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Summary of K-Horn Findings

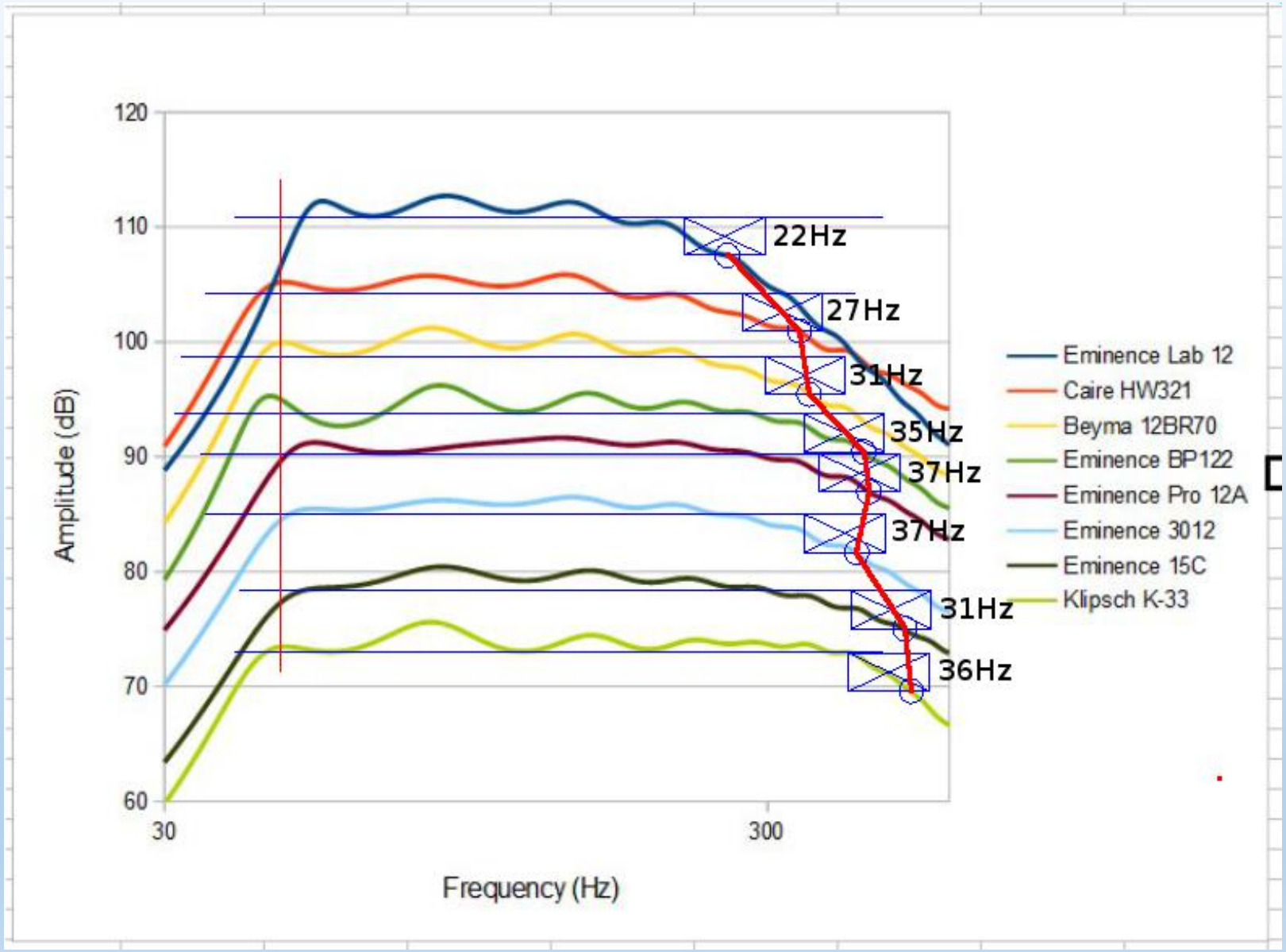
A summary of data accumulated for 12 inch drivers

Klipsch Bass Horn Analysis PDF constructs a full size corner horn using software, and then unfolds the acoustic path for dimensional analysis. It also determines the rear cavity volume in liters.

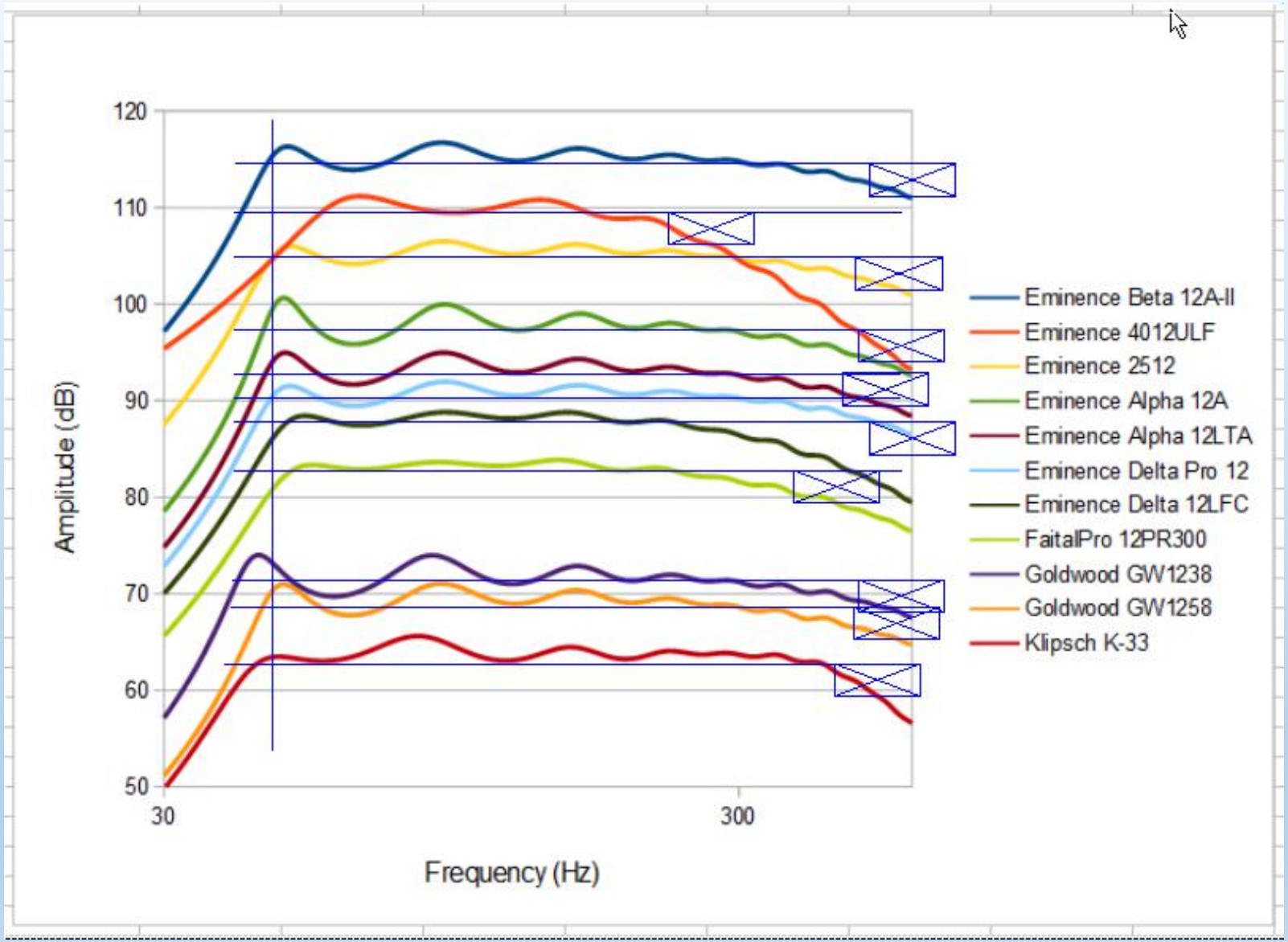
A Design of Experiments (DOE) was done on the standard K-horn cabinet and K-33 driver, to understand how changing driver parameters affects performance. Each of parameters listed below was changed by ± 10%. Parameters are listed by significance. Note that frequencies were broken into “bins” as shown below.

Freq	30.08	41.79	60.62	85.44	122.17	172.20	246.21	347.03	496.19	699.39	Parameter	Note
Sd+	0.13	0.42	-0.52	0.08	-0.34	-0.05	-0.04	0.02	0.25	1.04	Driver Diaphragm Piston Area	Piston size is a balance
Mmd+	0.12	-0.09	0.00	-0.09	-0.10	-0.27	-0.34	-0.42	-0.59	-0.93	Driver Diaphragm/Voice Coil Mass	Less diaphragm mass increases HF output (>120Hz)
Bl+	-0.07	-0.41	0.49	0.00	0.47	0.47	0.60	0.69	0.79	0.91	Driver Magnetic Flux Density	Higher flux density increases HF output (>60Hz)
Re+	-0.41	-0.26	-0.68	-0.46	-0.67	-0.67	-0.68	-0.64	-0.54	-0.40	Driver Voice Coil DC Resistance	Higher DC resistance decreases output
Le+	-0.02	0.02	-0.01	0.01	-0.01	0.00	-0.06	-0.17	-0.33	-0.52	Driver Voice Coil Inductance	Higher voice coil inductance decreases HF output (>350Hz)
Vtc+	0.03	0.01	-0.01	0.00	0.02	0.04	0.09	0.19	0.18	-0.81	Throat Chamber Volume	Chamber throat volume is a balance (>350Hz)
Tal+	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.19	-0.20	Rear Chamber Lining Thickness	More rear chamber lining thickness reduces HF slightly (>500Hz)
Vrc+	0.63	-0.26	0.00	-0.06	-0.03	-0.04	-0.02	-0.01	0.00	0.00	Rear Chamber Volume	Rear chamber volume is a balance (<40Hz)
Cms+	0.17	-0.07	0.00	-0.02	-0.01	-0.01	-0.01	0.00	0.00	0.00	Diaphragm Suspension Compliance	Higher diaphragm compliance increase LF slightly (<40Hz)
Atc+	-0.01	0.01	0.00	0.01	0.01	0.03	0.04	0.04	0.01	-0.02	Throat Chamber Sectional Area	
Lrc+	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.02	-0.02	-0.03	Rear Chamber Average Length	
Rms+	-0.02	-0.04	-0.01	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	Diaphragm Suspension Resistance	
Fr+	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Acoustical Lining Resistivity	

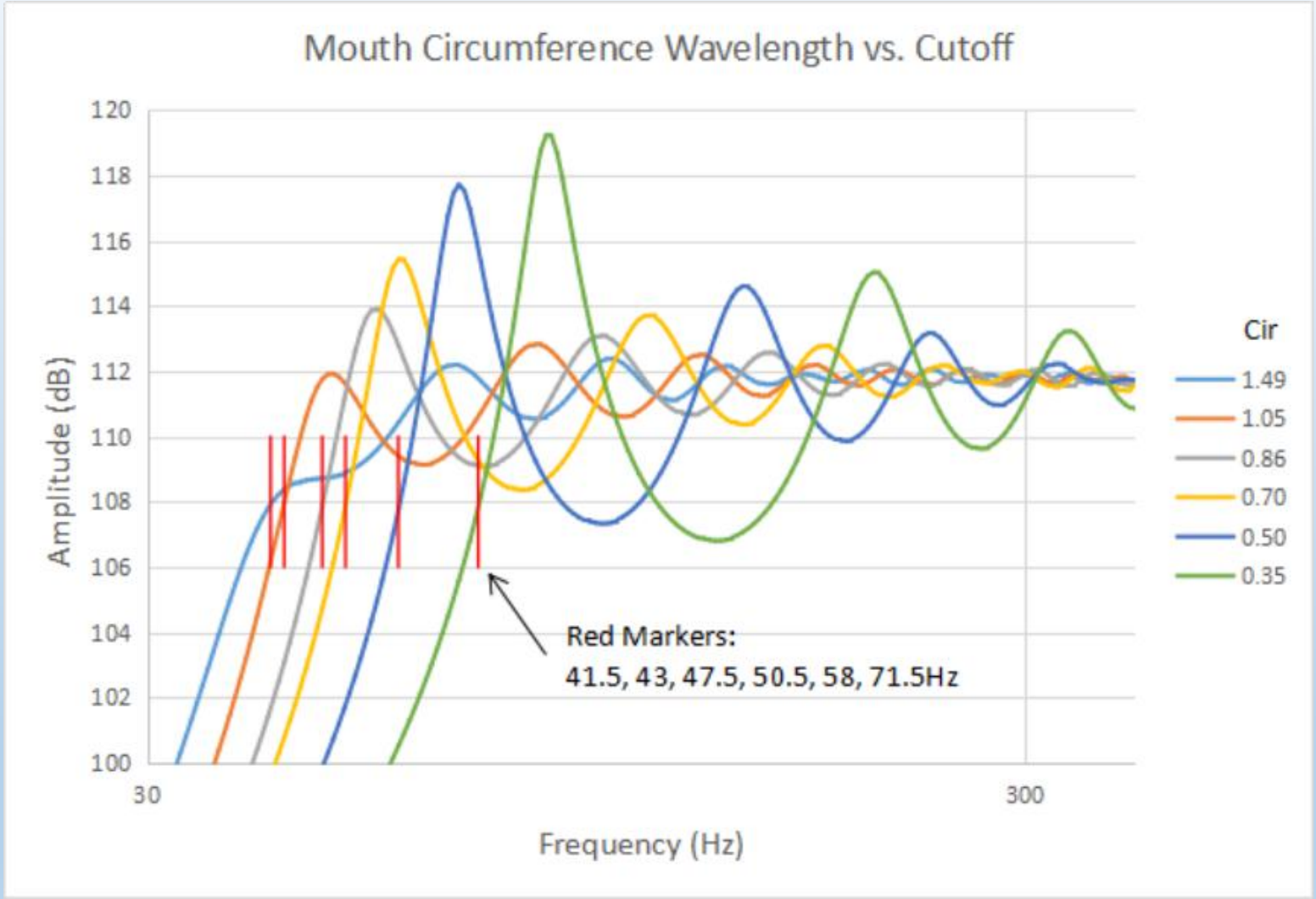
Klipsch Driver Analysis - I PDF shows the acoustic performance of these drivers when coupled with an exponential horn.



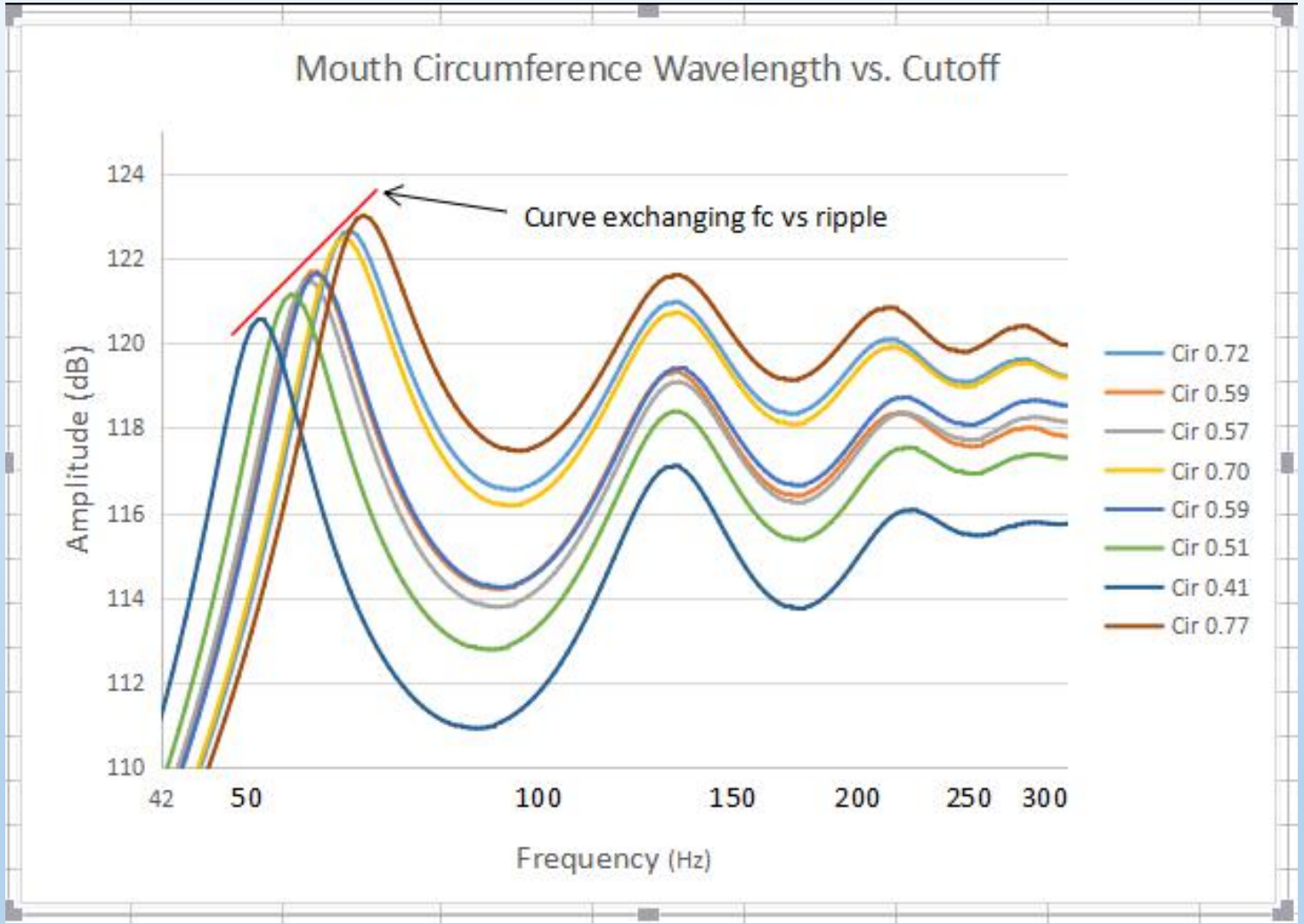
Klipsch Driver Analysis - II PDF shows more drivers in exponential horns.



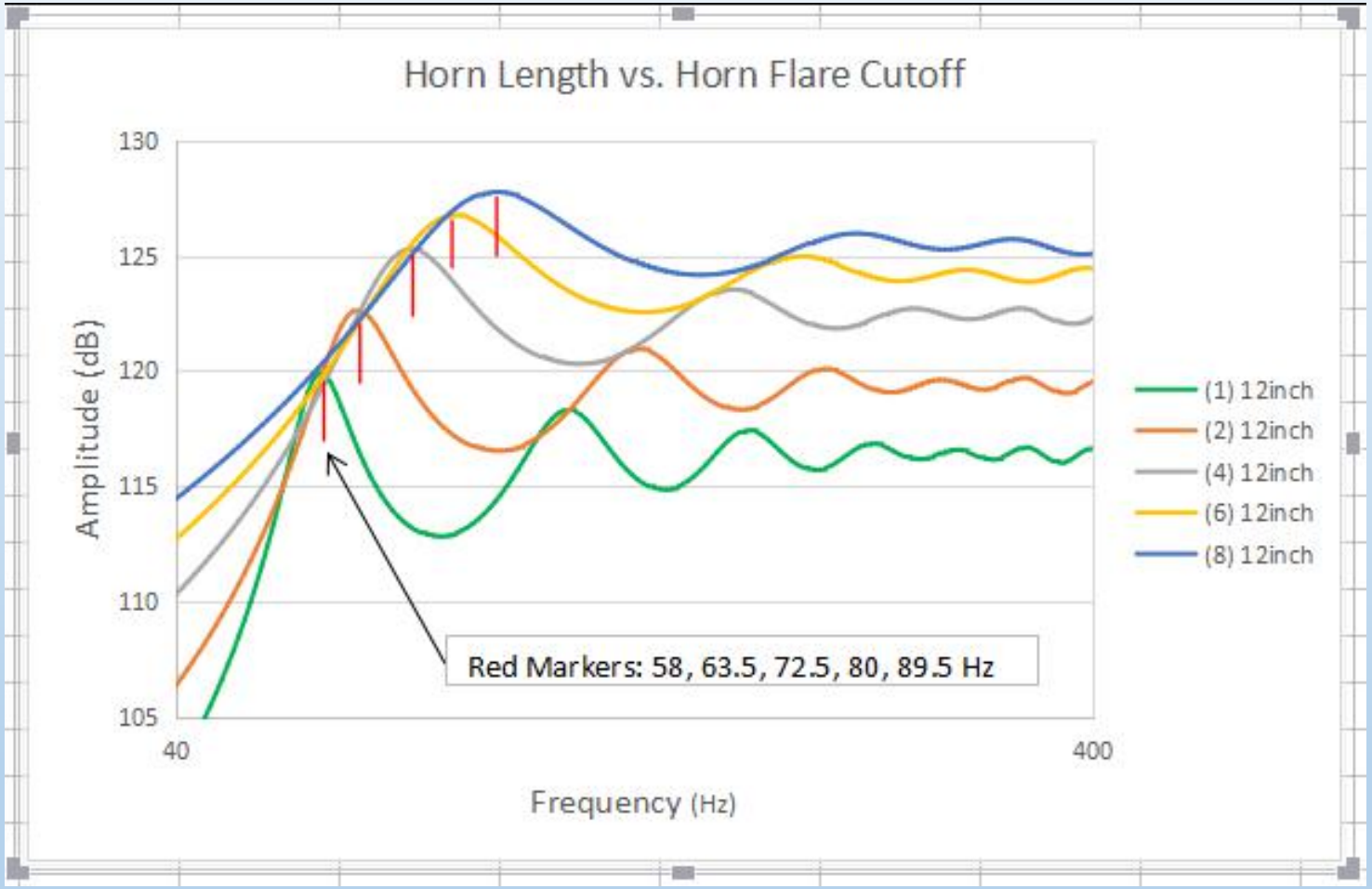
Horn Mouth Size Analysis PDF shows the acoustic performance of six exponential horns with various mouth sizes.



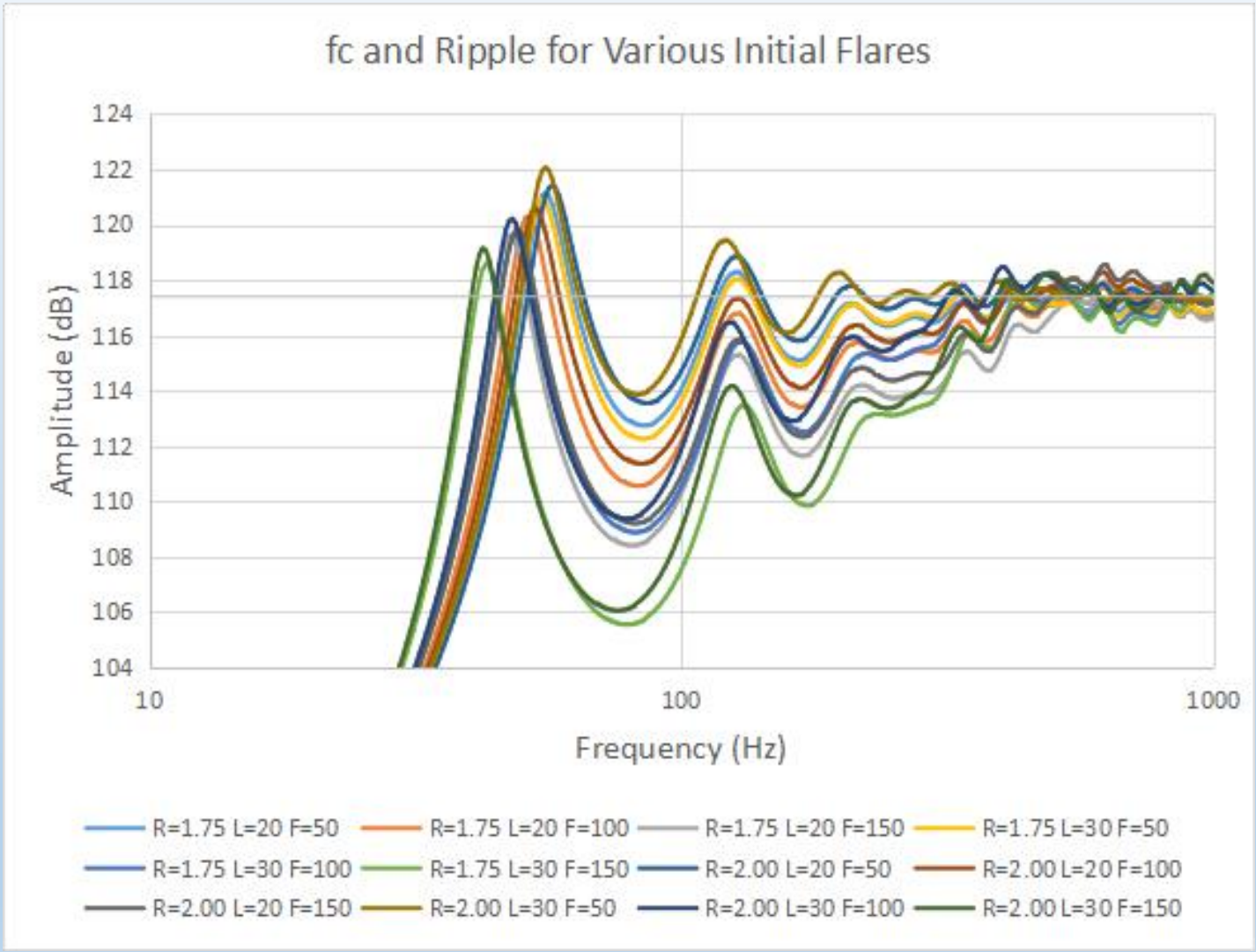
Klipsch Horn Optimization PDF shows the acoustic performance of eight high initial flare (100Hz) horns with various mouth sizes.



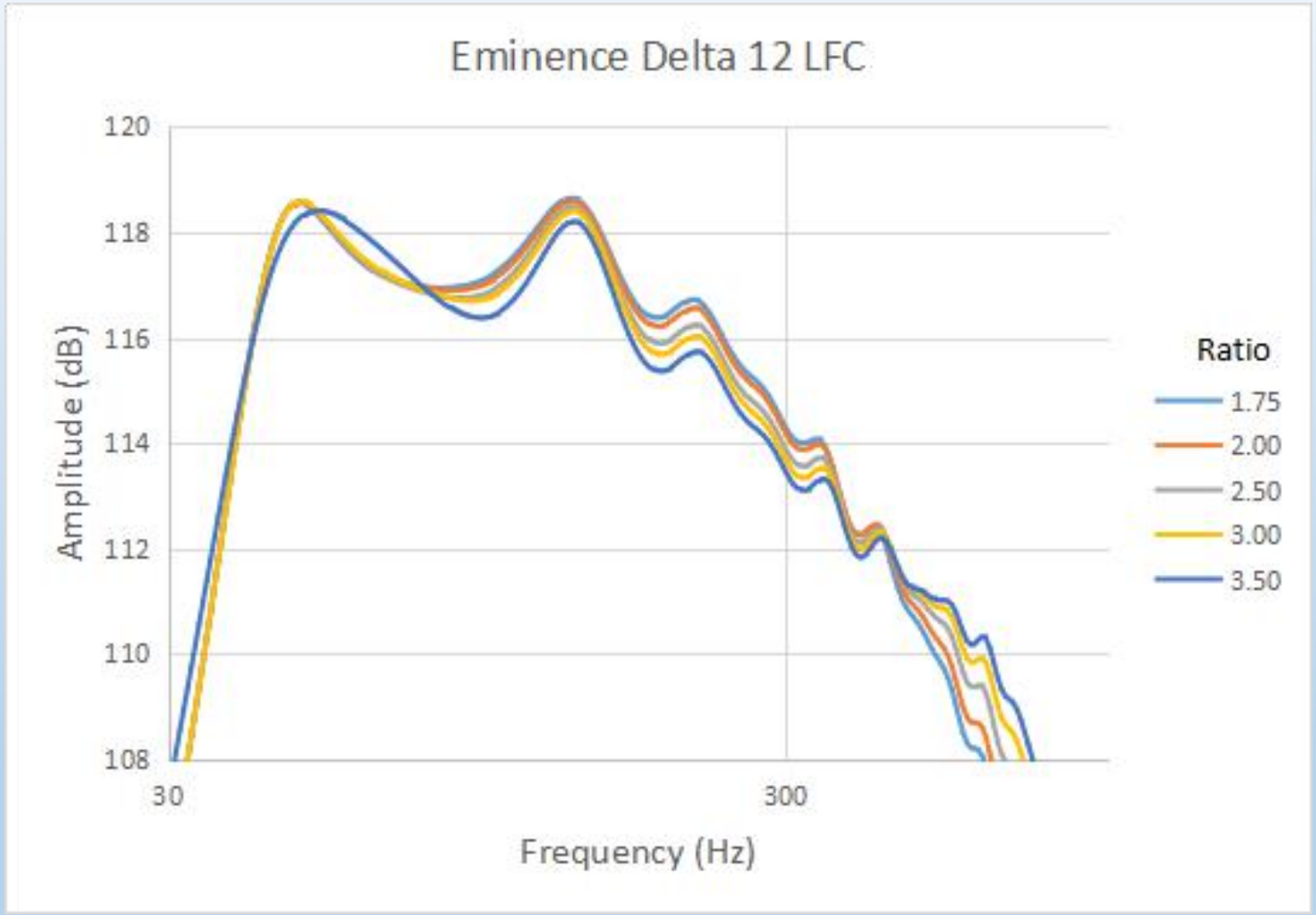
Horn Length Reduction PDF adds more drivers to the horn throat to see if this technique allows making a shorter horn.



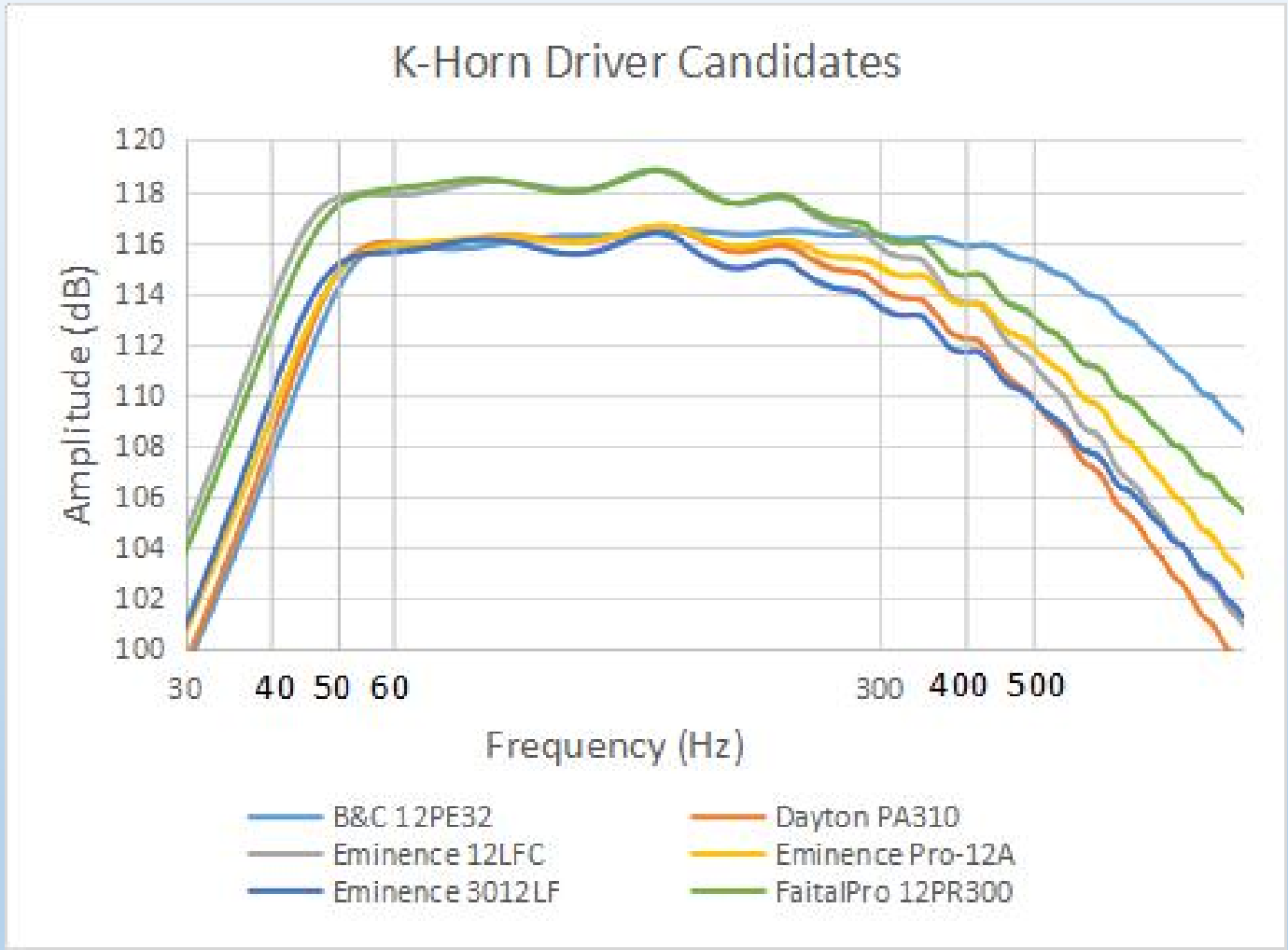
High Initial Flare Rate-I PDF looks at various high initial flare rates and lengths, and their effect on performance.



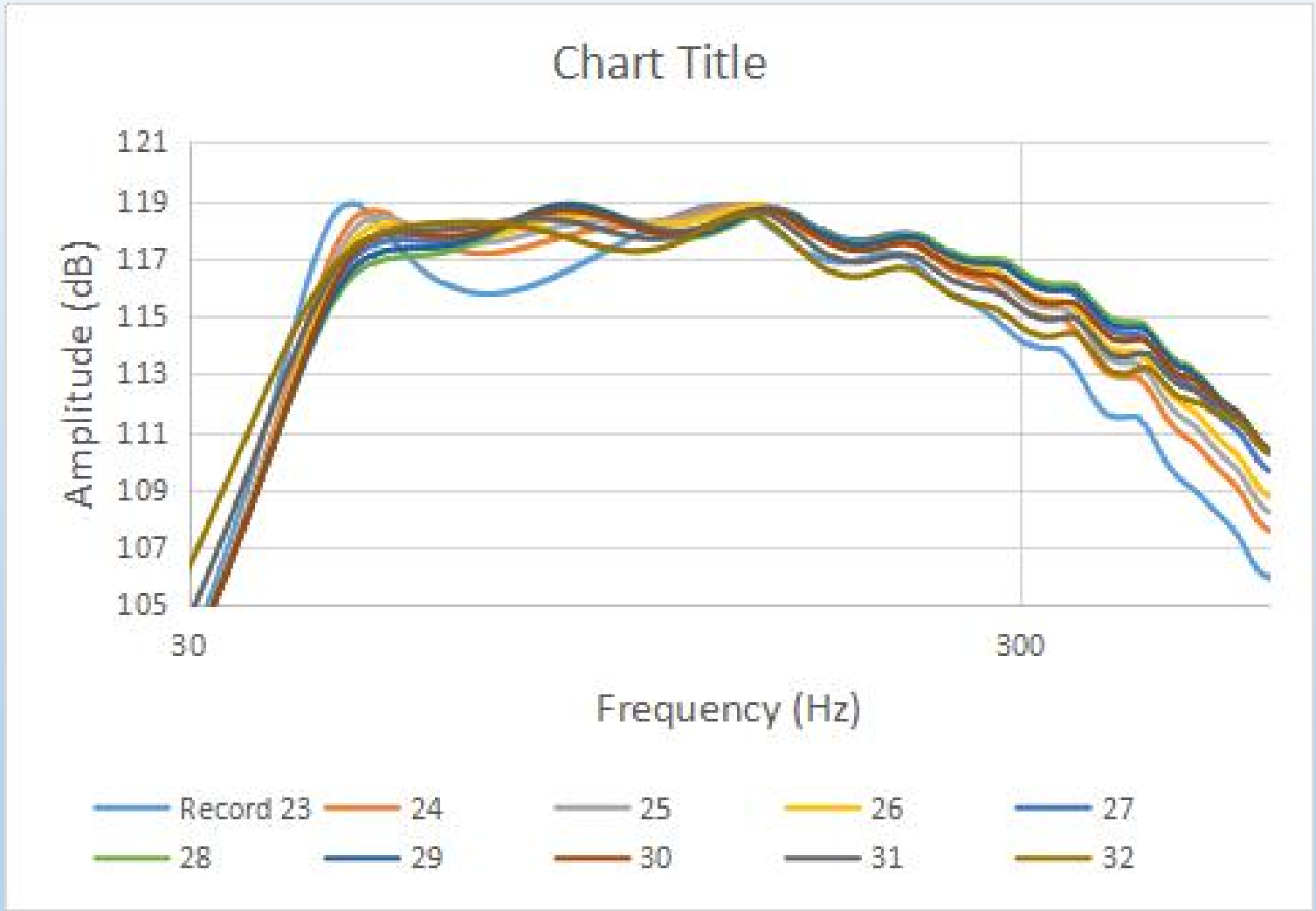
High Initial Flare Rate-II PDF looks at various high initial flare rates and lengths, and their effect on performance. Throat ratios give essentially the same SPL curves.



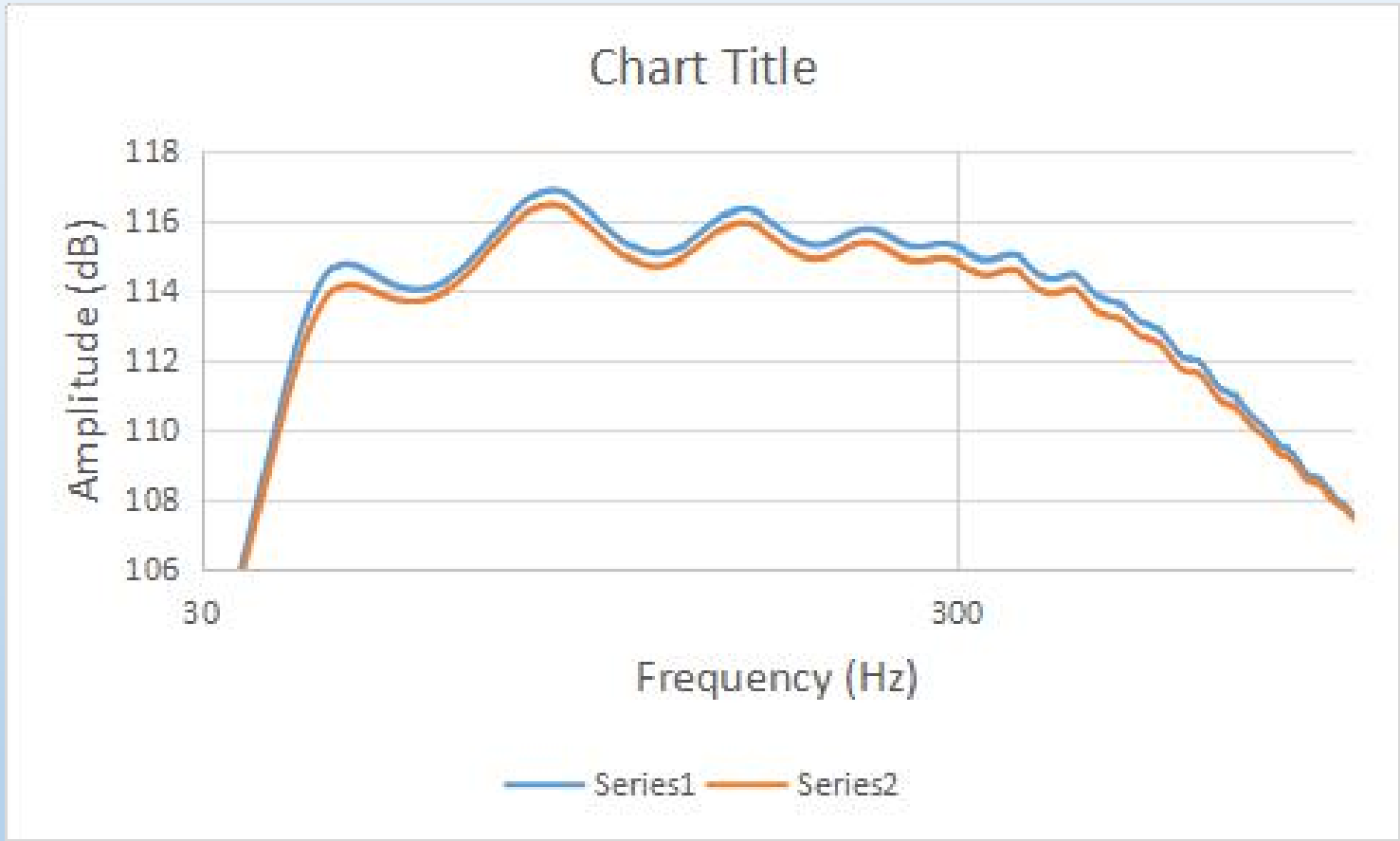
Candidate Drivers PDF checks the acoustic performance of these drivers as mounted in an exponential horn using parameters defined by Keele.



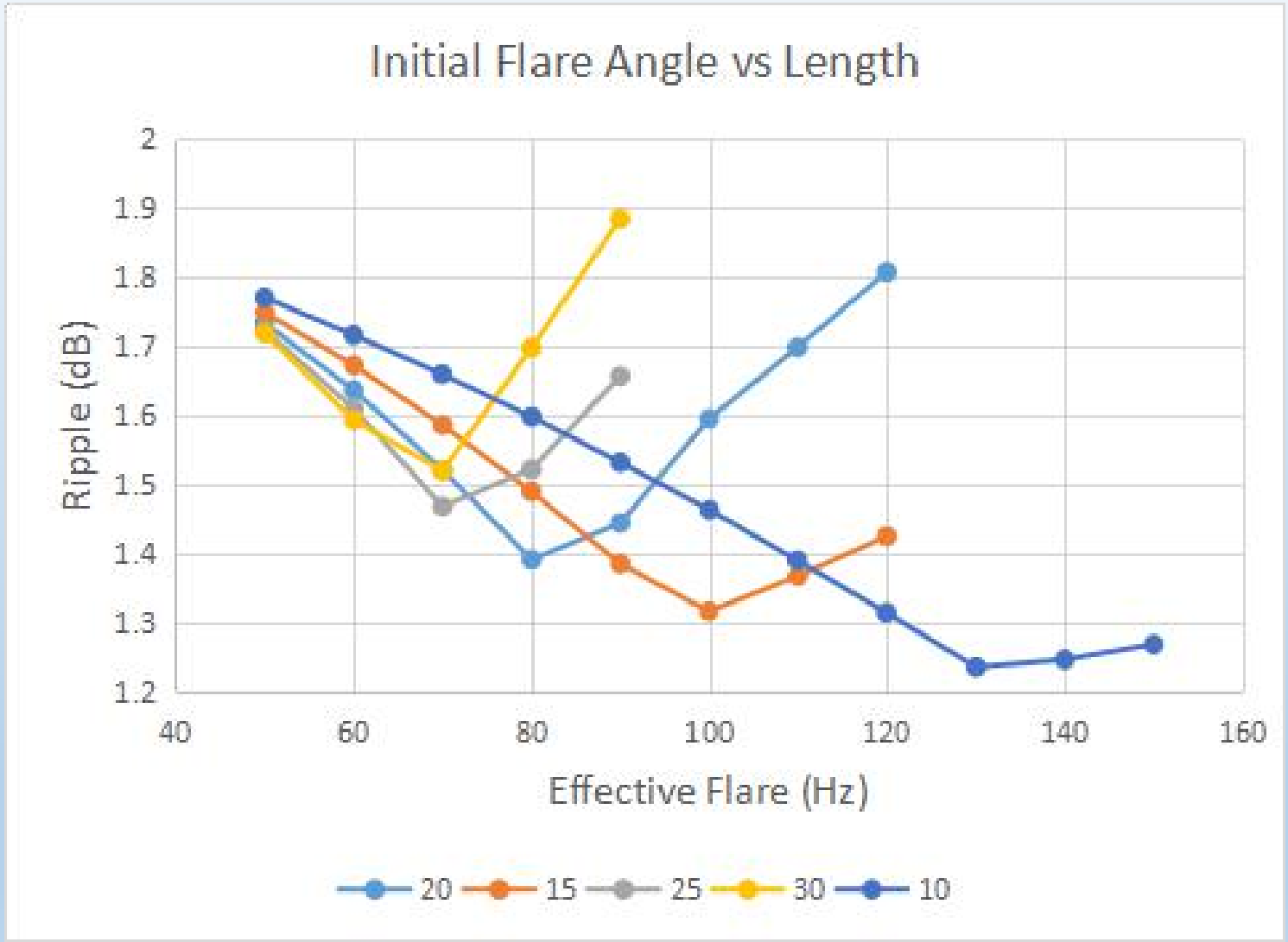
The Candidate Drivers PDF also checks the performance by utilizing a horn with high initial flare.



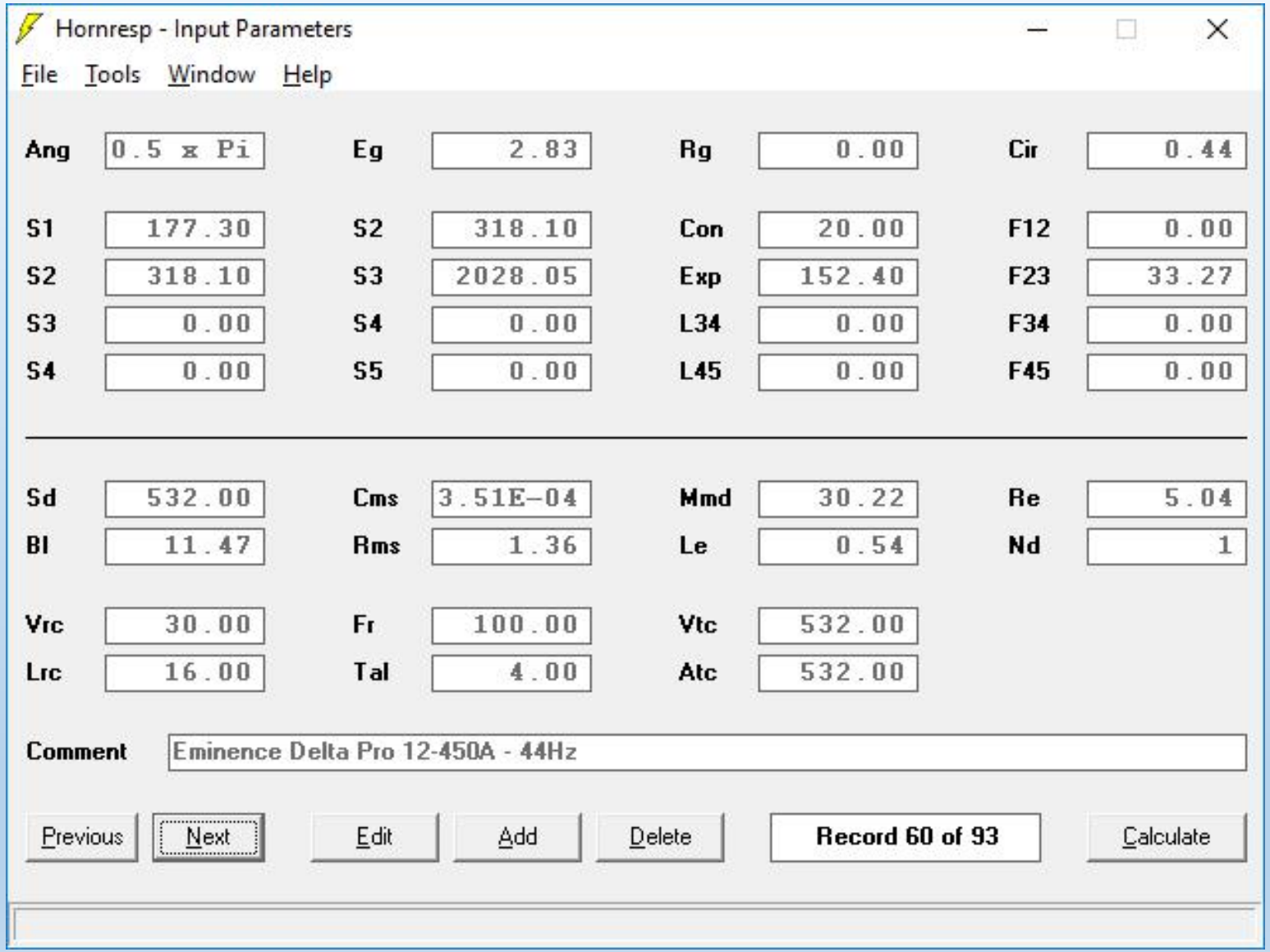
Finally, the Candidate Drivers PDF makes several drivers with optimum parameters for a corner horn. One is a Eminence Delta Pro 12A.



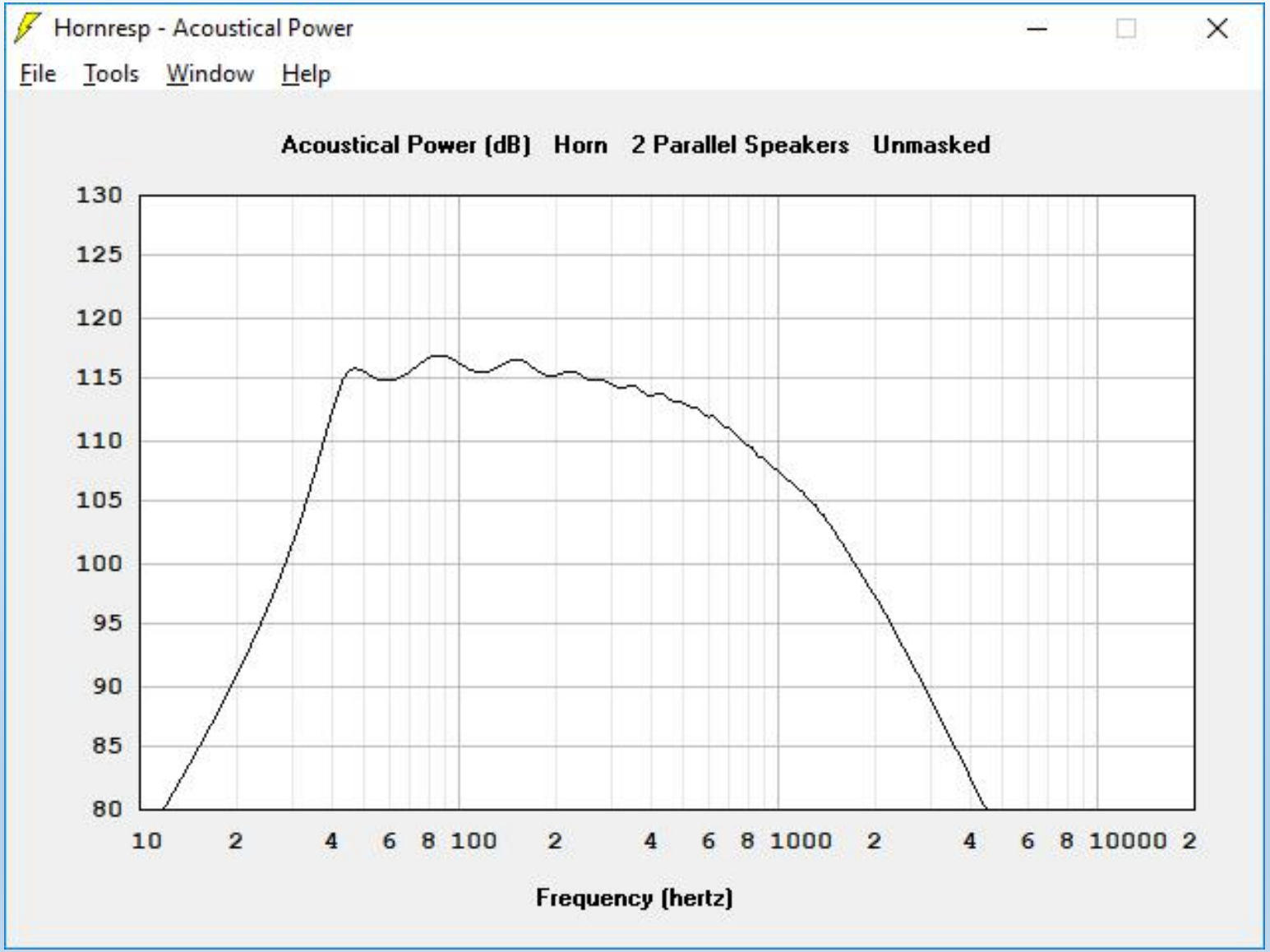
Optimum Horn Shape PDF uses a Eminence Delta Pro 12A to develop a high initial flare horn with optimum parameters.



The optimum horn shape for the Eminence driver in shown on the right. The horn shape will be tweaked along with changes to Vtc at a later date.



Here is the SPL data for the Eminence driver, along with the optimum horn shape.



Since there was so much data to process, a tool was created to help with data extraction and number crunching. It utilizes the export data from AllChartData and HornrespRecord. This tool has been used for most of the PDFs created at this point.