

My two-way bookshelf project

prashant

Drivers

- Tweeter: peerless TL26SG (F-R and Impedance curves in next slides)
- F_s :596Hz
- Sensitivity 94dB
- Impedence 6 Ohm

- woofer: peerless M16GJ, 6.5 midbass (F-Rand impedance not available)
- F_s :40.04
- Sensitivity 87dB
- Impedence 8 Ohm
- VAS : 29.37 ltr
- Q_{ms} :2.62
- Q_{es} :0.57
- Q_{ts} :0.47 (Mudmotor – damn lazy driver)

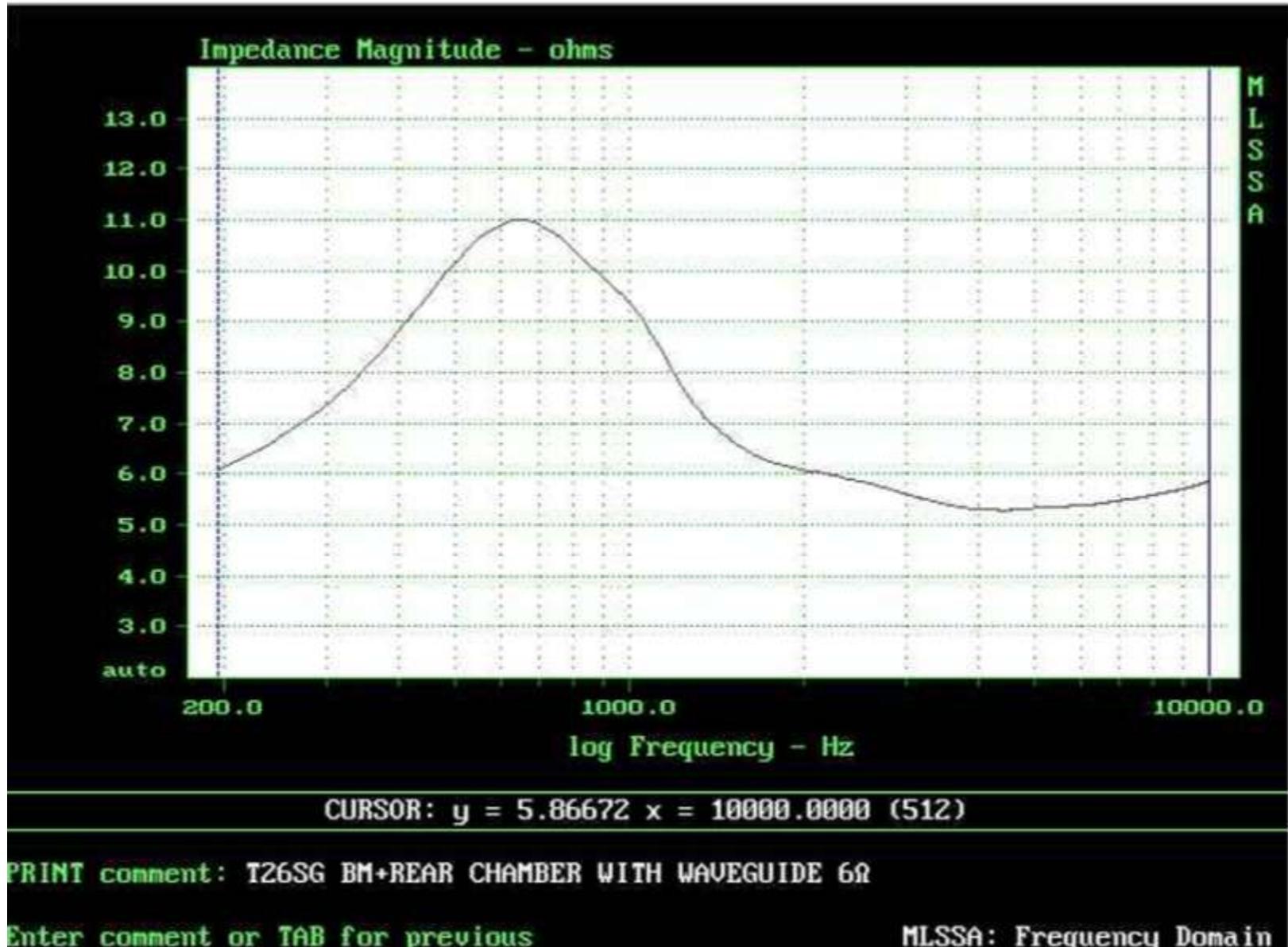
Tweeter f-r

SPL Curve



Tweeter impedance

Impedance Curve



Unibox Simulations

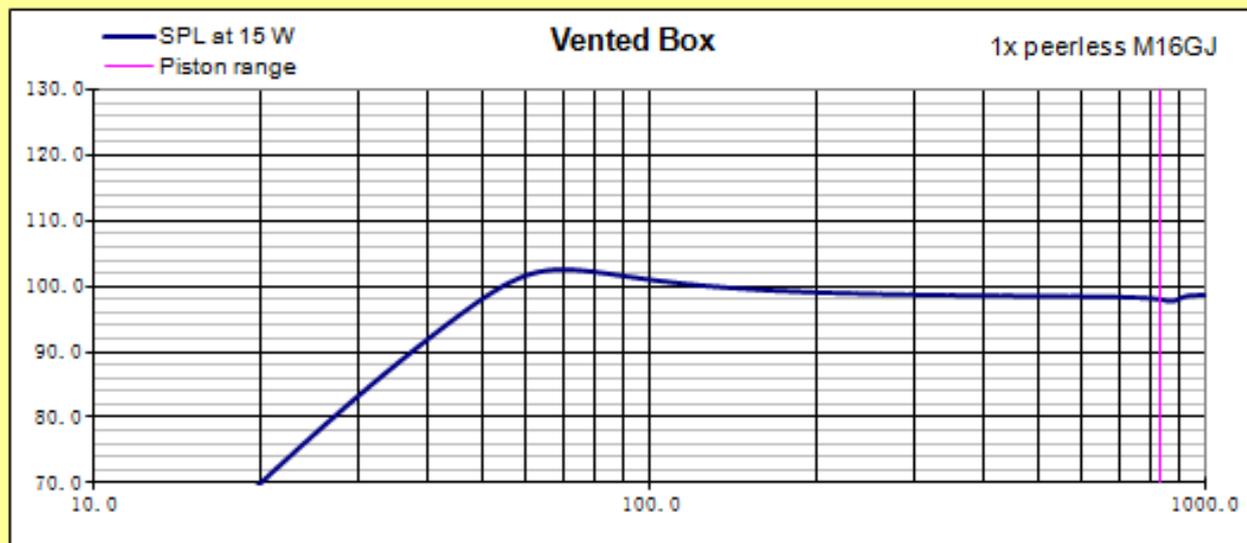
UniBox - Unified Box Model
 Version 4.08 21/1-2008 © Kristian Ougaard 2000 - 2008

Drive Unit Parameters		Parameters of Single Unit		Constants	
peerless M16GJ		SPL at 1 W 1 m	86.9 dB	Sound Speed	345.0 m/s
Fs	40.04 Hz	SPL at 2.83 Vrms 1m	88.3 dB	Air Density	1.18 kg/m ³
Re	5.45 Ohm	Max SPL at 15 W	98.6 dB	Linear Cone Overdrive	1.15
Qms	2.62	Qts	0.468	<input type="button" value="Set all constants to default values"/>	
Qes	0.57	Effective Qts	0.489	Design Data Base Total 43	
Sd	137.1 cm ²	Mms	14.20 g	<input type="text" value="Scan Speak 13M8636-KD"/> <input type="button" value="Reload"/>	
Vas	29.4 l	Cms	1.113 mm/N	<input type="button" value="Save"/> <input type="button" value="Delete"/> <input type="button" value="Import"/> <input type="button" value="Export"/>	
Xmax peak	3.50 mm	Rms	1.363 kg/s	Sort Design Data Base	
(Le)	0.23 mH	BI	5.84 Tm	<input type="button" value="Name"/> <input type="button" value="Fs"/> <input type="button" value="Qes"/> <input type="button" value="Sd"/>	
(Le2)	0.46 mH	Ref. efficiency, n0	0.318 %	Drive Unit Configuration	
(Re2)	6.29 Ohm	Efficiency, n	0.301 %	<input type="text" value="Single drive unit"/>	
Nominal Power	15.0 W	Applied voltage	9.04 Vrms	FR affected by Le, Le2, Re2 <input type="checkbox"/>	
External Components		Piston range	831 Hz	FR affected by external crossover <input type="checkbox"/>	
Rs	0.30 Ohm	Down fire application	0.96		
(Lco1)	0.00 mH	Suggested box type	Closed / Vented		
(Rco1)	0.00 Ohm	Frequency Response Correction Filter			
(Cco1)	0.00 uF	Import ext. active filter	<input type="button" value="FRD"/>		
(Lco2)	0.00 mH	Activate ext. active filter	<input type="checkbox"/>		
(Rco2)	0.00 Ohm	LinkwitzTransform.frd			
(Cco2)	0.00 uF				
Closed Box		<input type="checkbox"/> SPL at 15 W		Closed Box	

Speaker Design / Closed Box / Vented Box / PR Box / BPST Box / Save Graph / Compare / Help / DDBase

Unibox Simulations

52	
53	Vented Box
54	Port
55	No of ports 1
56	Inside port dia. 7.00 cm
57	Port area 38.48 cm²
58	Port end correction 0.646
59	<i>Standard Design</i>
60	Vb 55.5 l
61	Fb 32.88 Hz
62	F3 30.27 Hz
63	Port min dia. 5.59 cm
64	Port length 14.83 cm
65	<i>Design by Vb, Fb and Q</i>
66	Physical Vb 20.0 l
67	Absorption, Qa 20
68	Leakage, Ql 50
69	Port, Qp 120
70	Alpha, a 1.384
71	Vb 21.2 l
72	Fb 52.60 Hz
73	F3 45.29 Hz
74	Response peak 4.04 dB
75	Peak at 70.47 Hz
76	Port min dia. 4.58 cm
77	Port length 15.25 cm
78	Port 1. resonance 883 Hz
79	Include effect of port resonance <input checked="" type="checkbox"/>
80	



Damping Walls covered ▼ Recal

Leakage No leaks ▼ Recal

Port type One flared end ▼ Recal

Graphs updated Update

Frequency response Update

Wanted tuning peak **0.00 dB**

Optimise Fb for wanted peal Start

Export frequency response FRD

Export speaker impedance ZDA

81	Passive Radiator Box
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Unibox Simulations

— SPLtot at 15 W power input

— SPL produced by driver

— SPL produced by port

— SPL produced by leaks

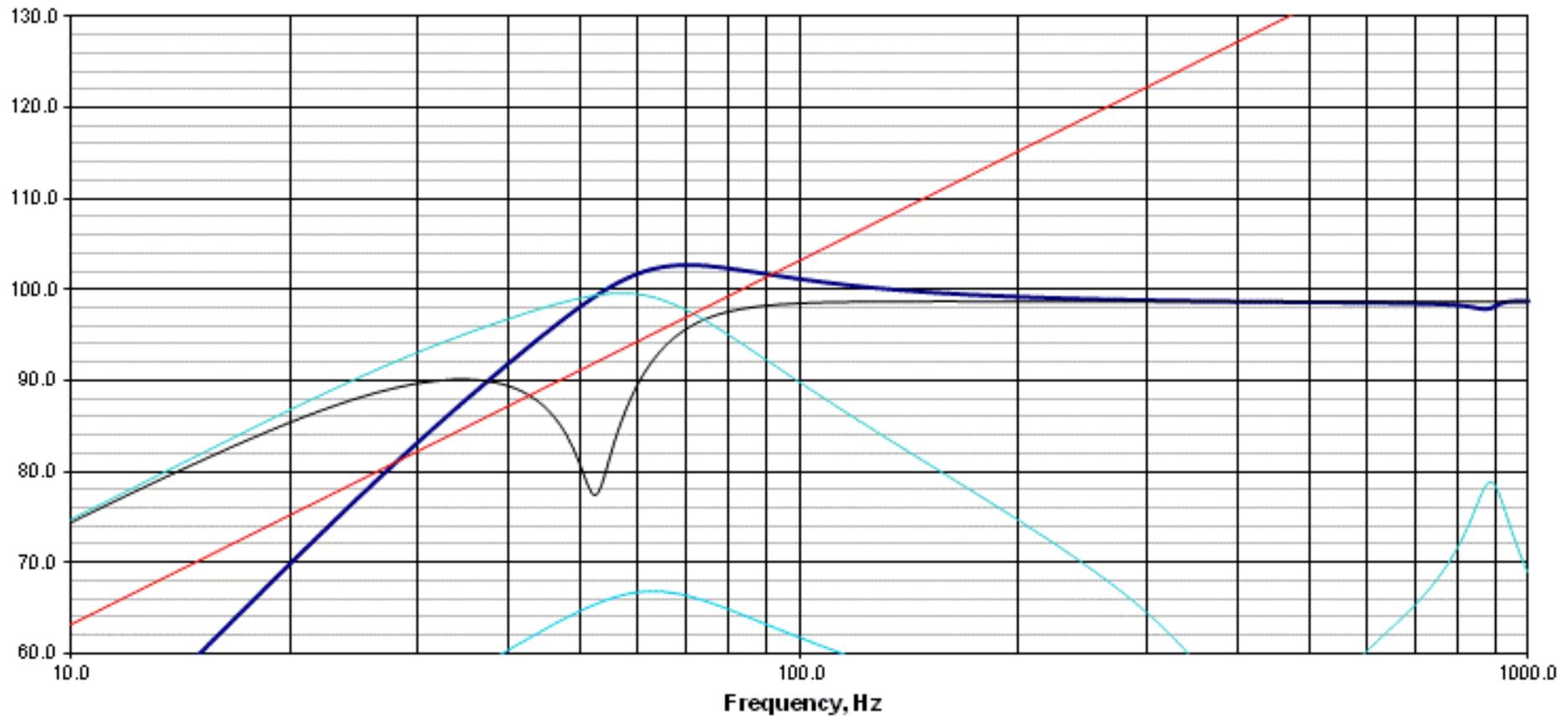
— SPL produced by driver at 0.4 mm peak excursion

Vented Box, $V_b = 20$ l
1x peerless M16GJ

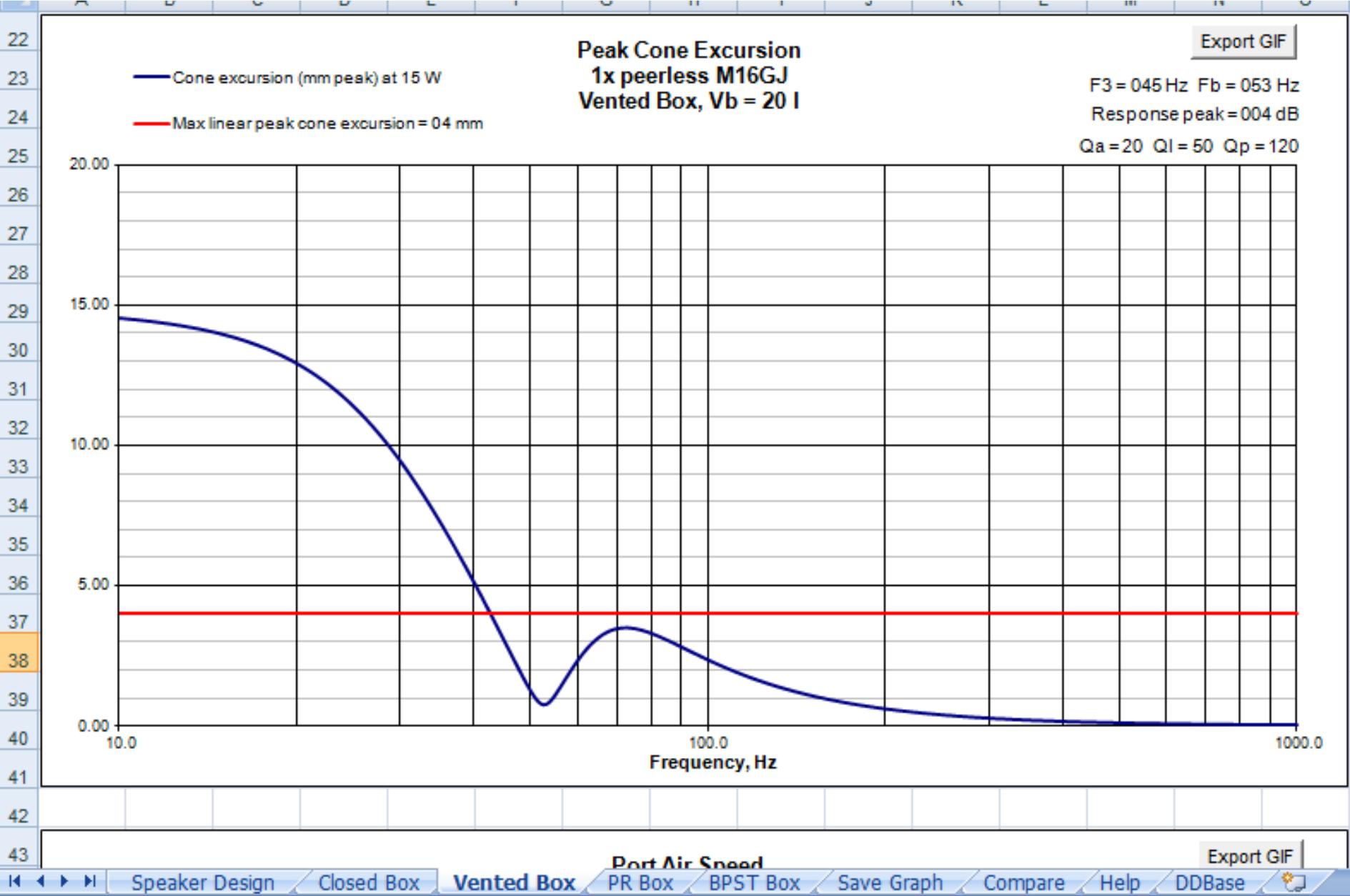
$F_3 = 045$ Hz $F_b = 053$ Hz

Response peak = 004 dB

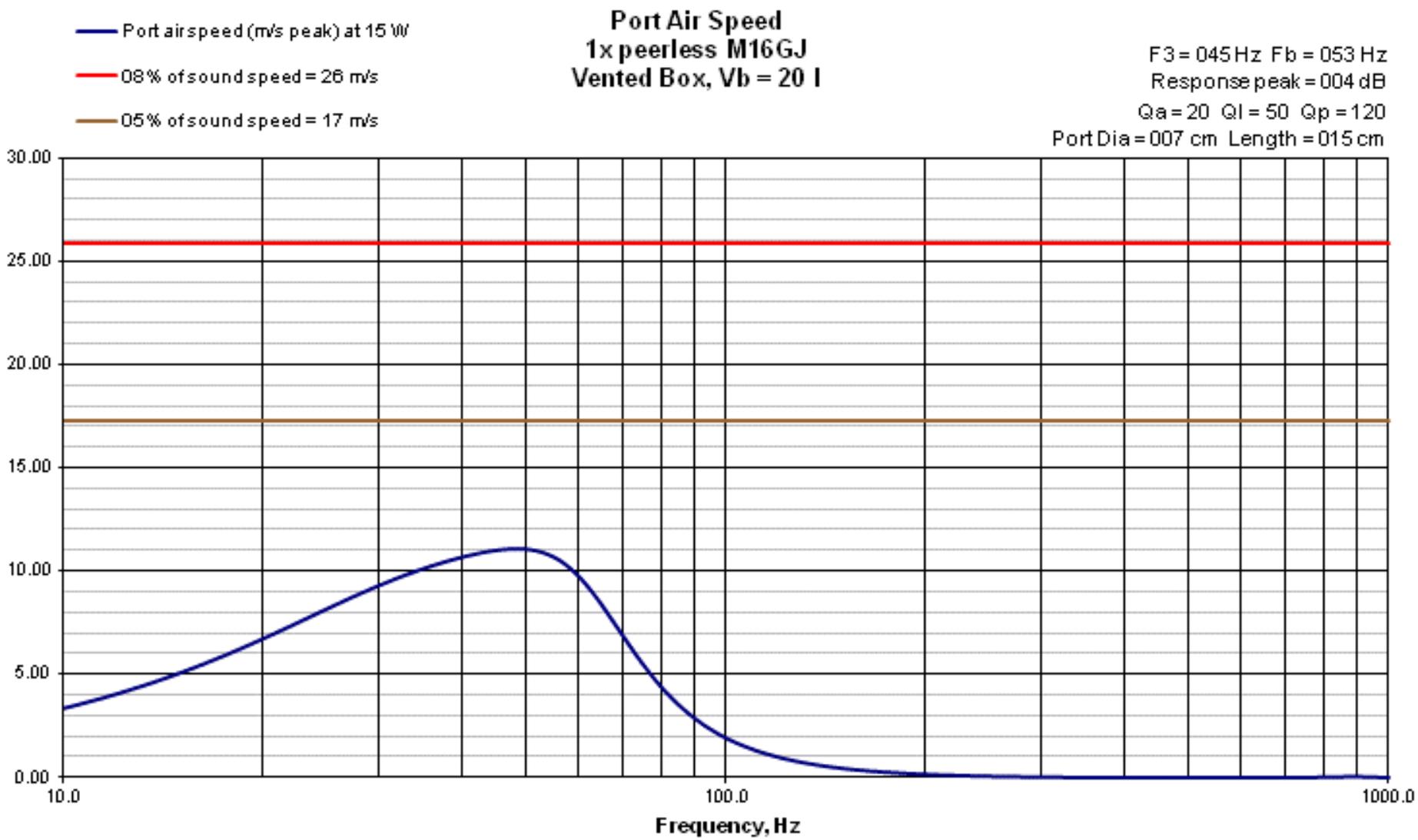
$Q_a = 20$ $Q_l = 50$ $Q_p = 120$



Unibox Simulations



Unibox Simulations



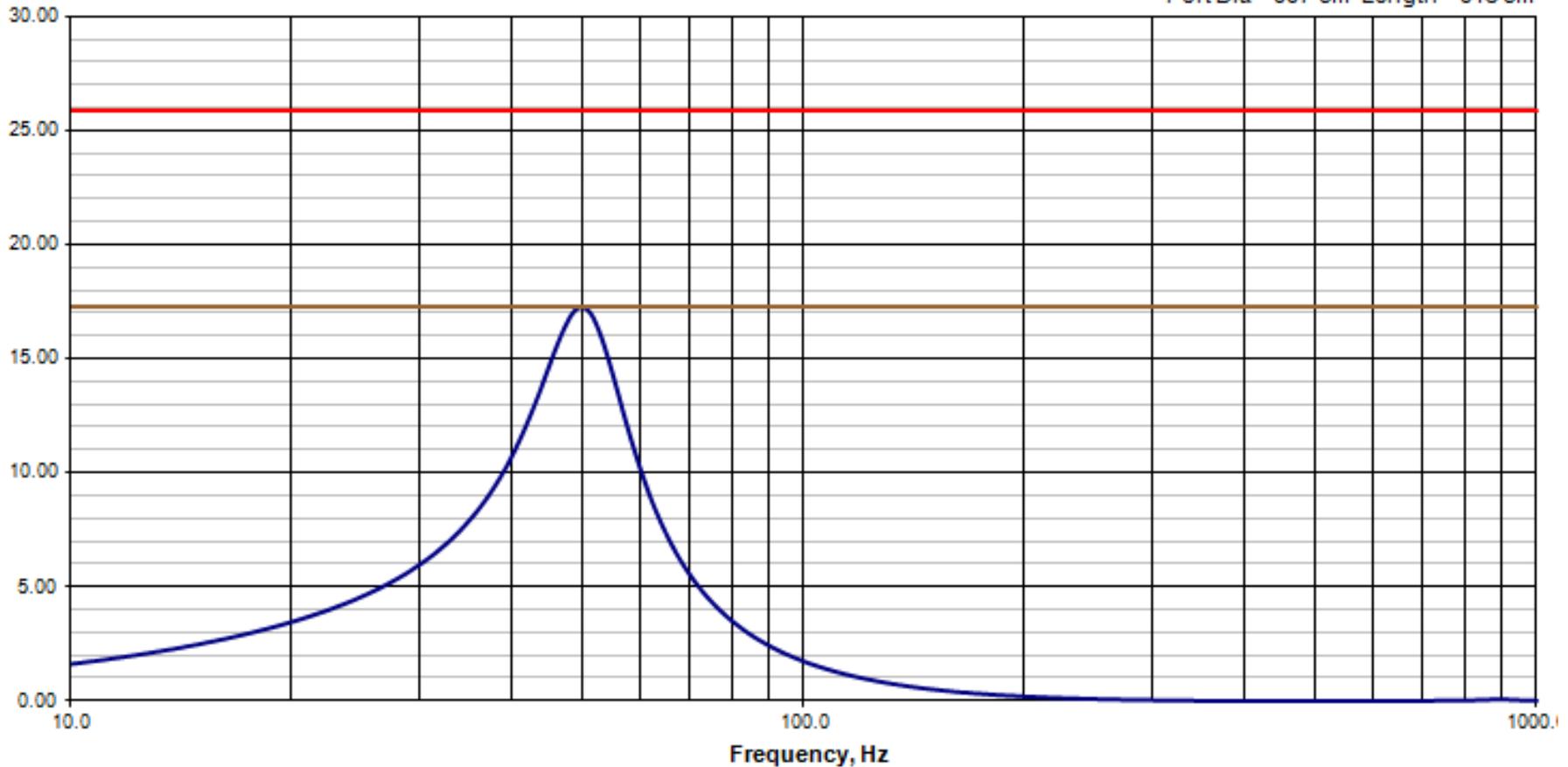
Unibox Simulations

Export GIF

- Port airspeed (m/s peak) at 20 W
- 08% of sound speed = 26 m/s
- 05% of sound speed = 17 m/s

Port Air Speed
1x peerless m13nh
Vented Box, Vb = 20 l

F3 = 046 Hz Fb = 053 Hz
Response peak = 001 dB
Qa = 20 Ql = 30 Qp = 120
Port Dia = 007 cm Length = 015 cm

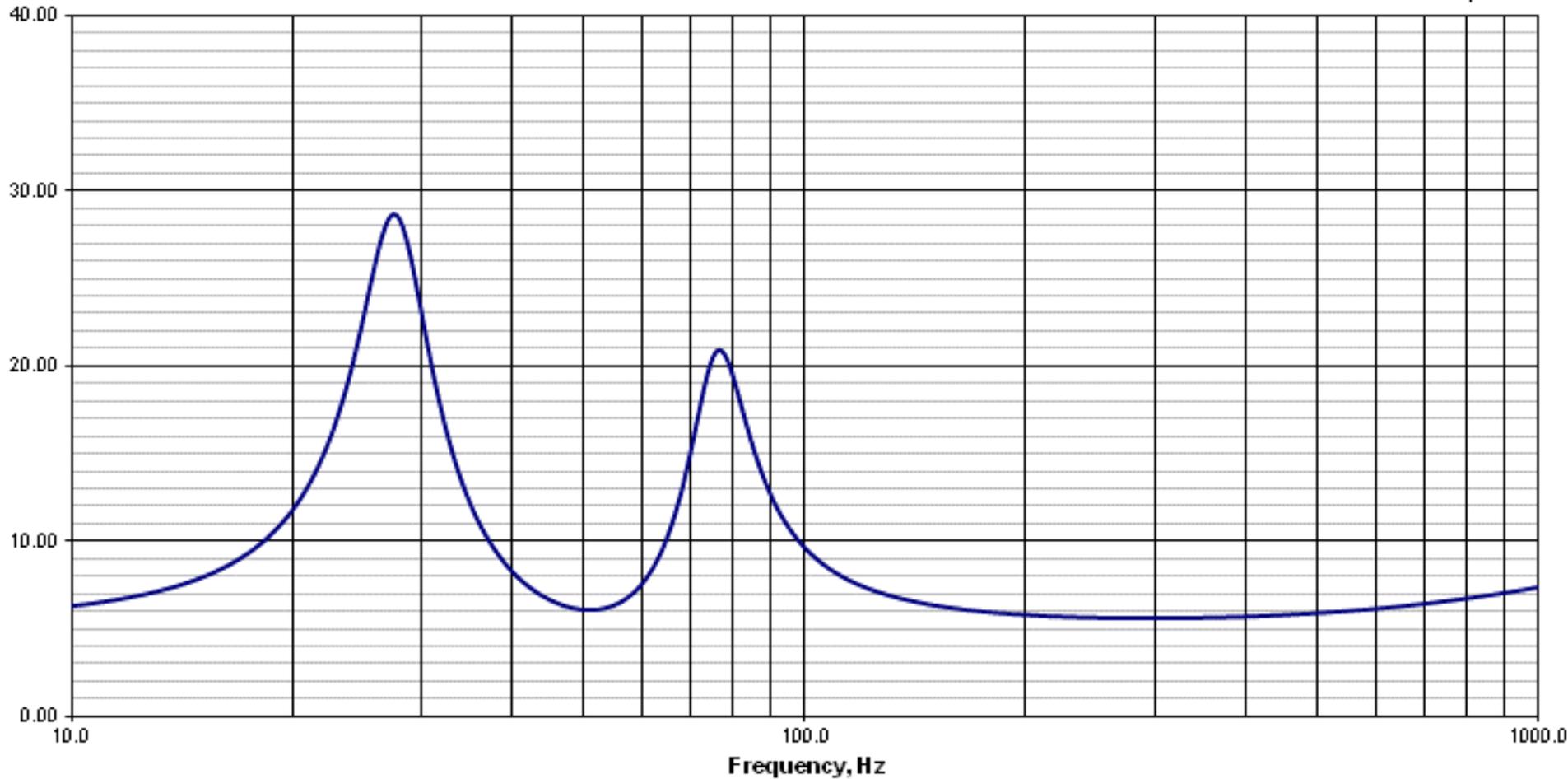


Unibox Simulations

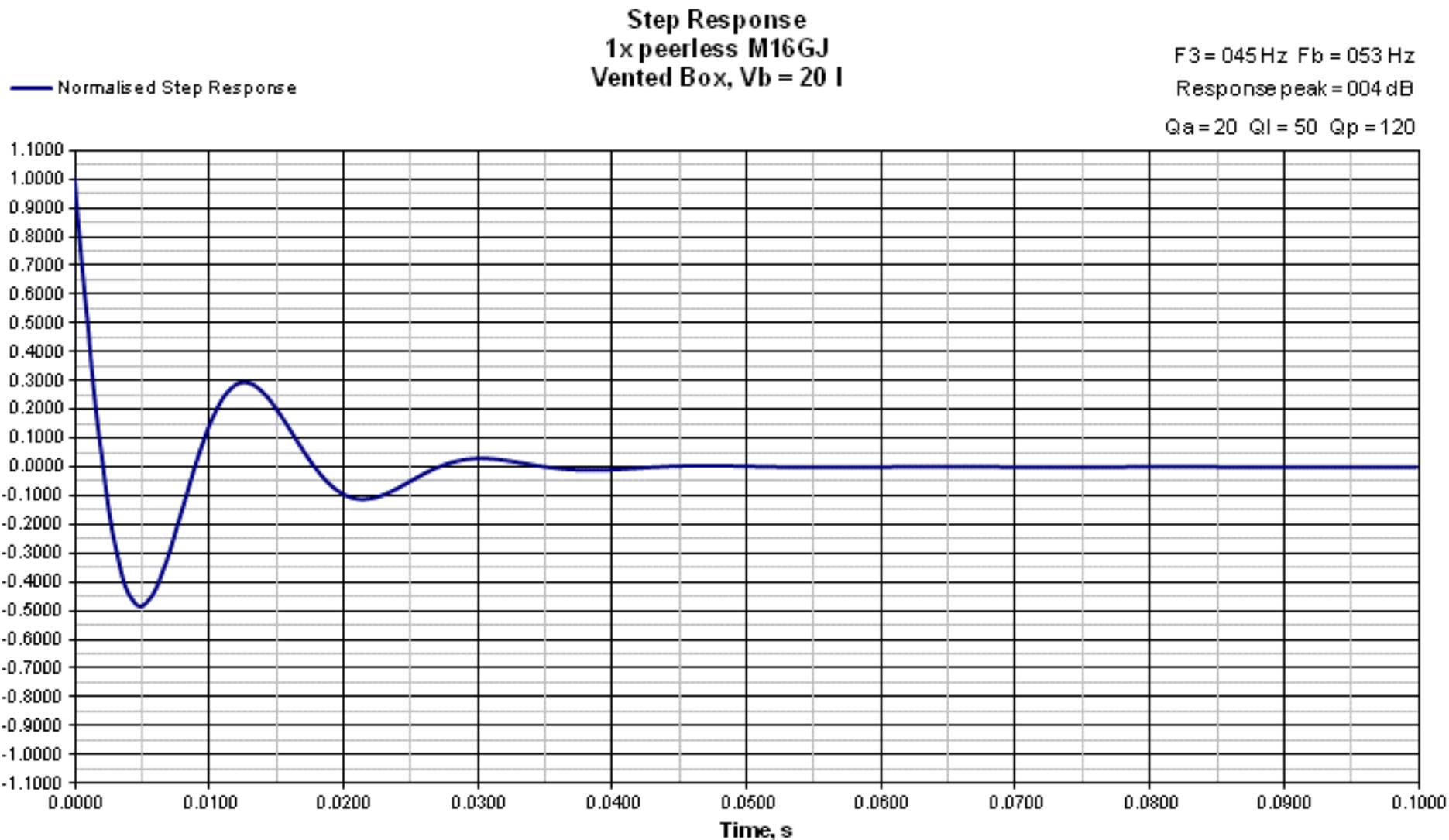
— Impedance of voice coil (Ohm)

Speaker Impedance
1x peerless M16GJ
Vented Box, $V_b = 20 \text{ l}$

$F_3 = 045 \text{ Hz}$ $F_b = 053 \text{ Hz}$
Response peak = 004 dB
 $Q_a = 20$ $Q_l = 50$ $Q_p = 120$



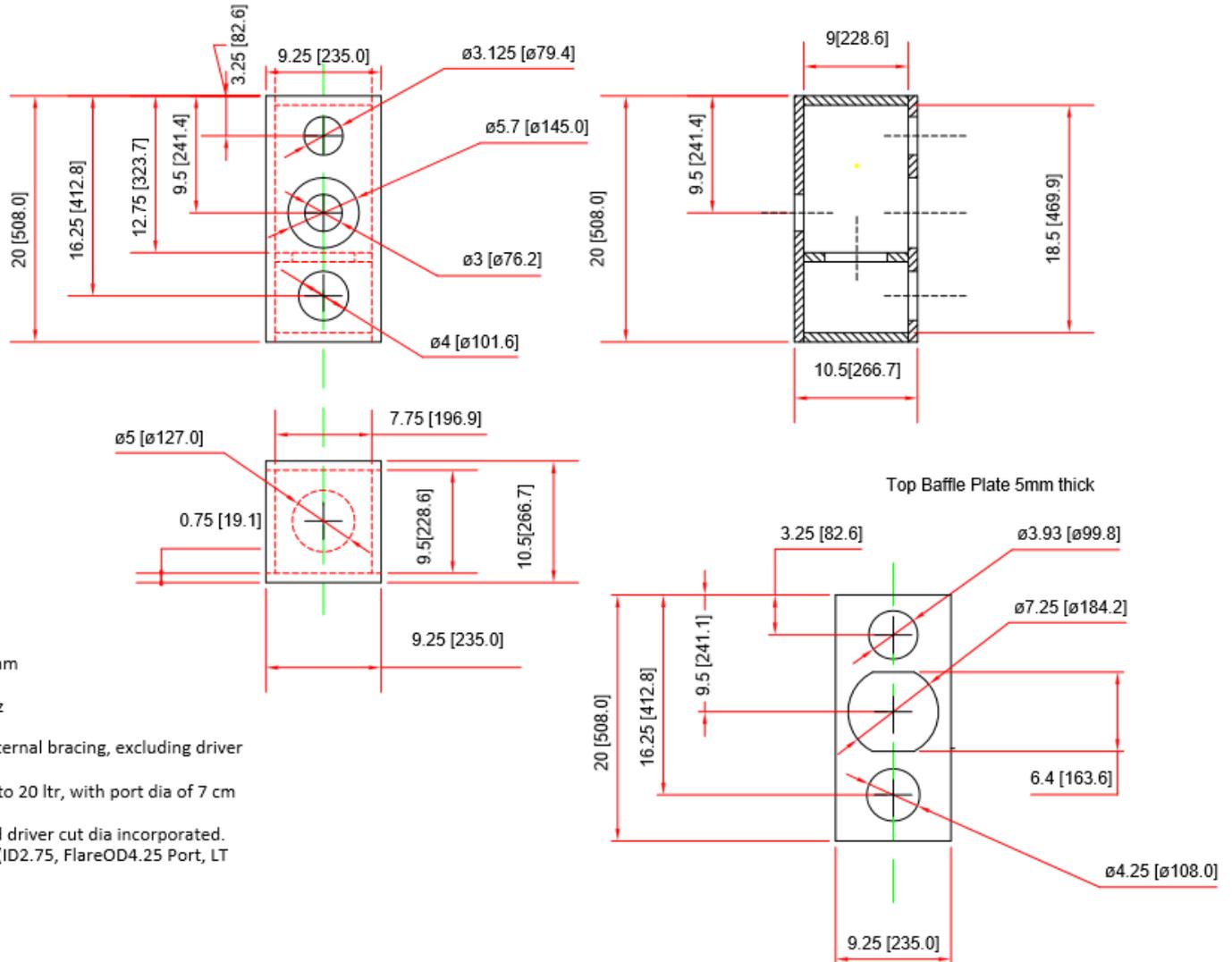
Unibox Simulations



Unibox simulation summary

- Box Tune Frequency: $F_b: 52.6\text{Hz}$
- Box $F_3: 45.29$
- Unibox Calculations are tuned to 20 ltr, with port dia of 7 cm and 152cm length
- Total Box Volume (including internal bracing, excluding driver volume)- 20.326ltr. (assumption that driver volume is 0.26 ltr)

Enclosure design



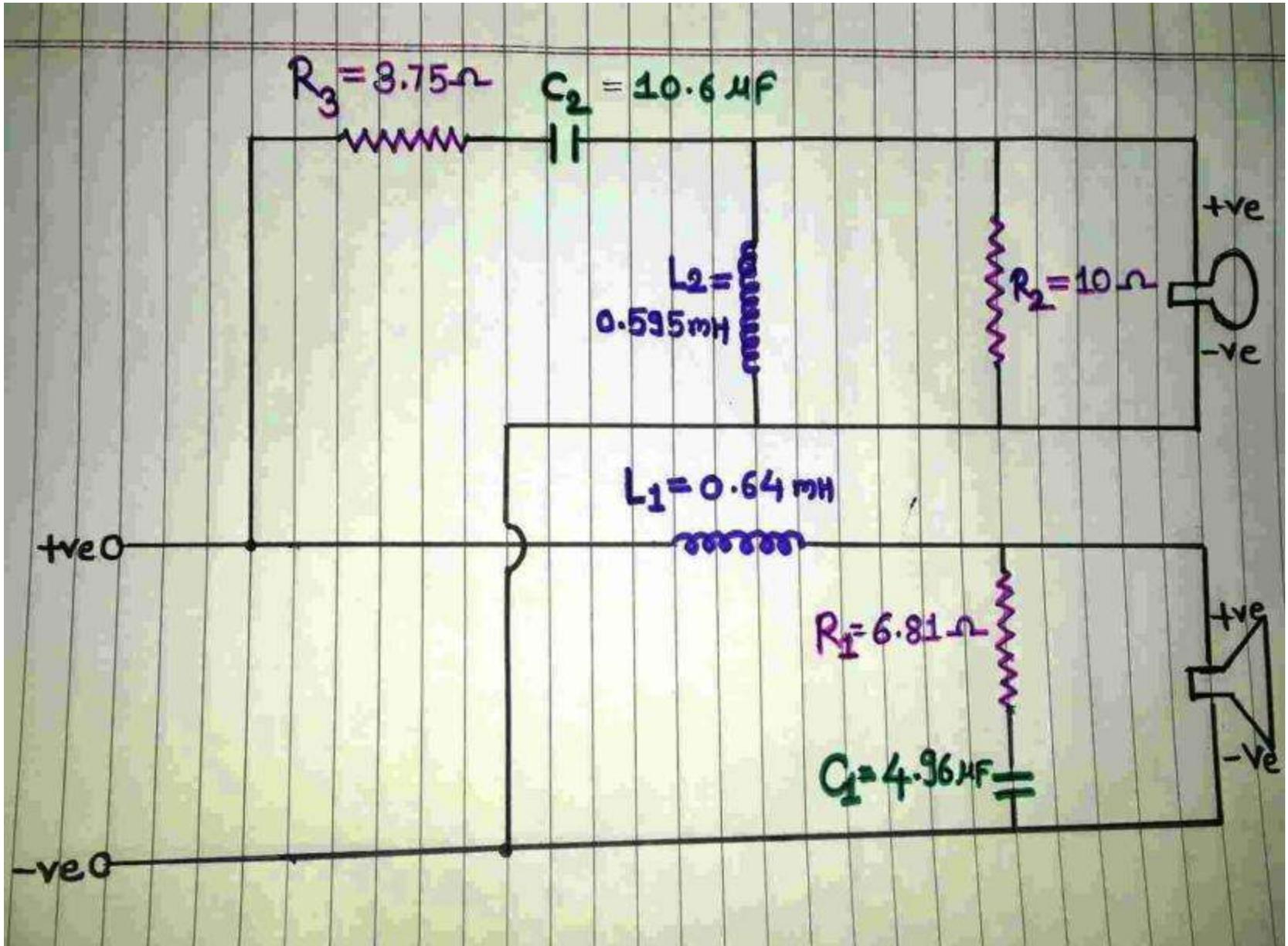
1. Tweeter: Peerless TL26SG, 26mm
2. Woofer: Peerless M16GJ, 6.5"
3. Box Tune Frequency: Fb:52.6Hz
4. Box F3: 45.29
5. Total Box Volume (including internal bracing, excluding driver volume)- 20.29ltr.
6. Unibox Calculations are tuned to 20 ltr, with port dia of 7 cm and 152cm length
7. TL26 SG Baffle flush mount and driver cut dia incorporated.
8. Port Cut out dia incorporated (ID2.75, FlareOD4.25 Port, LT 6")

Main Units are in Inches, Units in brackets are in mm

Crossover circuit

- Woofer impedance: 8 Ohm
- Tweeter impedance: 6 Ohm
- Crossover frequency: 2000Hz
- **Since I do not have the frequency response curves and impedance curves for drivers, I have considered rated impedance while calculating the crossover component values (pl tell me if its correct)**
- First order crossover considered for woofer and second order for tweeter
- L: pad attenuator is used to reduce the tweeter o/p and flatten impedance
- Zobel network is used to flatten the woofer's impedance

Crossover circuit



queries

- Whatever I have done till now, does it make sense?
- Can anybody tell me whether
 - 20ltr volume is too much for M13NH?
 - Will it sound boomy?
- Whether the crossover network design is correct?
- Will the damn thing perform acceptably (not audiophile acceptability)
- This is my first project, so I want to just try out to see if it can work.....
- Thanks a lot....