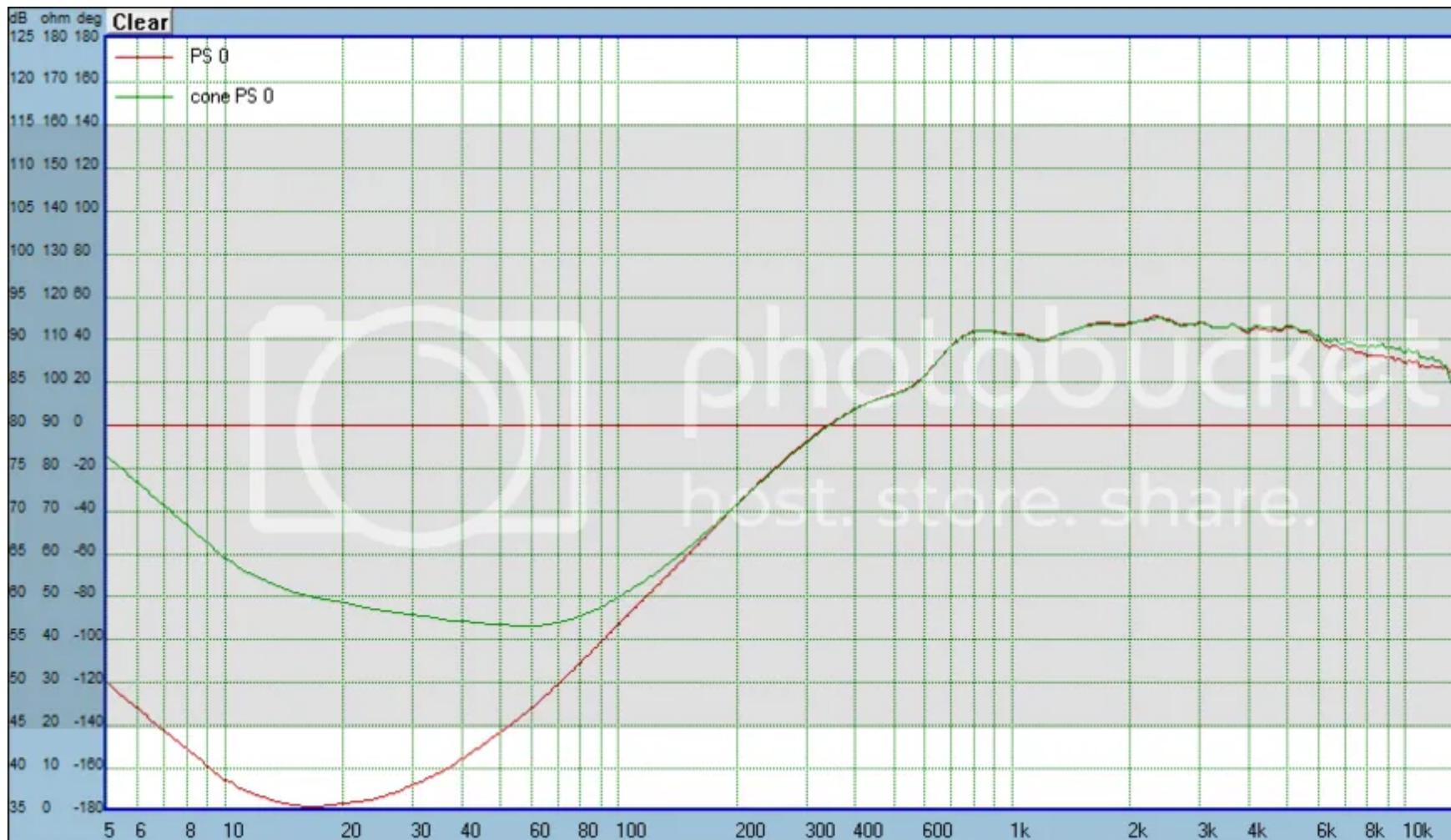






So clearly a benefit from the phase shield, but it shouldn't be large. .25" seemed pretty near the sweet spot. I also did a crude experiment with a cone phase shield using some blue putty:





So that didn't work well! I'll continue to experiment with phase shield shapes. Also it was suggested to try making the throat overhang the surround so it is closer to the dome. I've had bad luck doing this on the 3" TangBand dome midrange, but that might have just been bad luck, so I've got a waveguide being printed to test it out.

Kommentarer

Du har inte behörighet att lägga till kommentarer.

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