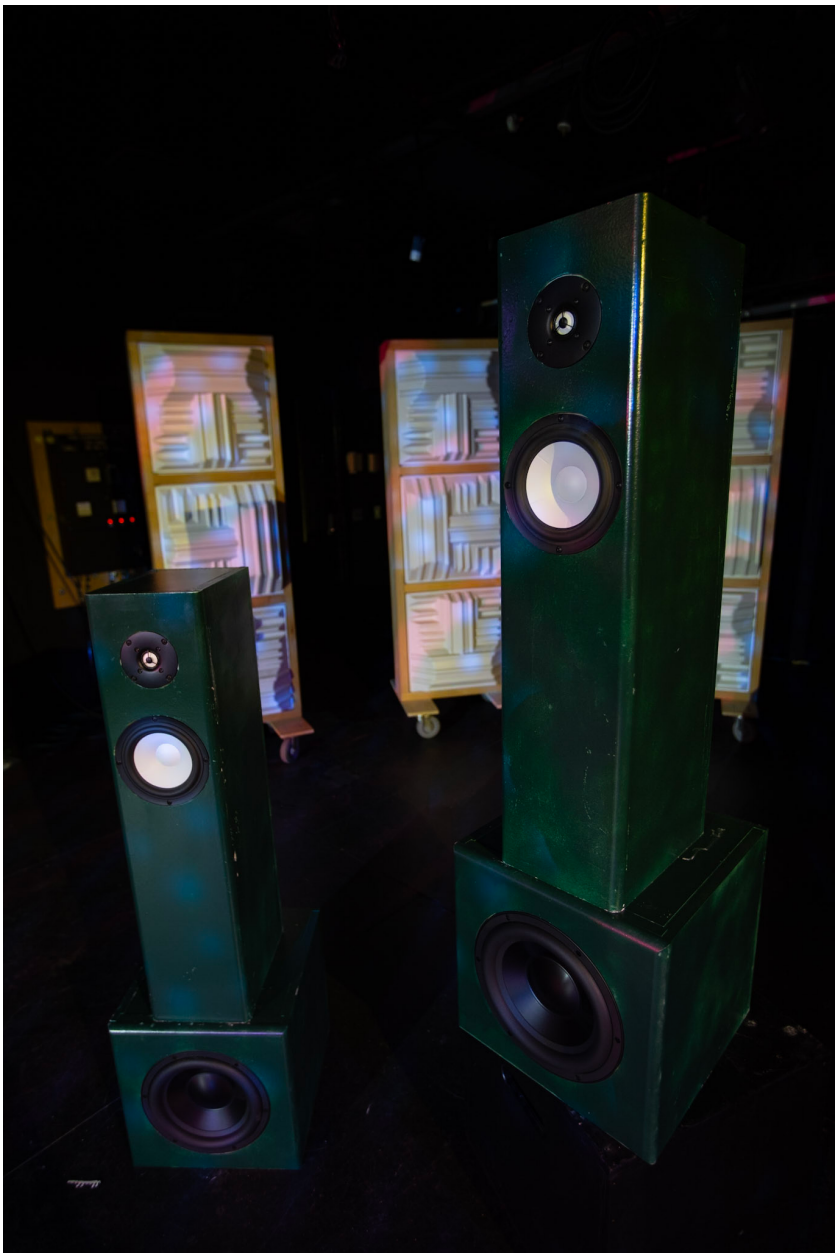


Tone Buck Two's

3-way tower speakers intended to be used for home entertainment.

Designed by: Cora Moyers

Table of Contents

1.0 Functional Description

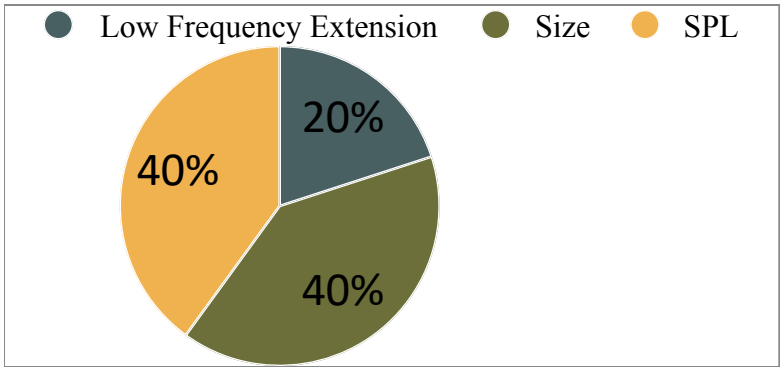
These speakers will be tall and have a very sleek look. These speakers will be used for casual listening and home entertainment purposes such as watching movies or listening to music. These speakers will stand at least four feet tall to be the perfect height for standing next to a television stand. These speakers will have a large listening plane with low ear fatigue to support the needs of what the speakers are built for.

These speakers will stand tall next to a television stand. With the set up being a 3-way speaker system having a tweeter, mid and low range woofer will supply a nice accurate listening plane for any listening activity it is presented with.

These speakers will not be mounted for permanent installation so weight will not be a huge factor when it comes to building factors.

The sound quality will be aimed towards low distortion, with overlapping frequency responses. With a target SPL of around 65 dB, it is important to remember that for a point source SPL falls at a rate of 6 dB per doubling distance according to the inverse square law. This rule also assumes that the listening distance is also large compared to the dimensions of the driver and that the loudspeaker is in a free space.[1]

Following John Murphy's three point deign tradeoff for a HI-FI speaker this speaker will prioritize size and SPL equally and then low frequency extension.[2]



1 John Murphy, p. 13

2 John Murphy.

2.0 Reference Systems

2.1 Overview

A review of three way floor standing speakers with 5-8” woofers was done to determine general performance in the current market. They speakers reviewed are summarized in this table:

Speaker	F3	SPL Peak	Weight (lb)	Dimensions (inch)	Price (US$, pair)
Focal Chora 816	50	89.5	40.8	12”Wx39-1/4”Hx15-7/8”D (with rubber feet)	$900.7
Klipsch Reference Premiere RP-8060FA	32	98	71	10-7/8"W x 43-1/4"H x 19-13/16"D	$1,398
JBL Studio 680	38	88	49.9	10-7/8"W x 43-1/4"H x 19-13/16"D	$1,199
Polk Audio Signature Elite ES50	38	88	32	10-5/16"W x 37-7/16"H x 11-1/16"D	$698
Bower & Wilkins 703 S3	46	90	63.5	11-7/16"W x 44-7/16"H x 14-5/8"D (including tweeter and plinth)	$5999.00

Looking over the reference speakers the F3 varies from 32-50 and the SPL output is mostly between 88 and 90.

2.2 Specific Speakers

Klipsch Reference Premiere RP-8060FA[3]

The Klipsch RP-8060FA have a very appealing look to them and has a very high SPL compared to the other speakers in the above table. While it is the heaviest of all the speakers it is at a fair price point and on paper seems to perform very nicely. This set of speakers has a very nice frequency response ranging from 32-25kHz, ±3 dB. I have not been able to find a frequency response graph.

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[3]https://www.crutchfield.com/p_714RP8060E/Klipsch-Reference-Premiere-RP-8060FA-Ebony.html?tp=185

Polk Audio Signature ES50[4]

The sleek look of these speakers and the very fair price point make these speakers seem very appealing to any buyer. The SPL is on the lower end being at 88 and the frequency response is 38-40,000 Hz. It would be very interesting to be able to listen to what these speakers sound like. I have not found a frequency response graph but have been able to find some testing done on the listening environment for these speakers. This says that midsize and large rooms and the best for the listener for these speakers.[5]

Bowers & Wikins 703 S3[6]

These speakers come at a very high price point. The come with the Bowers & Wikins famous high performance pod shaped tweeter that is mounted right on the top. These speakers have an SPL. Of 90 dB and a frequency response of 46 Hz- 28 kHz. This speaker is in a very high price point and when doing some research on it does seem to have very mixed feelings about it. Bowers and Wikins is known very well as some of there speakers can be seen in Abbey Road Studios. Bowers & Wikins spent many years researching how to make the best drivers, the dedicated continuum midrange driver with biomimetic suspension, which make it feel like the singer is in the room with you.[7] These speakers seem well worth the price point and have good specifications.

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[4]https://www.crutchfield.com/p_107ES50BK/Polk-Audio-Signature-Elite-ES50-Black.html?tp=185

[5]https://speakerdecision.com/compare/Polk-Audio-Signature-Elite-ES50-vs-Polk-Audio-Signature-S55

[6]https://www.crutchfield.com/p_749703S3WH/Bowers-Wilkins-703-S3-White.html?tp=185

[7]https://www.audioadvice.com/bowers-wilkins-703-s3-3-way-floorstanding-loudspeaker

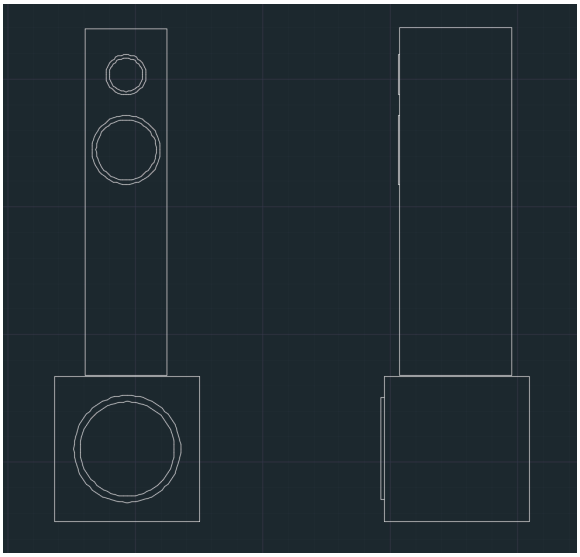
3.0 Technical Specifications

3.1 Size

The size of these speakers will be tall so that they can stand next to a television or entertainment center. They will be thirty-four inches tall, eight inches wide, and eleven inches deep. Under the speakers there will be a fourteen and a quarter inch wide and tall subwoofer.

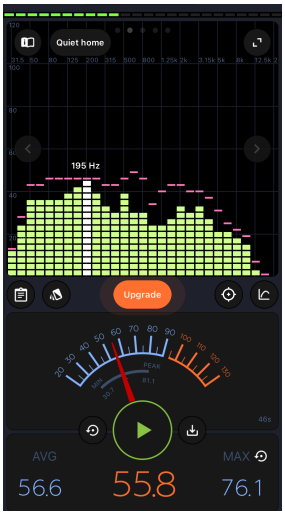
3.2 Cabinet Design

For these speakers, I want them to stand tall so that they can fit next to almost any TV. The towers will both be standing on sub woofers which adds an additional 14 inches to the height, which totals the height to 48 inches. The internal dimensions are 32-1/2" high, 6-1/2” wide, and 9-1/2" deep, and external dimensions being 34" high, 8" wide, and 11" deep. My speakers will not be moved often so weight is not a super big deal when it comes to my design. Although I do not want them to be so heavy I could not move them on my own.



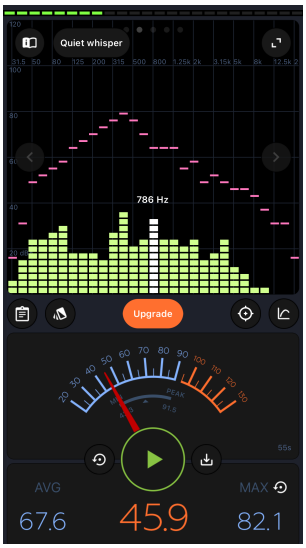
3.3 SPL

I do not like to listen to things very loud. My average listening level is 62.1dB. This is the average taken from listening to music, watching movies, etc, at all times of day. I used Youtube Music for my music source and the app Decibel X on my iPhone 14 Pro to observe my listening.



<- Pictured here is my typical morning listening levels. The Maximum was 76.1 but the average was 56.6 dB.

Pictured here is my afternoon listening levels. It peaks at 82.1 dB but the average is 67.6dB. ->



Taking both of these into account and knowing the Youtube Music headroom of 14 dB I want my speakers to be able to sustain 60dB and go up to 74dB to factor in peaks, also occasionally going up to 90 dB for peaks in movies following that Netflix has 27 dB of headroom.

Target: 65 dB continuous with 90dB peaks

3.4 Frequency Response and Extension

Low frequency extension is not a super high priority. With that being said I still do want a system that can go to at least 50Hz. In a a perfect ideal world my low frequency extension would be down to 40-45Hz.

3.5 Amplification

For the amplification of these speakers I went with two Fosi Audio BT30D Pro TPA3255 2.1. These were perfect for my system because each tower had one amplifier. It was not ideal when it came to crossovers since I could not run my sub through my DSP. Although these work fine for my system now I am hoping to buy one more so I can run my subwoofers through my DSP and have a proper crossover.

4.0 Design

For my loudspeakers they are designed to be as flat as they can be when it comes to frequency response. Because of this it is ideal that I have a frequency response that is ±2dB. They need to be able to reach 20kHz without any breakup frequencies below 20kHz.

4.1 Driver Selection

When selecting my drivers I kept in mind that I wanted my speakers to be aesthetically pleasing. For my mid drivers I wanted them from 4-6 inches to fit into my tower cabinet. I knew I wanted my subwoofer to be 10 inches but I was fine with going down to 8 inches depending on my budget since low frequency wasn't my top priority. Since I knew I was going to get a kit I went with the 10 inch Dayton Audio Reference Series HO Subwoofer and Cabinet Bundle. For my tweeter I wanted something that would match my mid, so when I found the SB Acoustics SB26CDC-C000-4 Alum-Ceramic Dome Tweeter, I knew almost instantly that it would be my tweeter. This tweeter fit all of my wanted aspects and had a relatively flat frequency response. Another tweeter I was considering was the Fountek NeoCd3.5H Horn Tweeter, I really liked the idea of a ribbon tweeter, and also had a flat frequency response but it was not super ideal for my budget.

4.2 Tweeter

For my tweeter I ultimately went with the SB Acoustics SB26CDC-C000-4 Alum-Ceramic Dome tweeter. When I was first going through options I originally wanted the Fountek NeoCD3.5H. I wanted this for the wide vertical dispersion that is ideal for home entertainment speakers. The other options I had were the Scan-Speak D2604/833000 and the Dayton Audio RST28F4. I liked the Dayton Audio one specifically for the price of it. The scan speak model was a middle ground for everything I was looking at at 50 dollars. I went with the SB Acoustics

one because it was matching with my mid and was very aesthetically pleasing. It also had a flat frequency response and it all the my needs. To see other tweeter options see Appendix A.

4.3 Mid

SB Acoustics SB17CAC35-4 was the perfect driver to me the second I looked at it. I loved the look of the white driver and the frequency response of it was exactly what I was looking for. I had two different options for size when it came to this driver wither 4” or 6”. I ultimately went for the 6” driver and it paired perfectly with my tweeter. This driver fit well with what I knew my budget was going to be and how I wanted my speakers to took. To take a closer look at my other options and modeling of my purchased driver see Appendix B.

4.4 Subwoofer

I only truly had two options for my sub woofer. The Dayton Audio 10" Reference Series HO Subwoofer and Cabinet Bundle 600 Watts or the Dayton Audio 8" Reference Series HO Subwoofer and Cabinet Bundle 300 Watts. I truly Just had to decide what size sub I wanted. At the end of the day I went with the 10” Dayton Audio kit because it fit nicely into my budget and added just a little bit more low frequency that I knew I was going to loose by not venting my subwoofers. To take a closer look at my other options and to look at modeling see Appendix C.

4.5 Cabinet Design

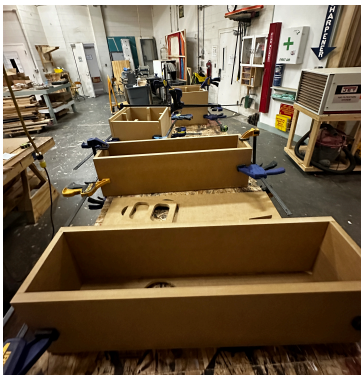
The design for these cabinets as said before are to stand tall next to a TV. I want the design of the towers to be slim and powerful. With the selection of drivers and the knockdown cabinet this will be achievable.

5.0 So No Vent?

Thats right I decided to not vent my speakers. Since low frequency extension was not a priority to me, and I wanted these to be aesthetically pleasing and clean looking I decided that a vent was not in my ideal design. I was aware that venting my speaker would give a low frequency extension to my subs that would have made them very crisp. If I would have vented my subs I would have needed a 2 inch by 6.5 inch size port. Before making my final decision of not having a vent I went through a pros and cons list. At the end of the day they were both pretty equal and for my speakers I just didn’t want the vent. Based of my final performance documentation I do not believe that it made that big of a difference and the speakers do sound crisp and look exactly the way I wanted them to.

6.0 Construction

6.1 Cabinets



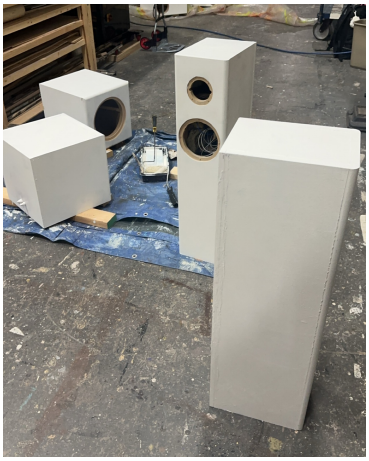
The original plan for these speakers were to have a solid wood front face, with MDF sides. At the end of the day time was not in my favor, because of this I ordered a knock-down kit from Parts Express. I decided on 1.16 cu. ft. tower knockdown cabinets. This knock down cabinet was a perfect fit for my needs as it stands 34" high ,8" wide, and 11" deep. To glue it all together I used titebond III and let it dry for 24 hours. I did the same thing for my subwoofer boxes. The subwoofer boxes are 14.25" high, 14.25" wide and 15" deep with a recess of a 1/2”. To route the holes in my tower cabinet, since I was running low on time I asked my dad to do them while I was home for Thanksgiving break. My sub boxes came with pre-routed.

6.2 Internal Dampening

For internal dampening I used rockwool, cut to size and fastened using a piece of tie-line and a staple gun. Since the rockwool would not stay to the sides itself I used the tie-line to keep it in place. I covered all sides with the rockwool from top to bottom in all of my cabinets.

6.3 Painting

When it came down to the aesthetics of my speakers I knew I wanted them a fun color but still very sleek looking, because of this I went with a dark green paint color. I first lightly sanded all the surfaces and then applied two coats of primer, I then went in with my green spray paint. Since I did not originally want to spray paint them I plan to resand them and then repaint them in the future.



7.0 Tuning

My goals going into the tuning process was to have good sounding speakers, easy right? I wanted to have smooth crossover points, good time alignment between my drivers.

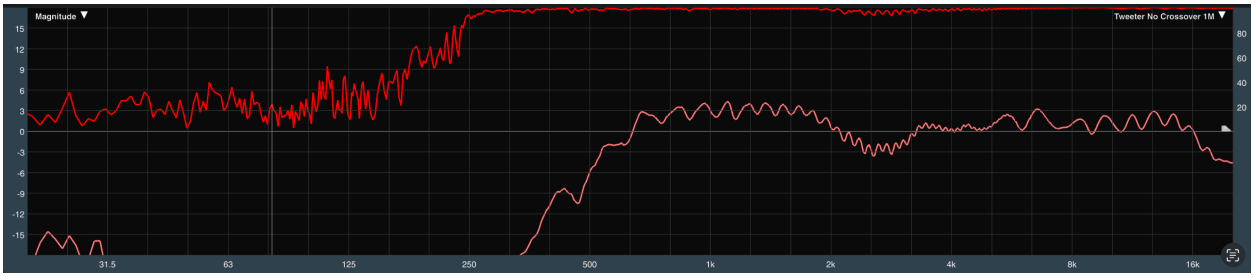
I did initial testing in McArdle Theater with Sonarworks SoundID Reference Measurement Microphone, and final measurements with the same microphone but on the Rozsa Stage. Measurements were taken in both SMAART Suite and FuzzMeasure.

7.1 Initial Driver Measurements

My initial measurements were taken at 1M and 2 inches. Initial measurements are in SMAART, with the exception of the subwoofer which was done in FuzzMeasure.

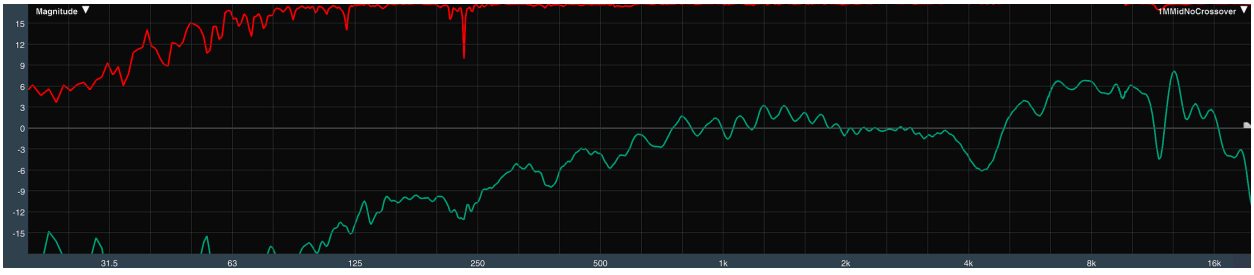
Tweeter

Initial measurements were looking very promising and I was thinking I could crossover at between 1.8 to 2kHz. This measurement is at 1M



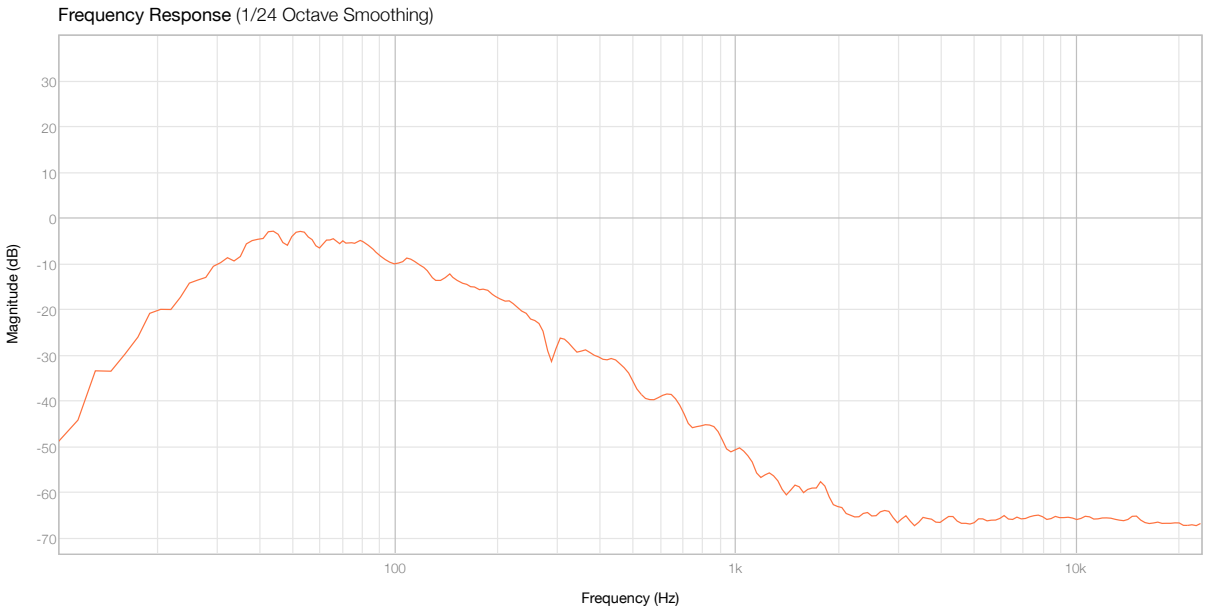
Mid Driver

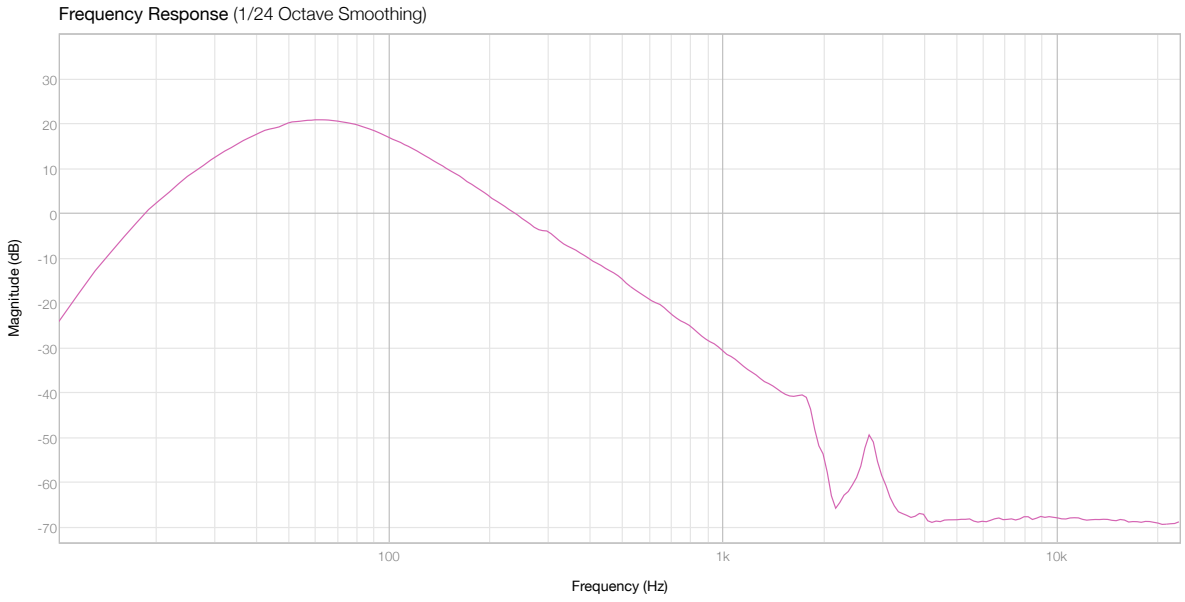
Initial Measurements were looking good for my mid and I was feeling confident. This measurement is at 1M.



Subwoofer

Starts rolling off at 50Hz. Top measurement is at 1 meter bottom is 2 inches.





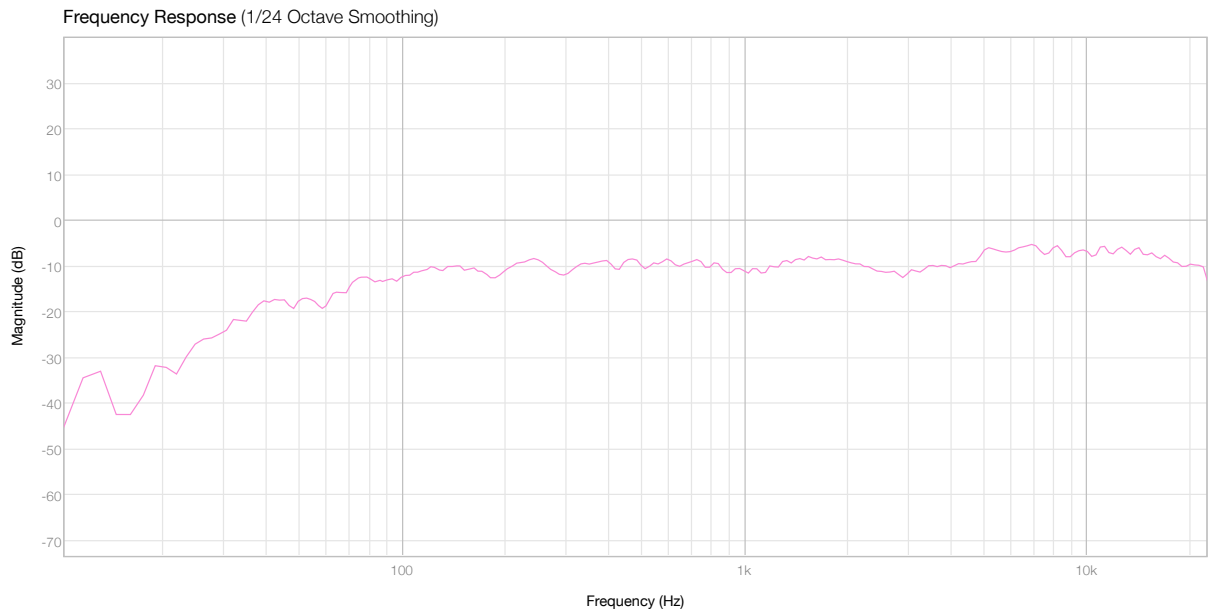
7.2 Crossover Design

Based on my initial driver measurements I decided to cross my tweeter at 2.5 kHz. I did this to benefit me more in the EQ stage. Because I bought the Fosi Audio BT30D Pro TPA3255 2.1 amplifiers, the sub woofer crossover is completely controlled by a knob in the front of the amplifier. I crossed my Mid woofer at the highs also at 2.5kHz and left it open at the lows so blend into my sub. I used the Dayton Audio DSP-408 for my mid driver and tweeter.

8.0 Final Performance Documentation

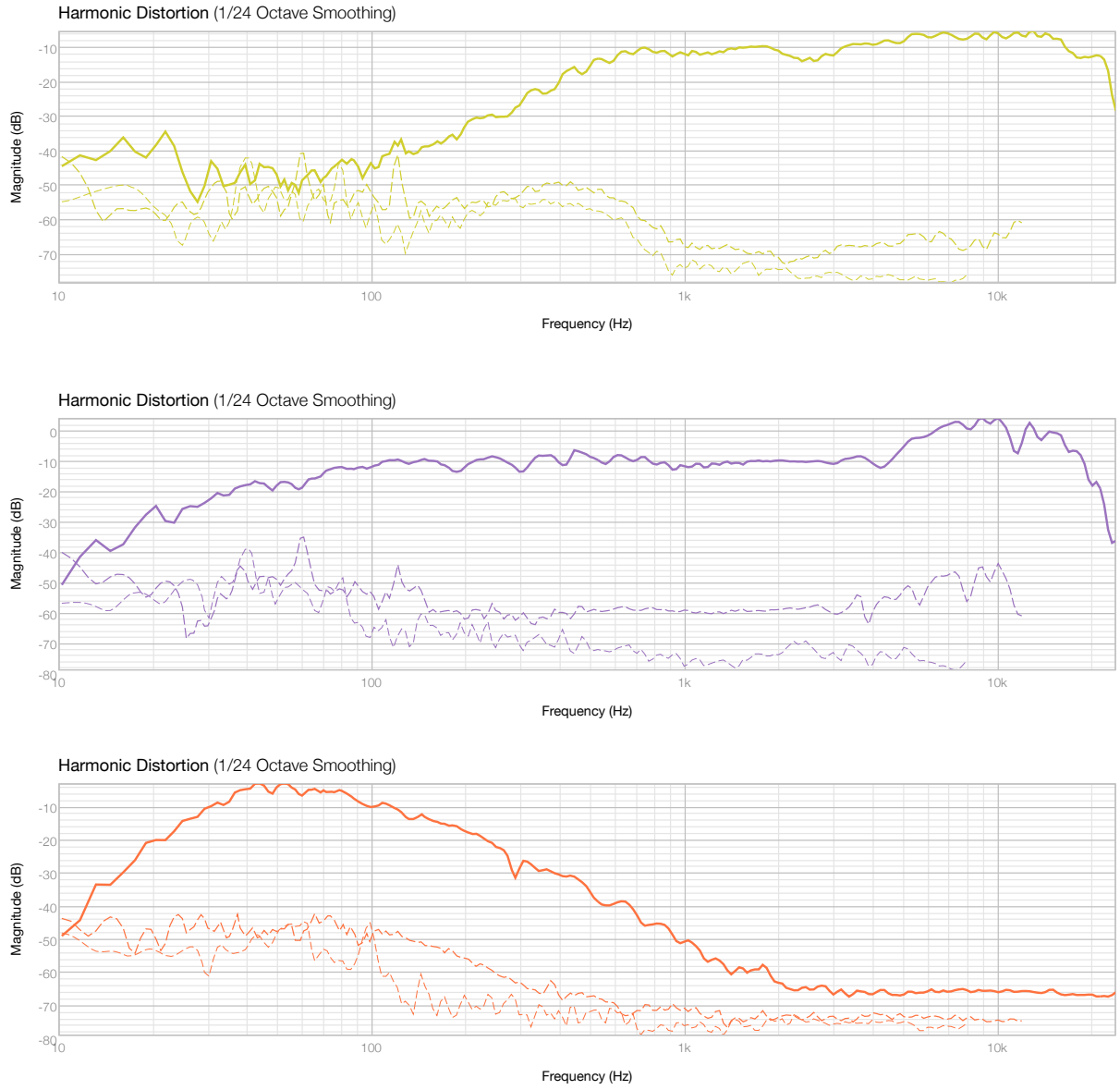
My final measurements were taken with the Sonarworks SoundID Reference Measurement Microphone, which was calibrated with the microphones calibration profile, which allows for for a ±0.9dB measurement accuracy. The speaker was about 3 feet off the ground on top of two rehearsal blocks. I used wool underneath the speakers to minimize reflections. All measurements were done in FuzzMeasure with three 2.5 second long sine sweeps which were averaged together. Final measurements were taken on the Rozsa stage with the main curtain down.

Frequency Response of Full Speaker at 1 meter



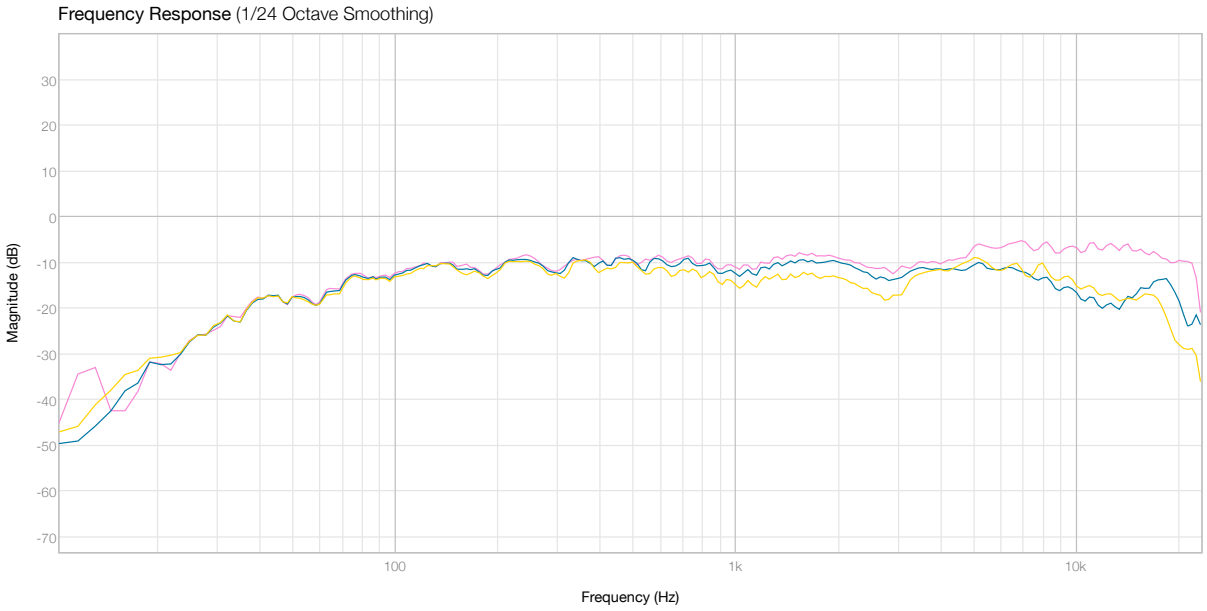
I am extremely happy with the overall frequency response of my speakers. The low end rolls off right around 50Hz but because these will be in a small room and against a wall an on the floor this is actually very ideal for me. The crossover points are not as flat as I wanted them to be but are acceptable.

Harmonic Distortion



From top to bottom: Tweeter(yellow), Mid(Purple), Subwoofer(Orange).

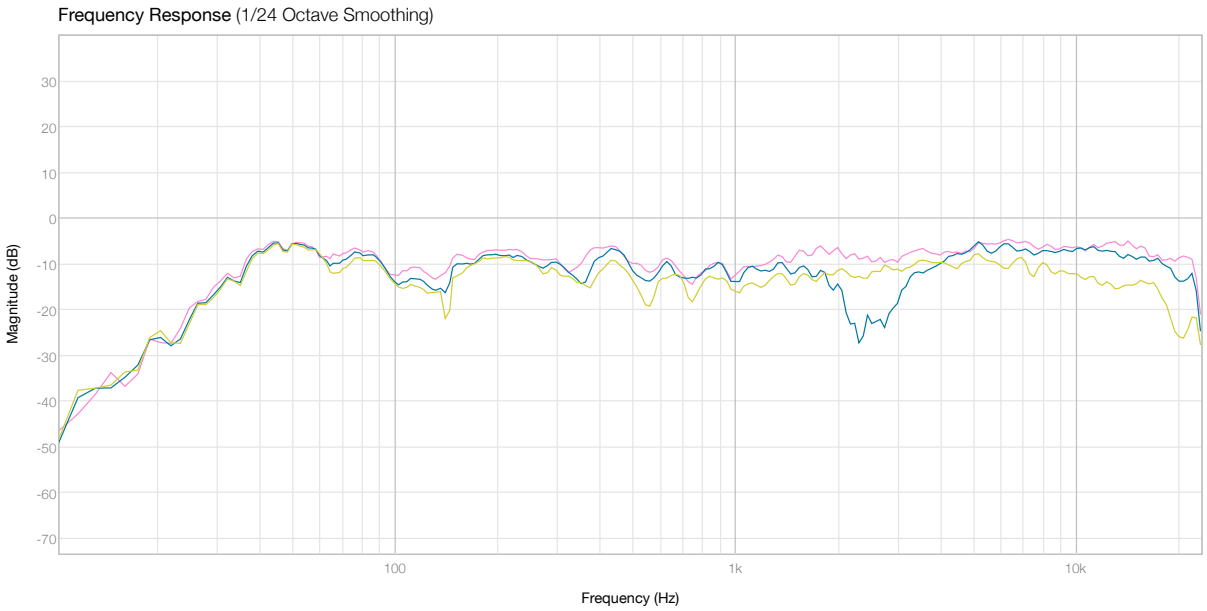
Horizontal Off Axis Frequency Response



On axis frequency response (pink), 30 degree off axis (Blue) 60 degrees off axis (yellow)

I am extremely happy with the horizontal off axis of these speakers. It is relatively smooth between all.

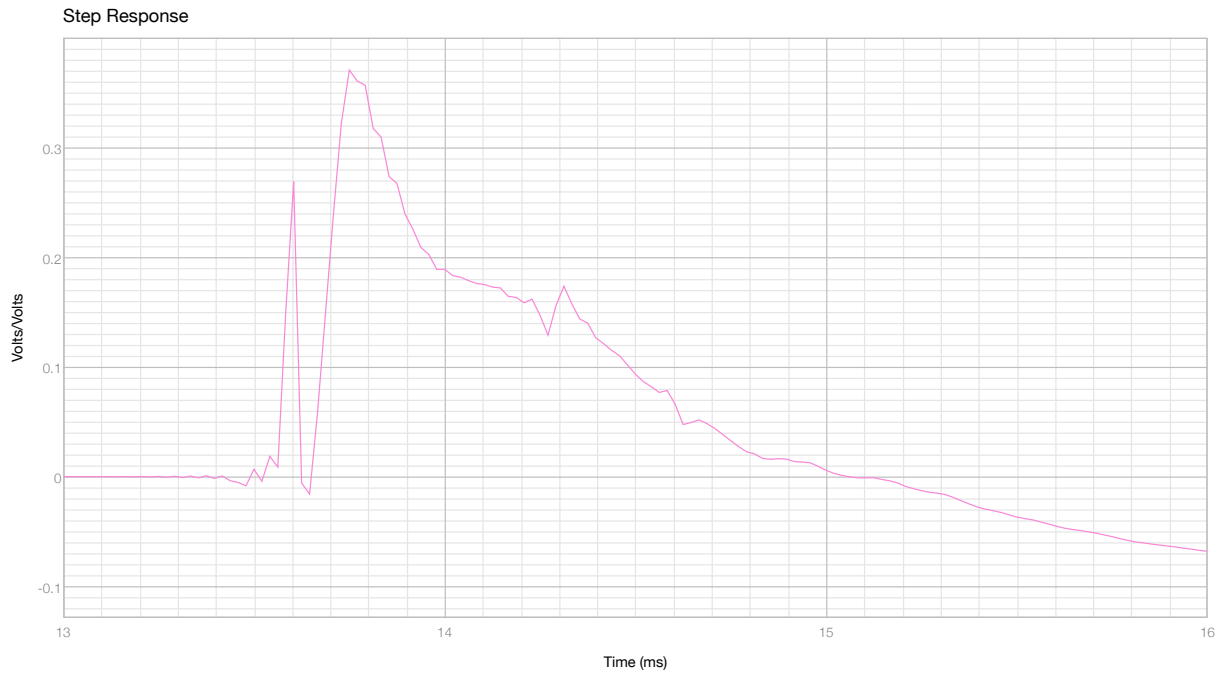
Vertical Off Axis Frequency Response



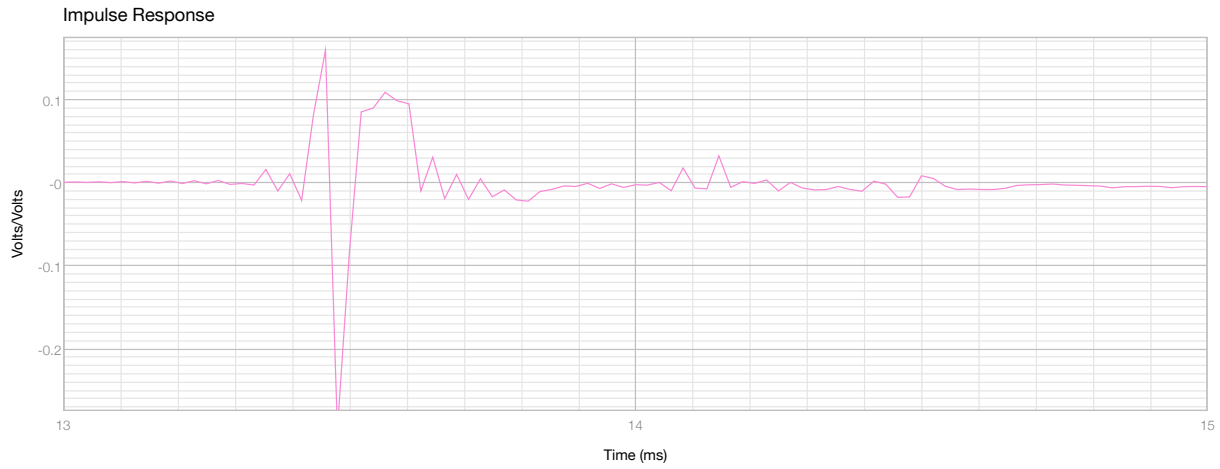
On axis frequency response (pink), 30 degree off axis (Blue) 60 degrees off axis (yellow)

The vertical off axis is also very smooth. There is a large notch in the 30 degrees off axis around 2kHz. This could be due to many reasons but will not be troublesome in normal listening environments.

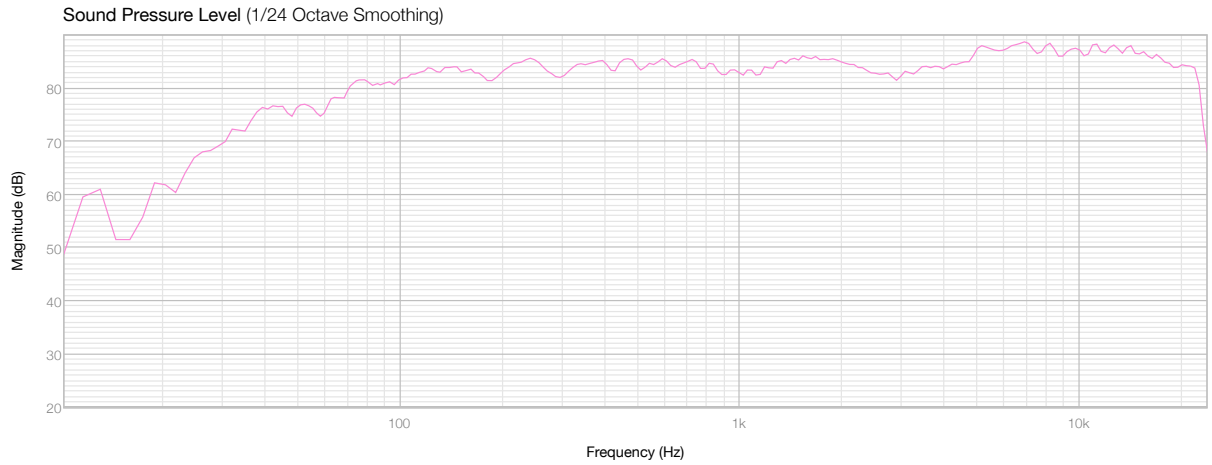
Step Response



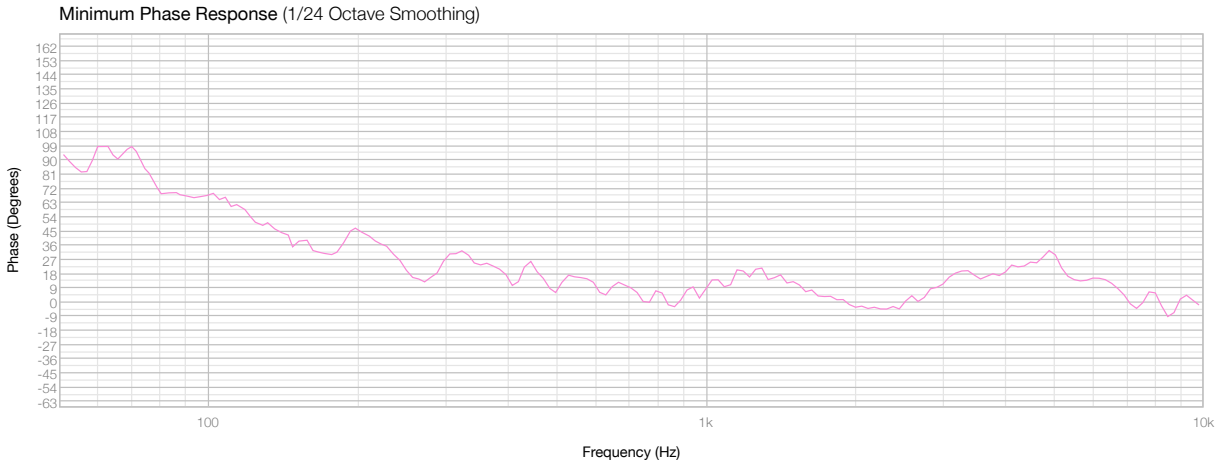
Impulse Response



SPL



Minimum Phase



9.0 Reflection

These speakers currently sit in my living around my TV. I have been able to watch some movies and my favorite TV shows. I often am listening to music on them and feeling all sorts of emotions. Although they do not look exactly how I imagined them to when I first began in the class I am very happy with them. They are easy to move even on my own, although is does take four separate trips since it is the two towers and the two subwoofers. My initial design was to have the tower speakers with the subs built into the side. As much I loved that initial design I am very happy I went with the separate subwoofers. I am in love with the green look of them as it fits into my extreme maximalist home design ideas.

The first time I brought these speakers home and was finally able to listen to them I cried many happy tears. When I first began my academic career at MTU I would not have imagined myself being able to make really good sounding speakers. This would not at all have been possible without Chris Plummer and his amazing teachings and support not only to me but to all of his students.

I am also super thankful for my dad who routed the holes for my drivers at 10pm over thanksgiving break, the night before I left to come back to school. (procrastination runs in the family.) I decided to name these speakers the Tone Buck Two's for my dad and my grandpa as my dad has always been my biggest supporter, and by grandpas nick-name was Buck and I know he is looking down on me proud of what I have accomplished.

10.0 Pictures

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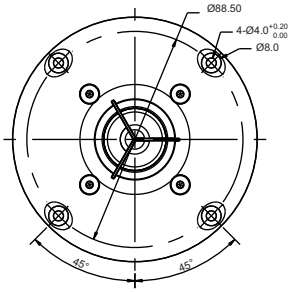
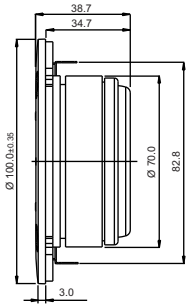
Appendix A:Tweeter

SB Acoustics SB26CDC-C000-4

SB ACOUSTICS

SB26CDC-C000-4





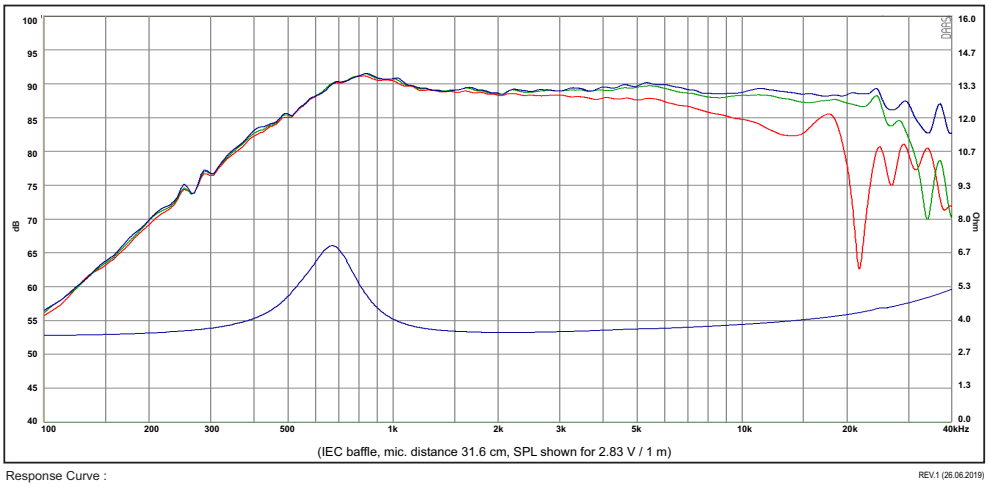
FEATURES

- Aluminium/Ceramic Dome
- Phase optimized diaphragm design for coherent high frequency radiation
- Copper cap for reduced voice coil inductance and minimum phase shift
- Saturation controlled motor system for low distortion
- Non-reflective rear chamber with optimized damping for improved dynamics
- Flow optimized vented pole piece for optimum coupling to rear chamber
- CCAW voice coil for low moving mass
- Long life silver lead wires
- Low resonance frequency

Specs :

Nominal Impedance	4 Ω	Free air resonance, Fs	690 Hz
DC resistance, Re	3.2 Ω	Sensitivity (2.83 V / 1 m)	89 dB
Voice coil inductance, Le	0.04 mH	Mechanical Q-factor, Qms	2.55
Effective piston area, Sd	6.2 cm^2	Electrical Q-factor, Qes	2.00
Voice coil diameter	25.4 mm	Total Q-factor, Qts	1.12
Voice coil height	1.3 mm	Force factor, Bl	1.6 Tm
Air gap height	2.5 mm	Rated power handling*	100 W
Linear coil travel (p-p)	1.2 mm	Magnetic flux density	1.15 T
Moving mass incl. air, Mms	0.38 g	Magnet weight	0.22 kg
		Net weight	0.5 kg

* IEC 268-5, high-pass Butterworth, 2600 Hz, 12 dB/oct.



(IEC baffle, mic. distance 31.6 cm, SPL shown for 2.83 V / 1 m)

Response Curve :

(Blue) : on axis (Green) : 30° off-axis (Red) : 60° off-axis

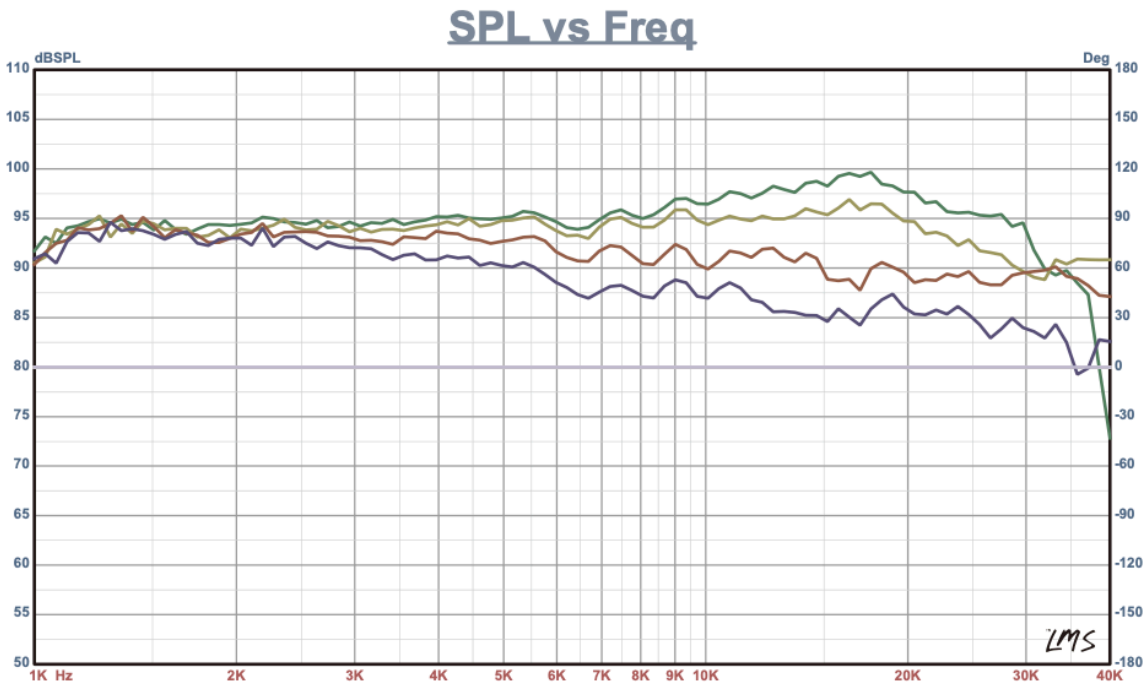
REV.1 (26.06.2019)

Fountek NeoCD3.5H

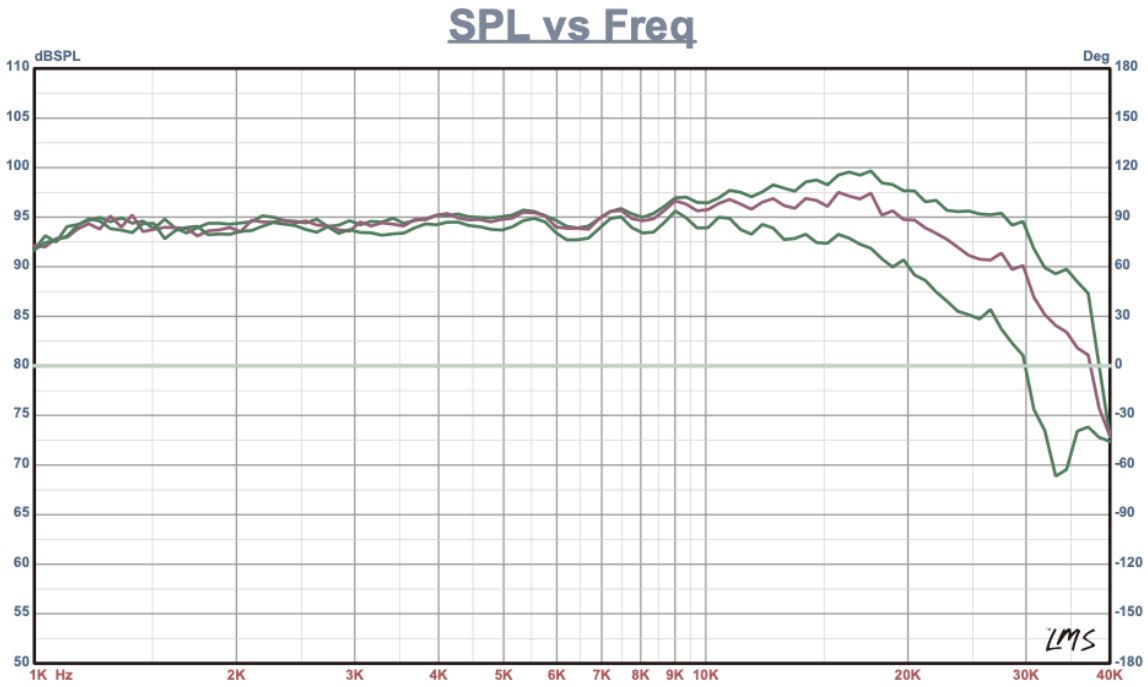
NeoCD3.5H True Ribbon Tweeter

FEATURES
- Strong Neodymium magnet
- 3" reinforced sandwich diaphragm
- Built-in impedance converting transformer
- Low distortion, high sensitivity

Parameter	
Sensitivity	**95.5dB/1m/2.83v**
Power handling	**12W nominal, 25W max**
Frequency range	**1,100-30,000Hz**
Nominal impedance	**7 ohm**
DCR	**0.02 ohm**
Ribbon dimension	**9mmX60mmX0.015mm**
Effective ribbon area	**360 square millimeter**
Ribbon weight	**30 milligram**
Gap flux	**0.5 Tesla average**
Gap height	**4 millimeter**
Recommended crossover	**2,500Hz with 3-order**
Net. Weight	**520 gram**

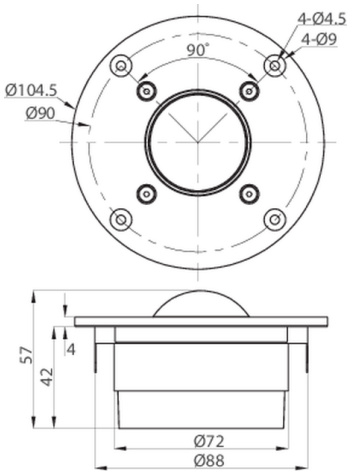


horizontal diffusion: on-axis, 15 degree , 30 degree, 45 degree



vertical diffusion: on-axis, 5 degree , 10 degree

RST28F-4 1-1/8" Reference Series Fabric Dome Tweeter 4 Ohm



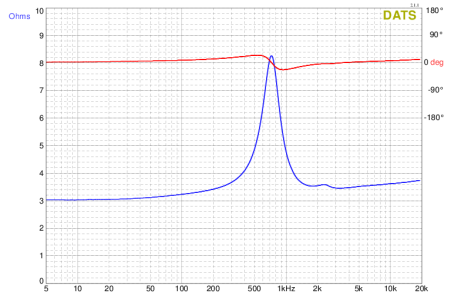
PARAMETERS

Impedance	4 ohms
Re	3.0 ohms
Le	0.03 mH
Fs	710 Hz
Qms	2.52
Qes	1.46
Qts	0.92
Mms	N/A
Cms	N/A
Sd	6.6 cm²
Vd	N/A
BL	N/A
Vas	N/A
Xmax	N/A
VC Diameter	N/A
SPL	93.5 dB @ 2.83V/1m
RMS Power Handling	80 watts
Usable Frequency Range (Hz)	1,400 - 20,000 Hz

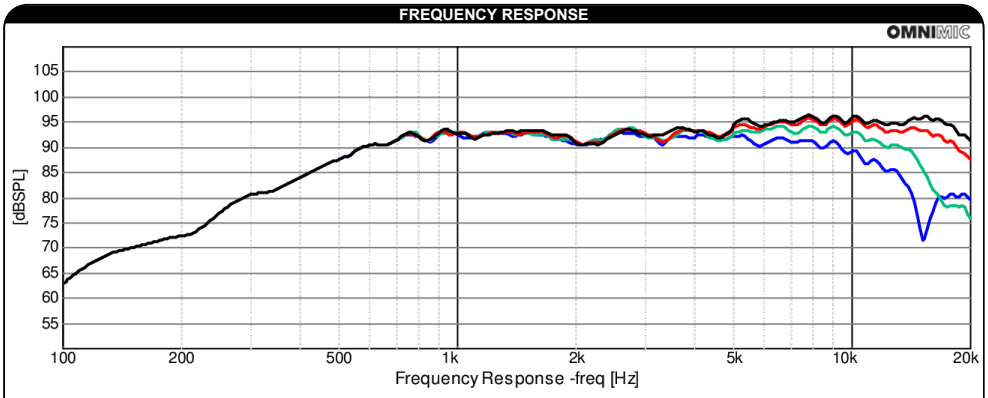
FEATURES

- 1-1/8" silk diaphragm offers remarkable clarity
- Exceptional efficiency at 93.5 ±3dB from 1.4 kHz to 20 kHz and a smooth frequency response
- Well-designed phase bridge to balance the response in the upper octave
- Tuned rear chamber and high-quality Ferrofluid for excellent low-end response
- Low-distortion motor system achieves a rare level of transparency
- Matches the performance of even the most expensive audiophile high-frequency transducers

IMPEDANCE/PHASE



FREQUENCY RESPONSE



Note: 1/24th octave smoothing - nearfield response included in graph below 450 Hz.

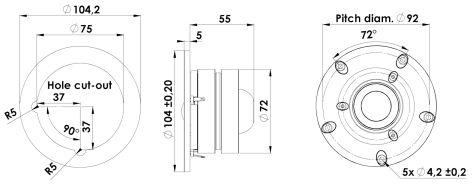
Black = 0°
Red = 15°
Green = 30°
Blue = 45°

SCANSPEAK

Discovery

26 mm Dome Tweeter

D2604/833000



T-S Parameters:	
Resonance frequency [fs]	475 Hz
Mechanical Q factor [Qms]	2.55
Electrical Q factor [Qes]	0.71
Total Q factor [Qts]	0.55
Force factor [Bl]	2.2 Tm
Mechanical resistance [Rms]	0.49 kg/s
Moving mass [Mms]	0.42 g
Compliance [Cms]	0.27 mm/N
Effective diaph. diameter [D]	32 mm
Effective piston area [Sd]	8 cm²
Equivalent volume [Vas]	0.02 l
Sensitivity (2,83V/1m)	93 dB

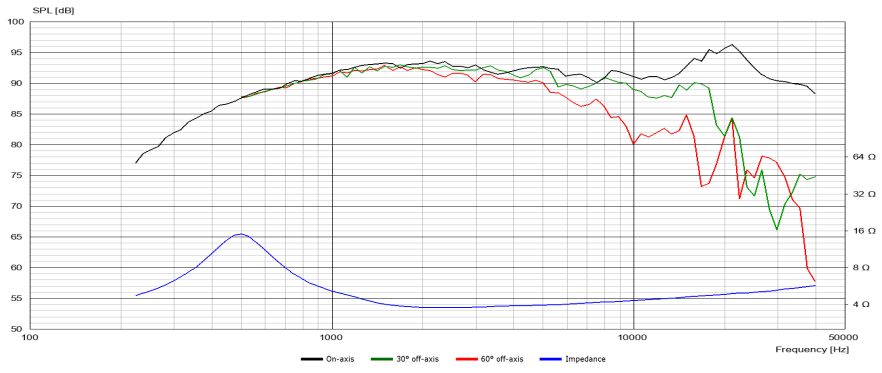
Mechanical Data:	
Voice coil diameter	26 mm
Voice coil height	2 mm
Voice coil layers	2
Gap height	2.5 mm
Linear excursion	± 0.3 mm
Max mech. excursion	± 1.6 mm
Unit weight	0.8 kg
Cabinet Displacement Volume	0.18 l

Key Features:
High sensitivity - 93dB
Extended Frequency to Above 40KHz
Low Resonance Frequency - 475Hz
Low Distortion
Wide Dispersion
Textile Diaphragm, wide Surround

Electrical Data:	
Nominal impedance [Zn]	4 Ω
Minimum impedance [Zmin]	3.8 Ω
Maximum impedance [Zo]	12.9 Ω
DC resistance [Re]	2.8 Ω
Voice coil inductance [Le]	0.04 mH

Recommendations (please see Tech Note):	
Operating frequency range:	2500-20000 Hz
Cabinet volume - closed box:	N.a.
Cabinet volume - vented box:	N.a.

Power Handling:	
100h RMS noise test (IEC 18.4)	100 W
Long-term max power (IEC 18.2)	240 W
X-over: 2. order HP Butterworth, 2.5 kHz	



www.scan-speak.dk

Datasheet updated: May 18, 2020.

Tweeter Comparison Spreadsheet

Tweeters

	Nominal Size	Design	Price	Fs	Sensitivity	Short Term Power	Long Term power	Peak SPL Limit	Thermal SPL Limit
Fountek NeoCD3.5H	3”	Ribbon	$106.50	500	95.5	25	12	109.5	106.3
SB Acoustics SB26CDC-C000-4	1”	Aluminum/ Ceramic Dome	$61.40	690	89		100		109.0
Dayton Audio RST28F4	1 1/8th”	Fabric Dome	$37.98	710	93.5		80		112.5
Scan-Speak D2604/833000	1“	Dome	$50.70	1470	91	40	240	107.0	100.0

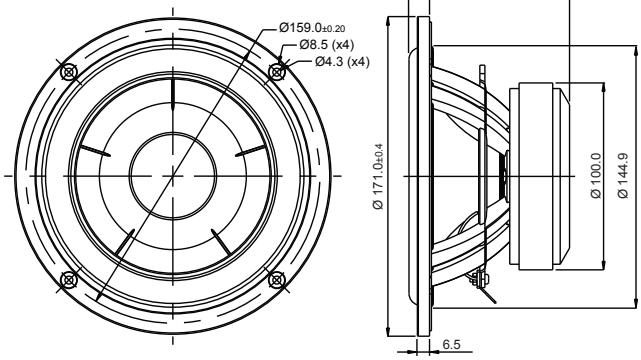
Appendix B: Mid Drivers

SB Acoustics SB17CAC35-4

SB ACOUSTICS

6" SB17CAC35-4

Preliminary Data



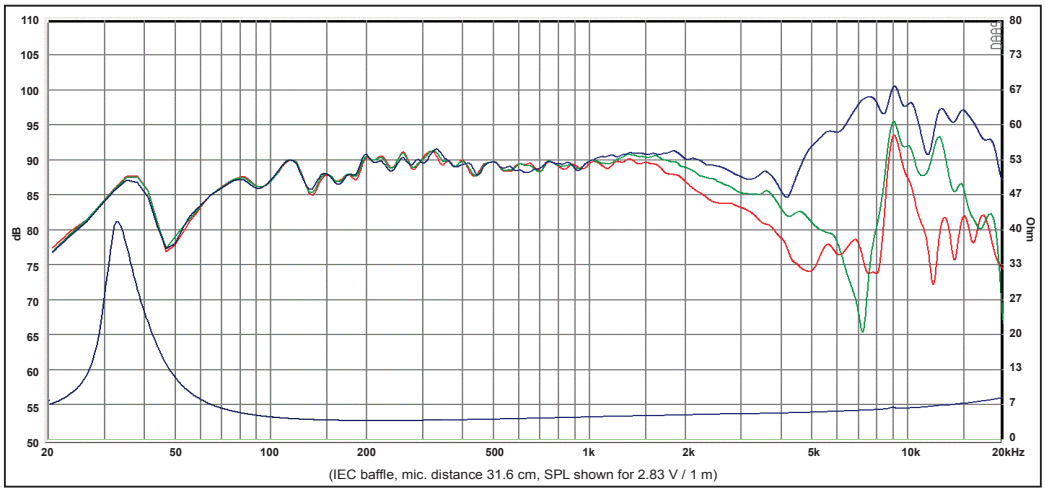
FEATURES

- Vented cast aluminum chassis for optimum strength and low compression
- Geometrically reinforced ceramic cone for optimum piston operation and reduced break-up.
- Soft low damping rubber surround for improved transient response
- Non-conducting fibre glass voice coil former for minimum damping
- Extended copper sleeve on pole piece for low inductance and low distortion
- CCAW voice coil for reduced moving mass
- Long life silver lead wires
- Vented pole piece for reduced compression

Specs :

Nominal Impedance	4 Ω	Free air resonance, Fs	29.5 Hz
DC resistance, Re	3.1 Ω	Sensitivity (2.83 V / 1 m)	90 dB
Voice coil inductance, Le	0.13 mH	Mechanical Q-factor, Qms	4.70
Effective piston area, Sd	118 cm²	Electrical Q-factor, Qes	0.31
Voice coil diameter	35.5 mm	Total Q-factor, Qts	0.29
Voice coil height	16 mm	Moving mass incl.air, Mms	15.2 g
Air gap height	5 mm	Force factor, Bl	5.3 Tm
Linear coil travel (p-p)	11 mm	Equivalent volume, Vas	37.8 liters
Magnetic flux density	1.0 T	Compliance, Cms	1.91 mm/N
Magnet weight	0.54 kg	Mechanical loss, Rms	0.6 kg/s
Net weight	1.56 kg	Rated power handling*	60 W

* IEC 268-5, T/S parameters measured on drive units that are broken in.



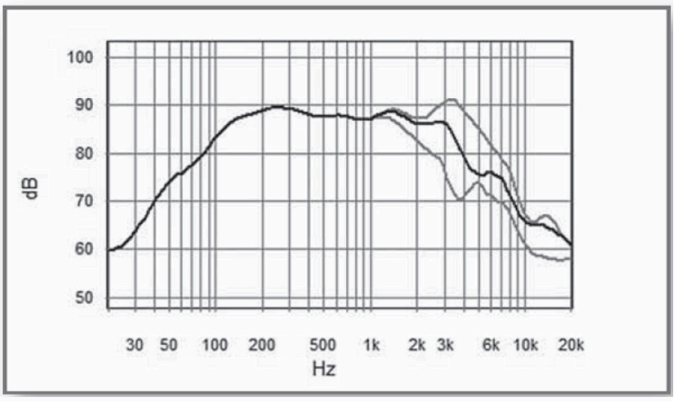
(IEC baffle, mic. distance 31.6 cm, SPL shown for 2.83 V / 1 m)

Response Curve :

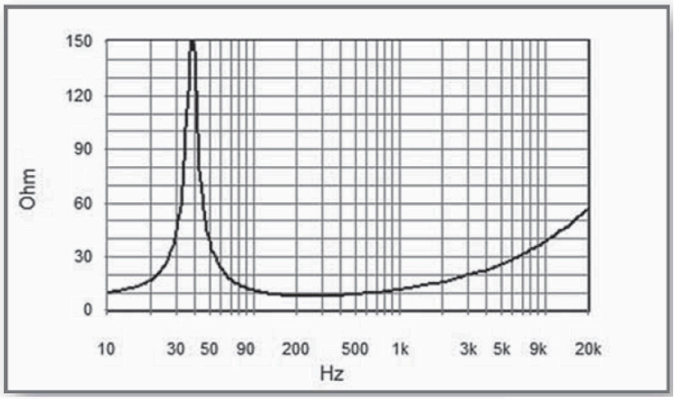
REV.1 (16.09.2017)

(Blue) : on axis (Green) : 30° off-axis (Red) : 60° off-axis

Frequency response



Impedance

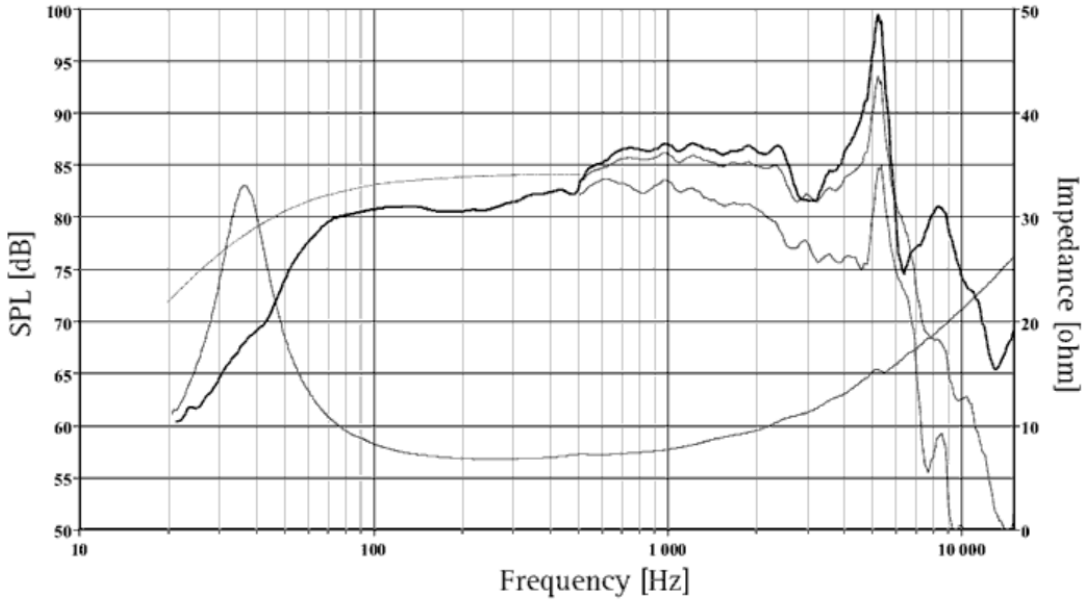


Main technical data

Nominal impedance	Z_n	8	Ω
DC resistance	R_e	6.6	Ω
Resonance frequency 1W	f_r	31	Hz
Resonance frequency TSP	f_r	38	Hz
Suspension compliance	C_{MS}	0.98	mm/N
Mechanical Q	Q_{ms}	5.61	
Electrical Q	Q_{es}	0.34	
Total Q	Q_{ts}	0.32	
Mechanical resistance	R_{MS}	0.75	kg/s
Total moving mass (incl. air mass)	M_{MD}	17.5	g
Effective piston area	S_D	137	cm^2
Voice coil inductance	L_e	0.95	mH
Force factor	B_L xl	9.0	Tm
Xmax electrical	+/-	4.5	mm
Xmax mechanical	+/-	8.8	mm
Equivalent air vol. of suspension	V_{AS}	26.0	dm^3
Characteristic SPL 1 Watt/1m		89	dB SPL
Rated power		80	W

Seas Prestige L16RN-SL

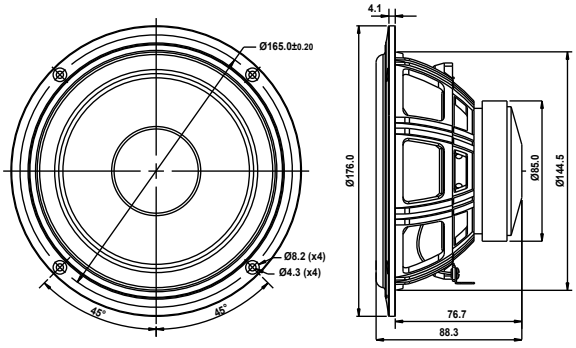
Nominal Impedance	8 Ohms	Voice Coil Resistance	6.1 Ohms
Recommended Frequency Range	45 - 2000 Hz	Voice Coil Inductance	0.68 mH
Short Term Power Handling *	250 W	Force Factor	6.2 N/A
Long Term Power Handling *	80 W	Free Air Resonance	36 Hz
Characteristic Sensitivity (2,83V, 1m)	84 dB	Moving Mass	14.8 g
Voice Coil Diameter	39 mm	Air Load Mass In IEC Baffle	0.62 g
Voice Coil Height	18 mm	Suspension Compliance	1.3 mm/N
Air Gap Height	6 mm	Suspension Mechanical Resistance	1.41 Ns/m
Linear Coil Travel (p-p)	12 mm	Effective Piston Area	104 cm²
Maximum Coil Travel (p-p)	22 mm	VAS	19 Litres
Magnetic Gap Flux Density	0.88T	QMS	2.47
Magnet Weight	0.42 kg	QES	0.56
Total Weight	1.40 kg	QTS	0.46



The frequency responses above show measured free field sound pressure in 0, 30, and 60 degrees angle using a 10L closed box. Input 2.83 VRMS, microphone distance 0.5m, normalized to SPL 1m. The dotted line is a calculated response in infinite baffle based on the parameters given for this specific driver. The impedance is measured in free air without baffle using a 2V sine signal.

SB ACOUSTICS

6" SB16PFCR25-8



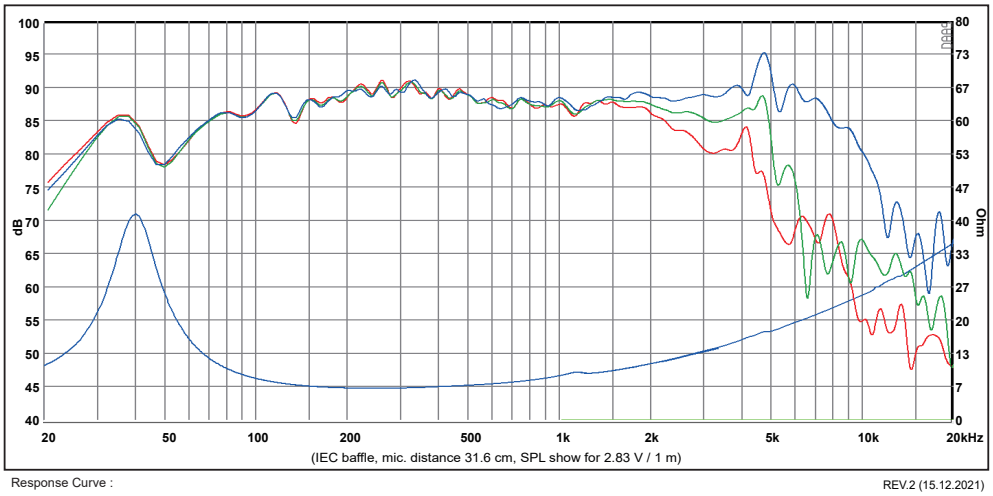
FEATURES

- Vented reinforced plastic chassis
- Proprietary cone material with natural fibers made in-house
- Soft low damping rubber surround for improved transient response
- Optimized motor system
- Vented coil former for low compression
- Non-resonant long life lead wires

Specs :

Nominal Impedance	8 Ω	Free air resonance, Fs	38 Hz
DC resistance, Re	5.6 Ω	Sensitivity (2.83 V / 1 m)	87 dB
Voice coil inductance, Le	0.77mH	Mechanical Q-factor, Qms	2.5
Effective piston area, Sd	124 cm^2	Electrical Q-factor, Qes	0.48
Voice coil diameter	25.4 mm	Total Q-factor, Qts	0.40
Voice coil height	14 mm	Moving mass incl.air, Mms	13.8 g
Air gap height	5 mm	Force factor, Bl	6.2 Tm
Linear coil travel (p-p)	9 mm	Equivalent volume, Vas	27 liters
Magnetic flux density	1.07 T	Compliance, Cms	1.25 mm/N
Magnet weight	0.36 kg	Mechanical loss, Rms	1.4 kg/s
Net weight	0.94 kg	Rated power handling*	40 W

* IEC 268-5, T/S parameters measured on drive units that are broken in.



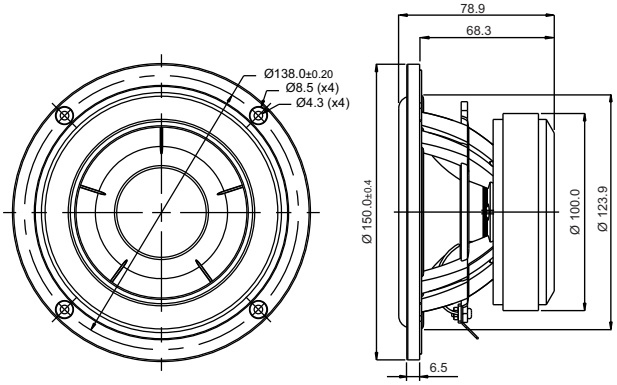
Response Curve :

----- (Blue) : on axis ----- (Green) : 30° off-axis ----- (Red) : 60° off-axis

REV.2 (15.12.2021)

SB ACOUSTICS

5" SB15CAC30-8



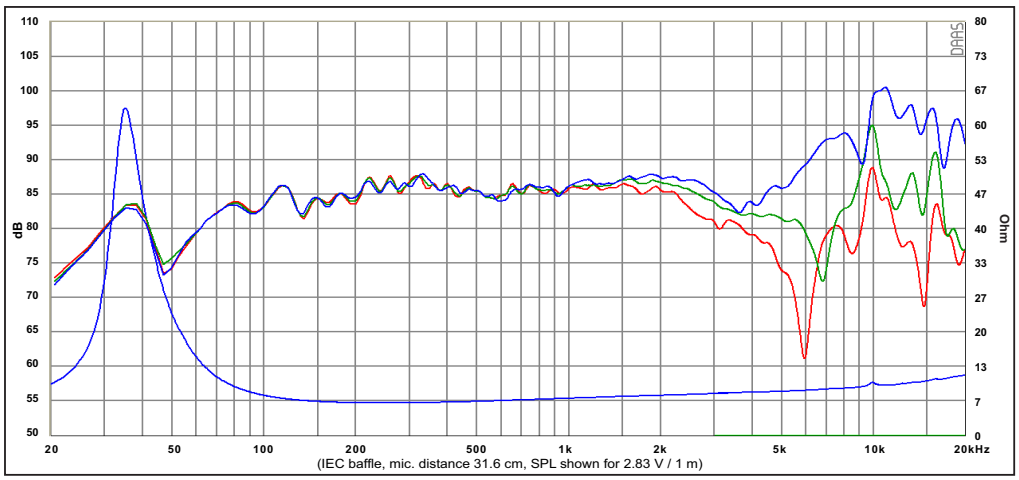
FEATURES

- Vented cast aluminium chassis for optimum strength and low compression
- Geometrically reinforced ceramic cone for optimum piston operation and reduced break-up.
- Soft low damping rubber surround for improved transient response
- Non-conducting fibre glass voice coil former for minimum damping
- Extended copper sleeve on pole piece for low inductance and low distortion
- CCAW voice coil for reduced moving mass
- Long life silver lead wires
- Vented pole piece for reduced compression

Specs :

Nominal Impedance	8 Ω	Free air resonance, Fs	35.5 Hz
DC resistance, Re	5.7 Ω	Sensitivity (2.83 V / 1 m)	86 dB
Voice coil inductance, Le	0.14 mH	Mechanical Q-factor, Qms	4.77
Effective piston area, Sd	82 cm^2	Electrical Q-factor, Qes	0.42
Voice coil diameter	30.5 mm	Total Q-factor, Qts	0.38
Voice coil height	14 mm	Moving mass incl.air, Mms	10.7 g
Air gap height	5 mm	Force factor, Bl	5.7 Tm
Linear coil travel (p-p)	10 mm	Equivalent volume, Vas	17.9 liters
Magnetic flux density	1.0 T	Compliance, Cms	1.88 mm/N
Magnet weight	0.54 kg	Mechanical loss, Rms	0.5 kg/s
Net weight	1.46 kg	Rated power handling*	50 W

* IEC 268-5, T/S parameters measured on drive units that are broken in.



Response Curve :

(Blue) : on axis (Green) : 30° off-axis (Red) : 60° off-axis

REV.2 (07.01.2019)

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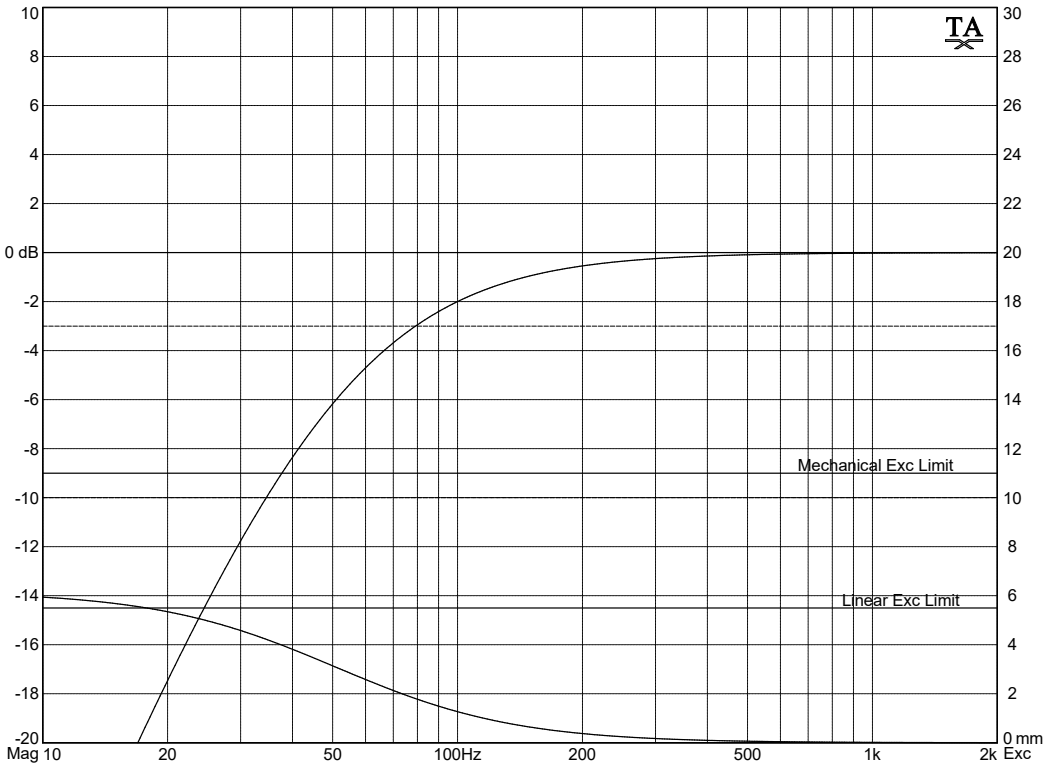
Comparison of Mid Drivers Spreadsheet

Mid Woofers

	Nominal Size	Cone	Price	Sensitivity	Power	Thermal SPL Limit	Mechanical SPL Limit	X-max	Sd cm2	Vas (liters)	Qts	Fs	Vb (liters)	Vb (cu feet)	Vd	F3	X-max SPL
Eton 7-212/C8/32 HEX Symphony II	7”	Hexacone	$185.20	86	50	103.0		4	82	17.9	0.38	35.5	14.69	0.52	0.0000	38.7	112.3
Seas Prestige L16RN-SL	6”	Aluminum	$139.80	84	80	103.0		6	104	19	0.45	37	27.25	0.96	0.0001	31.6	112.3
SB Acoustics SB17CAC35-4	6”	Ceramic	$105.60	90	60	107.8		5.1	118	37.8	0.29	29.5	12.72	0.45	0.0001	47.6	113.0
SB Acoustics SB16PFCR25-8	6”	Paper	$36.30	87	40	103.0		6.2	124	27	0.40	38	26.25	0.93	0.0001	38.5	112.8
SB Acoustics SB15CAC30-8	5”	Ceramic	$98.40	86	50	103.0		5.7	82	17.9	0.38	35.5	14.69	0.52	0.0000	38.7	112.4

Modeling of Purchased Driver-



Driver Parameters

Driver: **SB Acoustics SB17CAC35-4**

Nominal Diameter	D =	6	in
Nominal Power	P =	0	Watts
Sensitivity (1W/1m)	SPL =	90	dB SPL
Free Air Resonance	f(s) =	29.5	Hz
Total Q	Q(ts) =	0.29	
Electrical Q	Q(es) =	0.31	
Mechanical Q	Q(ms) =	4.7	
Equivalent Volume	V(as) =	1.335	cu ft
Nominal Impedance	Z =	0	Ohms
DC Resistance	R(e) =	0	Ohms
Max Thermal Power	P(t) =	0	Watts
Max Linear Excursion	X(max) =	5.5	mm
Max Excursion	X(lim) =	11	mm
Voice Coil Diam.	D(vc) =	0	mm

Driver Notes:

NOTE: Reference Efficiency was calculated based on the 1W/1m sensitivity.

System Notes:

Box Parameters

System Type: **2nd Order Closed Box**

Box Volume	V(B) =	0.6767	cu ft
Closed Box Q	Q(tc) =	0.5	
System Resonance	F(sc) =	50.87	Hz
Compliance Ratio	alpha =	1.973	

System Parameters

No. of Drivers	N =	1	
Isobaric Factor	I =	1	(1=normal, 2=iso)
Input Power	P(in) =	10	Watts
SPL Distance	D =	1	m

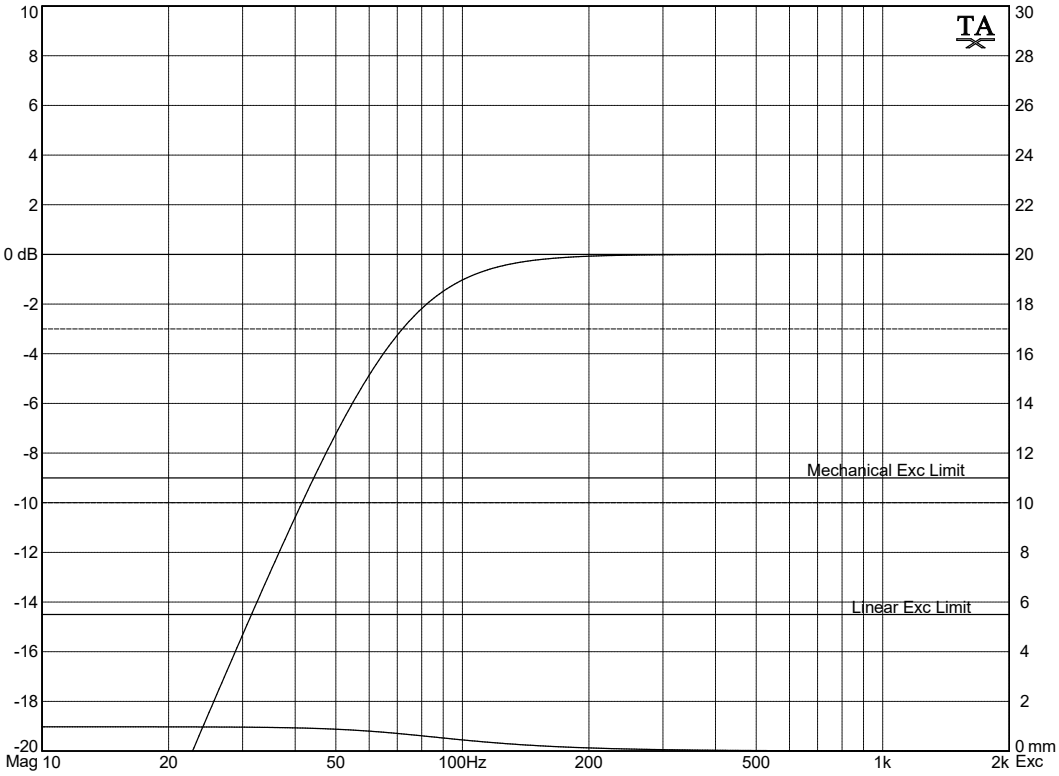
My Address, line 1
My Address, line 2
My Country My Phone

System Name:

2nd Order Closed Box

Designer: Cora Moyers
Title:

Rev Date: Rev:



Driver Parameters

Driver: **SB Acoustics** **SB17CAC35-4**

Nominal Diameter	D =	6	in
Nominal Power	P =	0	Watts
Sensitivity (1W/1m)	SPL =	90	dB SPL
Free Air Resonance	f(s) =	29.5	Hz
Total Q	Q(ts) =	0.29	
Electrical Q	Q(es) =	0.31	
Mechanical Q	Q(ms) =	4.7	
Equivalent Volume	V(as) =	1.335	cu ft
Nominal Impedance	Z =	0	Ohms
DC Resistance	R(e) =	0	Ohms
Max Thermal Power	P(t) =	0	Watts
Max Linear Excursion	X(max) =	5.5	mm
Max Excursion	X(lim) =	11	mm
Voice Coil Diam.	D(vc) =	0	mm

Driver Notes:

NOTE: Reference Efficiency was calculated based on the 1W/1m sensitivity.

System Notes:

Box Parameters

System Type: **2nd Order Closed Box**

Box Volume	V(B) =	0.2701	cu ft
Closed Box Q	Q(tc) =	0.707	
System Resonance	F(sc) =	71.92	Hz
Compliance Ratio	alpha =	4.944	

System Parameters

No. of Drivers	N =	1	
Isobaric Factor	I =	1	(1=normal, 2=iso)
Input Power	P(in) =	1	Watts
SPL Distance	D =	1	m

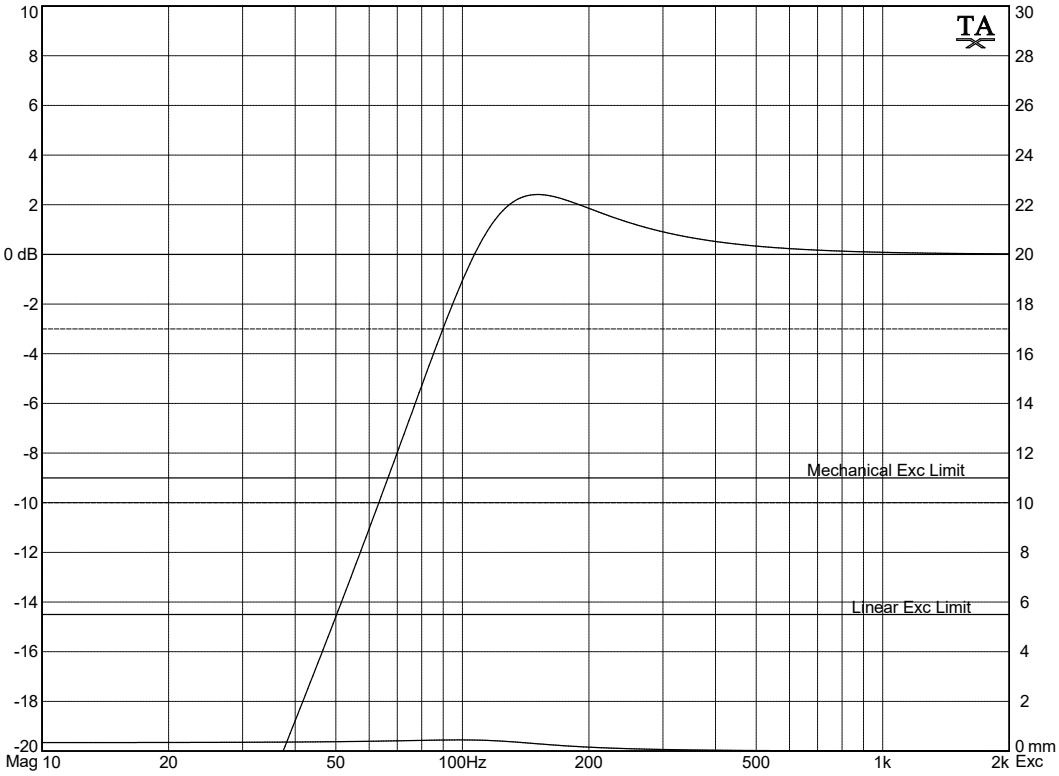
My Address, line 1
My Address, line 2
My Country My Phone

System Name:

2nd Order Closed Box

Designer: Cora Moyers
Title:

Rev Date: Rev:



Driver Parameters

Driver: **SB Acoustics** **SB17CAC35-4**

Nominal Diameter	D =	6	in
Nominal Power	P =	0	Watts
Sensitivity (1W/1m)	SPL =	90	dB SPL
Free Air Resonance	f(s) =	29.5	Hz
Total Q	Q(ts) =	0.29	
Electrical Q	Q(es) =	0.31	
Mechanical Q	Q(ms) =	4.7	
Equivalent Volume	V(as) =	1.335	cu ft
Nominal Impedance	Z =	0	Ohms
DC Resistance	R(e) =	0	Ohms
Max Thermal Power	P(t) =	0	Watts
Max Linear Excursion	X(max) =	5.5	mm
Max Excursion	X(lim) =	11	mm
Voice Coil Diam.	D(vc) =	0	mm

Driver Notes:

NOTE: Reference Efficiency was calculated based on the 1W/1m sensitivity.

System Notes:

Box Parameters

System Type: **2nd Order Closed Box**

Box Volume	V(B) =	0.0828	cu ft
Closed Box Q	Q(tc) =	1.2	
System Resonance	F(sc) =	122.1	Hz
Compliance Ratio	alpha =	16.12	

System Parameters

No. of Drivers	N =	1	
Isobaric Factor	I =	1	(1=normal, 2=iso)
Input Power	P(in) =	1	Watts
SPL Distance	D =	1	m

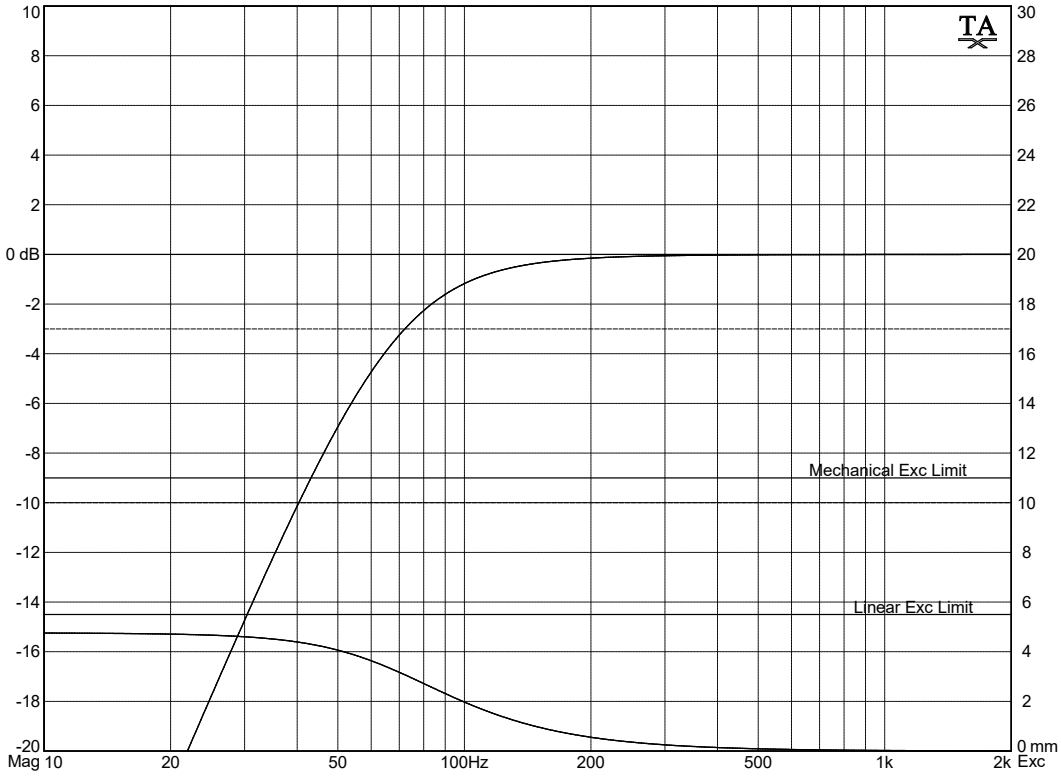
My Address, line 1
My Address, line 2
My Country — My Phone

System Name:

2nd Order Closed Box

Designer: Cora Moyers
Title:

Rev Date: Rev:



Driver Parameters

Driver: **SB Acoustics** **SB17CAC35-4**

Nominal Diameter	D =	6	in
Nominal Power	P =	0	Watts
Sensitivity (1W/1m)	SPL =	90	dB SPL
Free Air Resonance	f(s) =	29.5	Hz
Total Q	Q(ts) =	0.29	
Electrical Q	Q(es) =	0.31	
Mechanical Q	Q(ms) =	4.7	
Equivalent Volume	V(as) =	1.335	cu ft
Nominal Impedance	Z =	0	Ohms
DC Resistance	R(e) =	0	Ohms
Max Thermal Power	P(t) =	0	Watts
Max Linear Excursion	X(max) =	5.5	mm
Max Excursion	X(lim) =	11	mm
Voice Coil Diam.	D(vc) =	0	mm

Driver Notes:

NOTE: Reference Efficiency was calculated based on the 1W/1m sensitivity.

System Notes:

Box Parameters

System Type: **4th Order Vented Box**

Box Volume	V(B) =	0.3	cu ft
Closed Box Q	Q(tc) =	0.677	
Box Frequency	F(B) =	0	Hz
Min Rec Vent Area	S(vMin) =	0	sq in
Vent Surface Area	S(v) =	0	sq in
Vent Length	L(v) =	0	in
Compliance Ratio	alpha =	4.45	
Box Loss Q	Q(B) =	7	

System Parameters

No. of Drivers	N =	1	
Isobaric Factor	I =	1	(1=normal, 2=iso)
Input Power	P(in) =	20	Watts
SPL Distance	D =	1	m

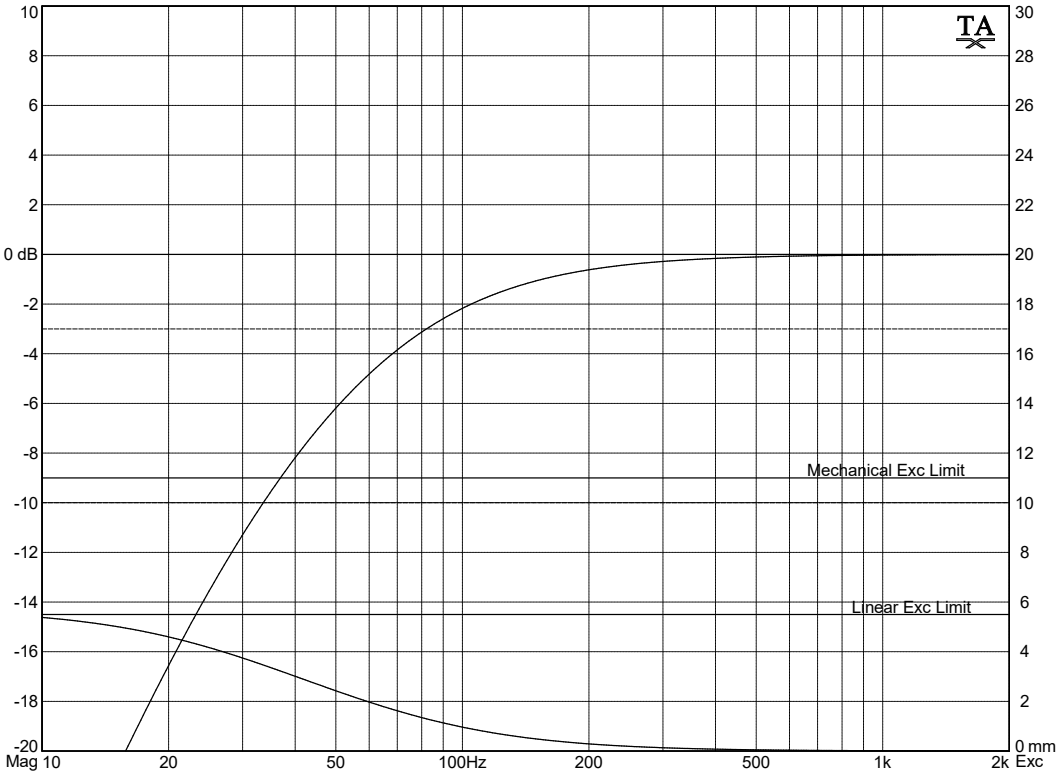
My Address, line 1
My Address, line 2
My Country My Phone

System Name:

4th Order Vented Box

Designer: Cora Moyers
Title:

Rev Date: Rev:



Driver Parameters

Driver: **SB Acoustics** **SB17CAC35-4**

Nominal Diameter	D =	6	in
Nominal Power	P =	0	Watts
Sensitivity (1W/1m)	SPL =	90	dB SPL
Free Air Resonance	f(s) =	29.5	Hz
Total Q	Q(ts) =	0.29	
Electrical Q	Q(es) =	0.31	
Mechanical Q	Q(ms) =	4.7	
Equivalent Volume	V(as) =	1.335	cu ft
Nominal Impedance	Z =	0	Ohms
DC Resistance	R(e) =	0	Ohms
Max Thermal Power	P(t) =	0	Watts
Max Linear Excursion	X(max) =	5.5	mm
Max Excursion	X(lim) =	11	mm
Voice Coil Diam.	D(vc) =	0	mm

Driver Notes:

NOTE: Reference Efficiency was calculated based on the 1W/1m sensitivity.

System Notes:

Box Parameters

System Type: **4th Order Vented Box**

Box Volume	V(B) =	0.9	cu ft
Closed Box Q	Q(tc) =	0.457	
Box Frequency	F(B) =	0	Hz
Min Rec Vent Area	S(vMin) =	0	sq in
Vent Surface Area	S(v) =	0	sq in
Vent Length	L(v) =	0	in
Compliance Ratio	alpha =	1.483	
Box Loss Q	Q(B) =	7	

System Parameters

No. of Drivers	N =	1	
Isobaric Factor	I =	1	(1=normal, 2=iso)
Input Power	P(in) =	6	Watts
SPL Distance	D =	1	m

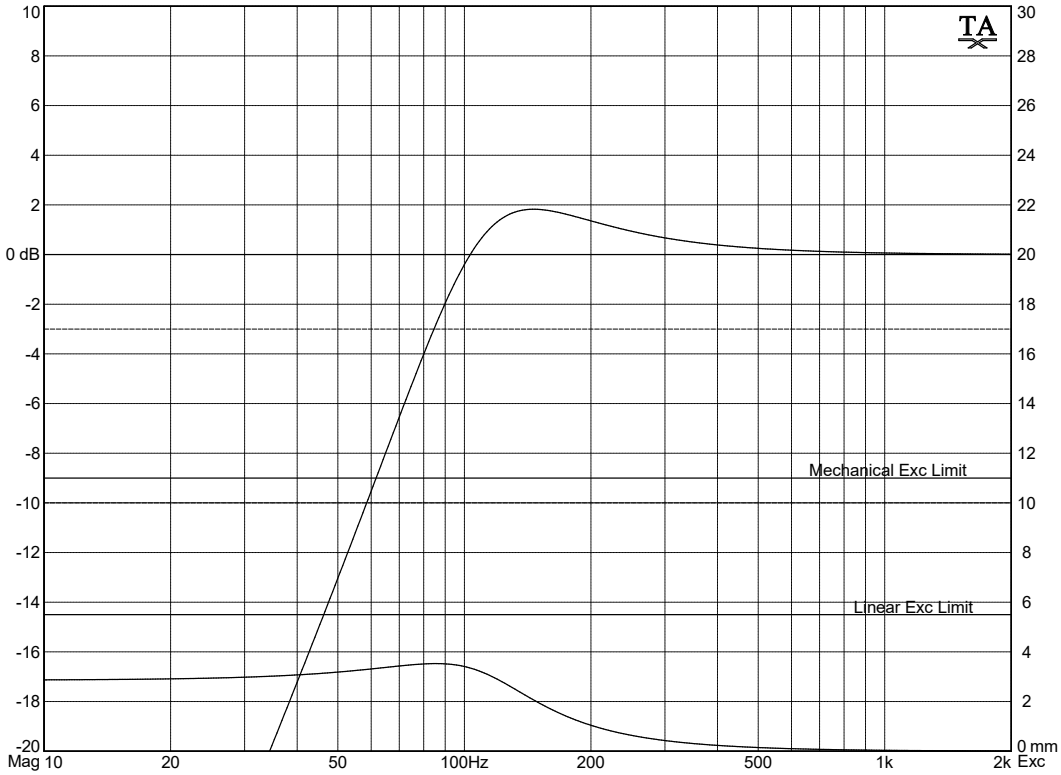
My Address, line 1
My Address, line 2
My Country My Phone

System Name:

4th Order Vented Box

Designer: Cora Moyers
Title:

Rev Date: Rev:



Driver Parameters

Driver: **SB Acoustics** **SB17CAC35-4**

Nominal Diameter	D =	6	in
Nominal Power	P =	0	Watts
Sensitivity (1W/1m)	SPL =	90	dB SPL
Free Air Resonance	f(s) =	29.5	Hz
Total Q	Q(ts) =	0.29	
Electrical Q	Q(es) =	0.31	
Mechanical Q	Q(ms) =	4.7	
Equivalent Volume	V(as) =	1.335	cu ft
Nominal Impedance	Z =	0	Ohms
DC Resistance	R(e) =	0	Ohms
Max Thermal Power	P(t) =	0	Watts
Max Linear Excursion	X(max) =	5.5	mm
Max Excursion	X(lim) =	11	mm
Voice Coil Diam.	D(vc) =	0	mm

Driver Notes:

NOTE: Reference Efficiency was calculated based on the 1W/1m sensitivity.

System Notes:

Box Parameters

System Type: **4th Order Vented Box**

Box Volume	V(B) =	0.1	cu ft
Closed Box Q	Q(tc) =	1.099	
Box Frequency	F(B) =	0	Hz
Min Rec Vent Area	S(vMin) =	0	sq in
Vent Surface Area	S(v) =	0	sq in
Vent Length	L(v) =	0	in
Compliance Ratio	alpha =	13.35	
Box Loss Q	Q(B) =	7	

System Parameters

No. of Drivers	N =	1	
Isobaric Factor	I =	1	(1=normal, 2=iso)
Input Power	P(in) =	50	Watts
SPL Distance	D =	1	m

My Address, line 1
My Address, line 2
My Country My Phone

System Name:

4th Order Vented Box

Designer: Cora Moyers
Title:

Rev Date: Rev:

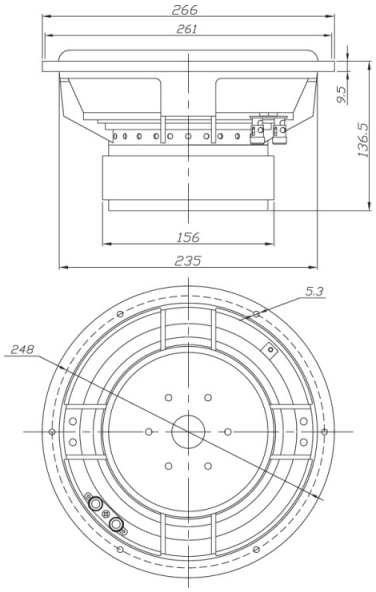
Appendix C: Subwoofer

RSS265HO-4 10" Reference HO Subwoofer

DAYTON AUDIO

RSS265HO-4 10" Reference HO Subwoofer 4 Ohm

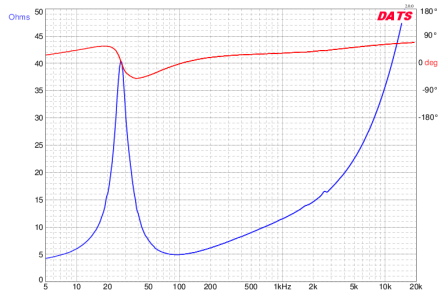
RSS265HO-4



PARAMETERS

Impedance	4 ohms
Re	3.5 ohms
Le	1.74 mH @ 1 kHz
Fs	26.9 Hz
Qms	4.02
Qes	0.39
Qts	0.35
Mms	201g
Cms	0.17 mm/N
Sd	349.7 cm²
Vd	430.1 cm³
BL	17.6 Tm
Vas	29.4 liters
Xmax	12.3 mm
VC Diameter	64 mm
SPL	87.2 dB @ 2.83V/1m
RMS Power Handling	600 watts
Usable Frequency Range (Hz)	24 - 600 Hz

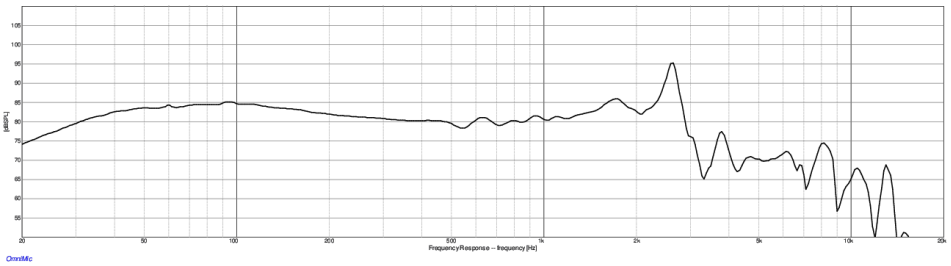
IMPEDANCE/PHASE



FEATURES

- Extensively vented motor eliminates compression and allows quiet excursion
- Extra-thick black anodized aluminum cone for maximum rigidity
- Triple shorting ring motor for ultra-low distortion
- 4-layer coil for high power handling
- Optimized parameters for small enclosures

FREQUENCY RESPONSE

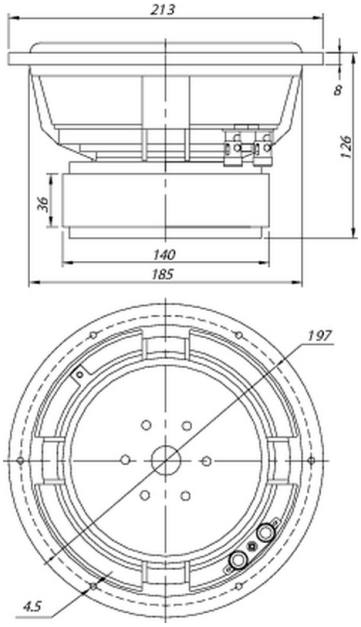


Note: 1/24th octave smoothing - nearfield response included in graph below 450 Hz.

Black = 0°

RSS210HO-4 8" Reference HO Subwoofer 4 Ohm

RSS210HO-4



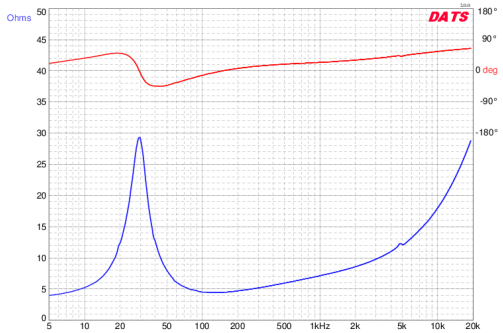
PARAMETERS

Impedance	4 ohms
Re	3.6 ohms
Le	0.99 mH @ 1 kHz
Fs	29.6 Hz
Qms	3.33
Qes	0.46
Qts	0.40
Mms	99.3g
Cms	0.29 mm/N
Sd	213.8 cm²
Vd	235.2 cm³
BL	12 Tm
Vas	18.7 liters
Xmax	11 mm
VC Diameter	50.1 mm
SPL	85.7 dB @ 2.83V/1m
RMS Power Handling	300 watts
Usable Frequency Range (Hz)	30 - 1,500 Hz

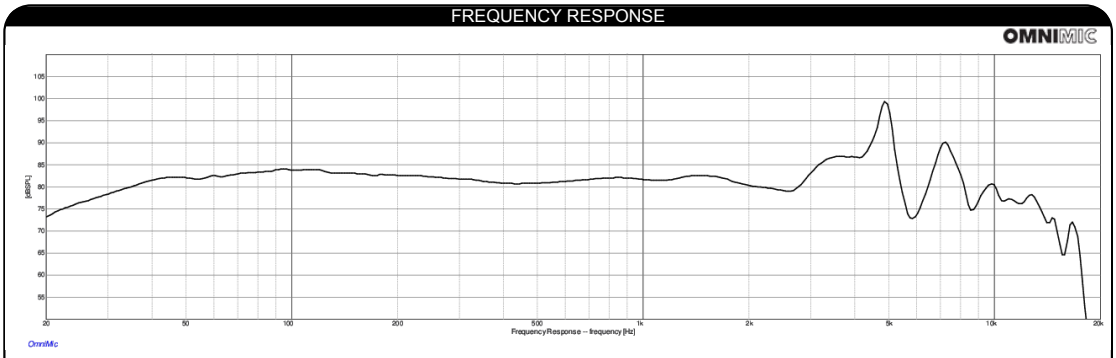
FEATURES

- Extensively vented motor eliminates compression and allows quiet excursion
- Extra-thick black anodized aluminum cone for maximum rigidity
- Triple shorting ring motor for ultra-low distortion
- 4-layer coil for high power handling
- Optimized parameters for small enclosures

IMPEDANCE/PHASE



FREQUENCY RESPONSE



Note: 1/24th octave smoothing - nearfield response included in graph below 450 Hz.

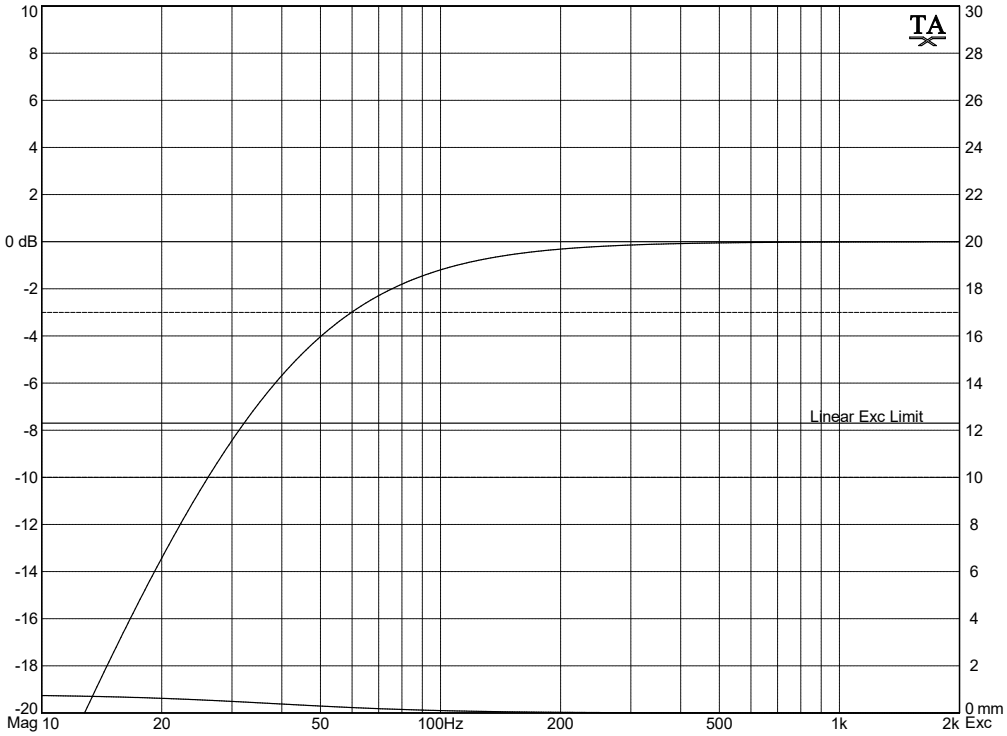
Black = 0°

Subwoofer Comparison Spreadsheet

Subwoofers

	Nominal Size	Cone	Price	Sensitivity	Power	Thermal SPL Limit	Mechanical SPL Limit	X-max	Sd cm2	Vas (liters)	Qts	Fs	Vb (liters)	Vb (cu feet)	Vd	F3	X-max SPL
RSS265HO-4 10" Reference HO Subwoofer 4 Ohm-Cabinet Kit	10"	aluminum	$269.98	87.2	600	115.0		12.3	349.7	29.4	0.35	26.9	18.40	0.65	0.0004	33.1	113.7
Dayton Audio 8" Reference Series HO Subwoofer-Cabinet kit	8"	Aluminum	$229.98	85.7	300	110.5		11	213.8	18.7	0.40	29.6	18.18	0.64	0.0002	30.0	113.1

Modeling of Purchased Driver



Driver Parameters

Driver: **Dayton Audio** **RSS265HO-10**

Nominal Diameter	D =	0	in
Nominal Power	P =	0	Watts
Sensitivity (1W/1m)	SPL =	87.2	dB SPL
Free Air Resonance	f(s) =	26.9	Hz
Total Q	Q(ts) =	0.35	
Electrical Q	Q(es) =	0.39	
Mechanical Q	Q(ms) =	4.02	
Equivalent Volume	V(as) =	1.038	cu ft
Nominal Impedance	Z =	0	Ohms
DC Resistance	R(e) =	0	Ohms
Max Thermal Power	P(t) =	600	Watts
Max Linear Excursion	X(max) =	12.3	mm
Max Excursion	X(lim) =	0	mm
Voice Coil Diam.	D(vc) =	0	mm

Driver Notes:

NOTE: Reference Efficiency was calculated based on the 1W/1m sensitivity.

System Notes:

Box Parameters

System Type: **2nd Order Closed Box**

Box Volume	V(B) =	0.9973	cu ft
Closed Box Q	Q(tc) =	0.5	
System Resonance	F(sc) =	38.43	Hz
Compliance Ratio	alpha =	1.041	

System Parameters

No. of Drivers	N =	1	
Isobaric Factor	I =	1	(1=normal, 2=iso)
Input Power	P(in) =	1	Watts
SPL Distance	D =	1	m

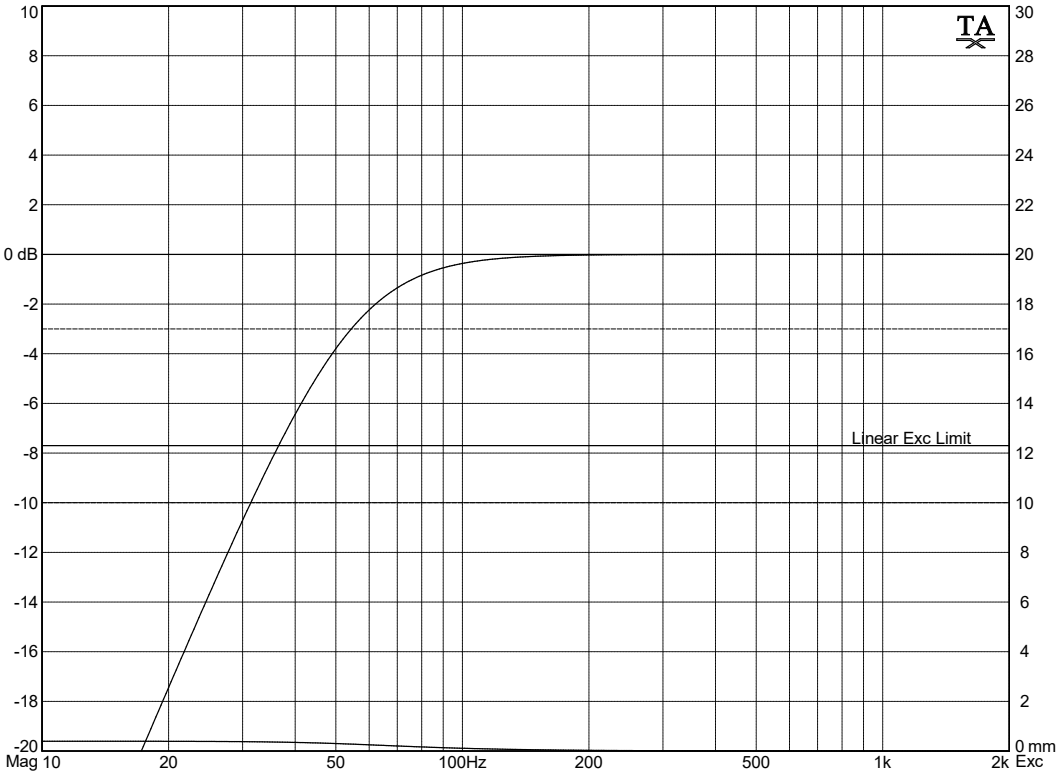
My Address, line 1
My Address, line 2
My Country My Phone

System Name:

2nd Order Closed Box

Designer: Cora Moyers
Title:

Rev Date: Rev:



Driver Parameters

Driver: **Dayton Audio** **RSS265HO-10**

Nominal Diameter	D =	0	in
Nominal Power	P =	0	Watts
Sensitivity (1W/1m)	SPL =	87.2	dB SPL
Free Air Resonance	f(s) =	26.9	Hz
Total Q	Q(ts) =	0.35	
Electrical Q	Q(es) =	0.39	
Mechanical Q	Q(ms) =	4.02	
Equivalent Volume	V(as) =	1.038	cu ft
Nominal Impedance	Z =	0	Ohms
DC Resistance	R(e) =	0	Ohms
Max Thermal Power	P(t) =	600	Watts
Max Linear Excursion	X(max) =	12.3	mm
Max Excursion	X(lim) =	0	mm
Voice Coil Diam.	D(vc) =	0	mm

Driver Notes:

NOTE: Reference Efficiency was calculated based on the 1W/1m sensitivity.

System Notes:

Box Parameters

System Type: **2nd Order Closed Box**

Box Volume	V(B) =	0.337	cu ft
Closed Box Q	Q(tc) =	0.707	
System Resonance	F(sc) =	54.34	Hz
Compliance Ratio	alpha =	3.08	

System Parameters

No. of Drivers	N =	1	
Isobaric Factor	I =	1	(1=normal, 2=iso)
Input Power	P(in) =	1	Watts
SPL Distance	D =	1	m

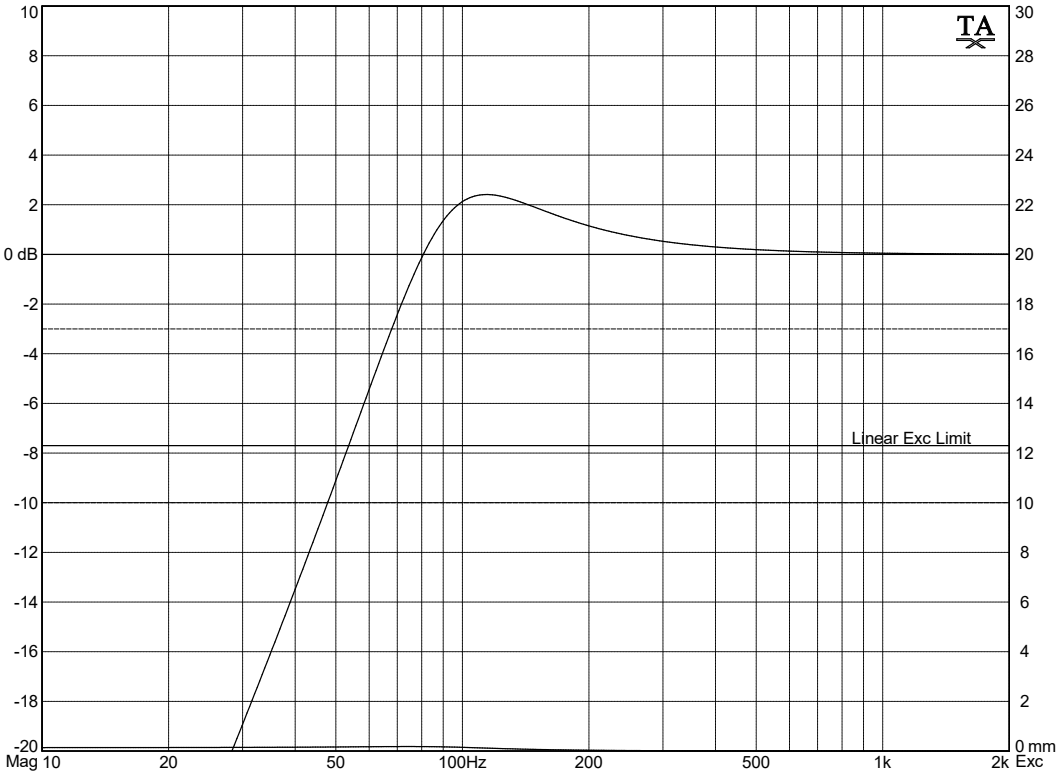
My Address, line 1
My Address, line 2
My Country My Phone

System Name:

2nd Order Closed Box

Designer: Cora Moyers
Title:

Rev Date: Rev:



Driver Parameters

Driver: **Dayton Audio** **RSS265HO-10**

Nominal Diameter	D =	0	in
Nominal Power	P =	0	Watts
Sensitivity (1W/1m)	SPL =	87.2	dB SPL
Free Air Resonance	f(s) =	26.9	Hz
Total Q	Q(ts) =	0.35	
Electrical Q	Q(es) =	0.39	
Mechanical Q	Q(ms) =	4.02	
Equivalent Volume	V(as) =	1.038	cu ft
Nominal Impedance	Z =	0	Ohms
DC Resistance	R(e) =	0	Ohms
Max Thermal Power	P(t) =	600	Watts
Max Linear Excursion	X(max) =	12.3	mm
Max Excursion	X(lim) =	0	mm
Voice Coil Diam.	D(vc) =	0	mm

Driver Notes:

NOTE: Reference Efficiency was calculated based on the 1W/1m sensitivity.

System Notes:

Box Parameters

System Type: **2nd Order Closed Box**

Box Volume	V(B) =	0.09651	cu ft
Closed Box Q	Q(tc) =	1.2	
System Resonance	F(sc) =	92.23	Hz
Compliance Ratio	alpha =	10.75	

System Parameters

No. of Drivers	N =	1	
Isobaric Factor	I =	1	(1=normal, 2=iso)
Input Power	P(in) =	1	Watts
SPL Distance	D =	1	m

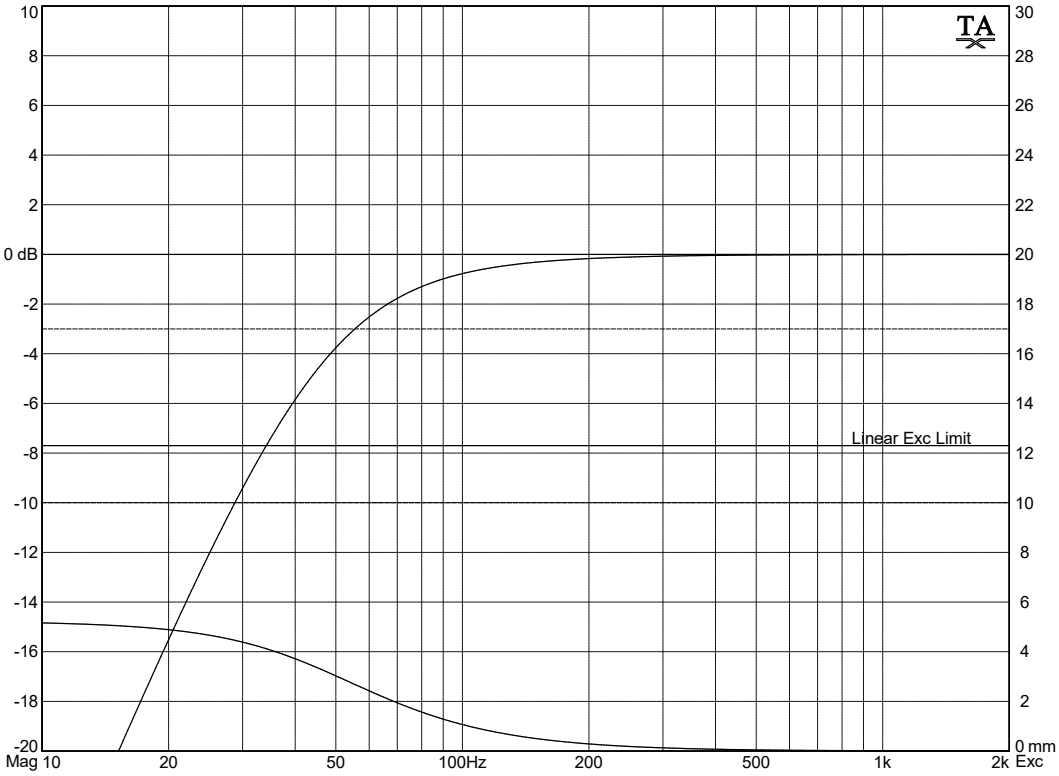
My Address, line 1
My Address, line 2
My Country My Phone

System Name:

2nd Order Closed Box

Designer: Cora Moyers
Title:

Rev Date: Rev:



Driver Parameters

Driver: **Dayton Audio RSS265HO-10**

Nominal Diameter	D =	0	in
Nominal Power	P =	0	Watts
Sensitivity (1W/1m)	SPL =	87.2	dB SPL
Free Air Resonance	f(s) =	26.9	Hz
Total Q	Q(ts) =	0.35	
Electrical Q	Q(es) =	0.39	
Mechanical Q	Q(ms) =	4.02	
Equivalent Volume	V(as) =	1.038	cu ft
Nominal Impedance	Z =	0	Ohms
DC Resistance	R(e) =	0	Ohms
Max Thermal Power	P(t) =	600	Watts
Max Linear Excursion	X(max) =	12.3	mm
Max Excursion	X(lim) =	0	mm
Voice Coil Diam.	D(vc) =	0	mm

Driver Notes:

NOTE: Reference Efficiency was calculated based on the 1W/1m sensitivity.

System Notes:

Box Parameters

System Type: **4th Order Vented Box**

Box Volume	V(B) =	0.5	cu ft
Closed Box Q	Q(tc) =	0.6139	
Box Frequency	F(B) =	0	Hz
Min Rec Vent Area	S(vMin) =	0	sq in
Vent Surface Area	S(v) =	0	sq in
Vent Length	L(v) =	0	in
Compliance Ratio	alpha =	2.076	
Box Loss Q	Q(B) =	7	

System Parameters

No. of Drivers	N =	1	
Isobaric Factor	I =	1	(1=normal, 2=iso)
Input Power	P(in) =	100	Watts
SPL Distance	D =	1	m

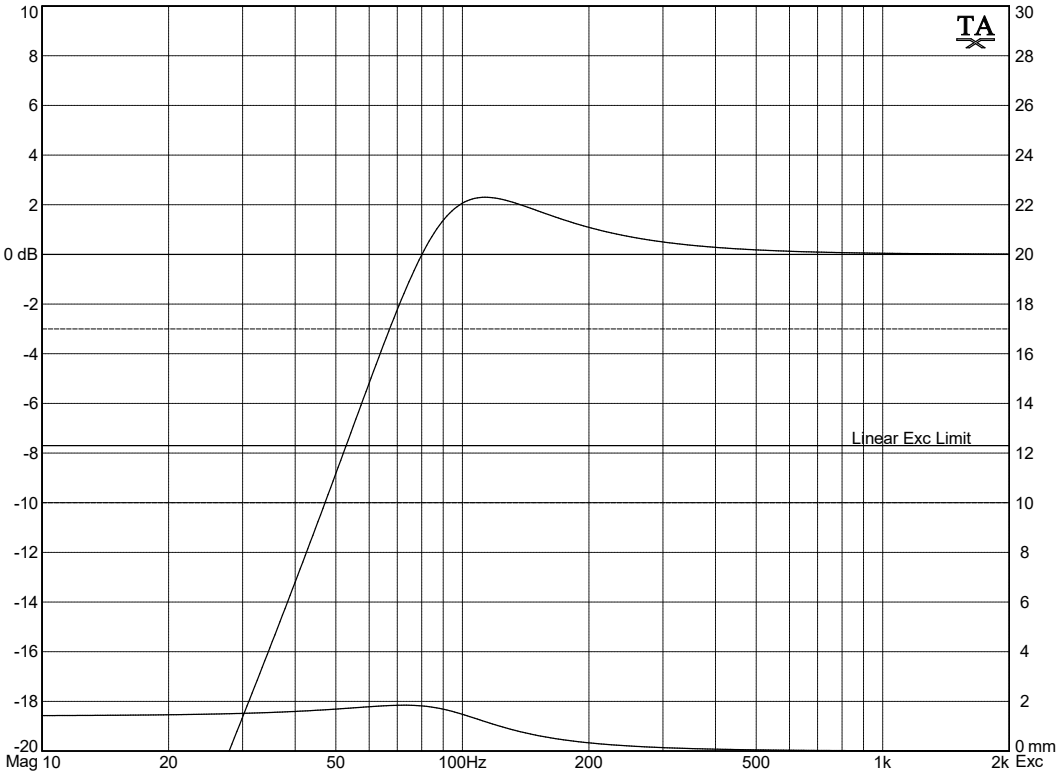
My Address, line 1
My Address, line 2
My Country My Phone

System Name:

4th Order Vented Box

Designer: Cora Moyers
Title:

Rev Date: Rev:



Driver Parameters

Driver: **Dayton Audio** **RSS265HO-10**

Nominal Diameter	D =	0	in
Nominal Power	P =	0	Watts
Sensitivity (1W/1m)	SPL =	87.2	dB SPL
Free Air Resonance	f(s) =	26.9	Hz
Total Q	Q(ts) =	0.35	
Electrical Q	Q(es) =	0.39	
Mechanical Q	Q(ms) =	4.02	
Equivalent Volume	V(as) =	1.038	cu ft
Nominal Impedance	Z =	0	Ohms
DC Resistance	R(e) =	0	Ohms
Max Thermal Power	P(t) =	600	Watts
Max Linear Excursion	X(max) =	12.3	mm
Max Excursion	X(lim) =	0	mm
Voice Coil Diam.	D(vc) =	0	mm

Driver Notes:

NOTE: Reference Efficiency was calculated based on the 1W/1m sensitivity.

System Notes:

Box Parameters

System Type: **4th Order Vented Box**

Box Volume	V(B) =	0.1	cu ft
Closed Box Q	Q(tc) =	1.181	
Box Frequency	F(B) =	0	Hz
Min Rec Vent Area	S(vMin) =	0	sq in
Vent Surface Area	S(v) =	0	sq in
Vent Length	L(v) =	0	in
Compliance Ratio	alpha =	10.38	
Box Loss Q	Q(B) =	7	

System Parameters

No. of Drivers	N =	1	
Isobaric Factor	I =	1	(1=normal, 2=iso)
Input Power	P(in) =	100	Watts
SPL Distance	D =	1	m

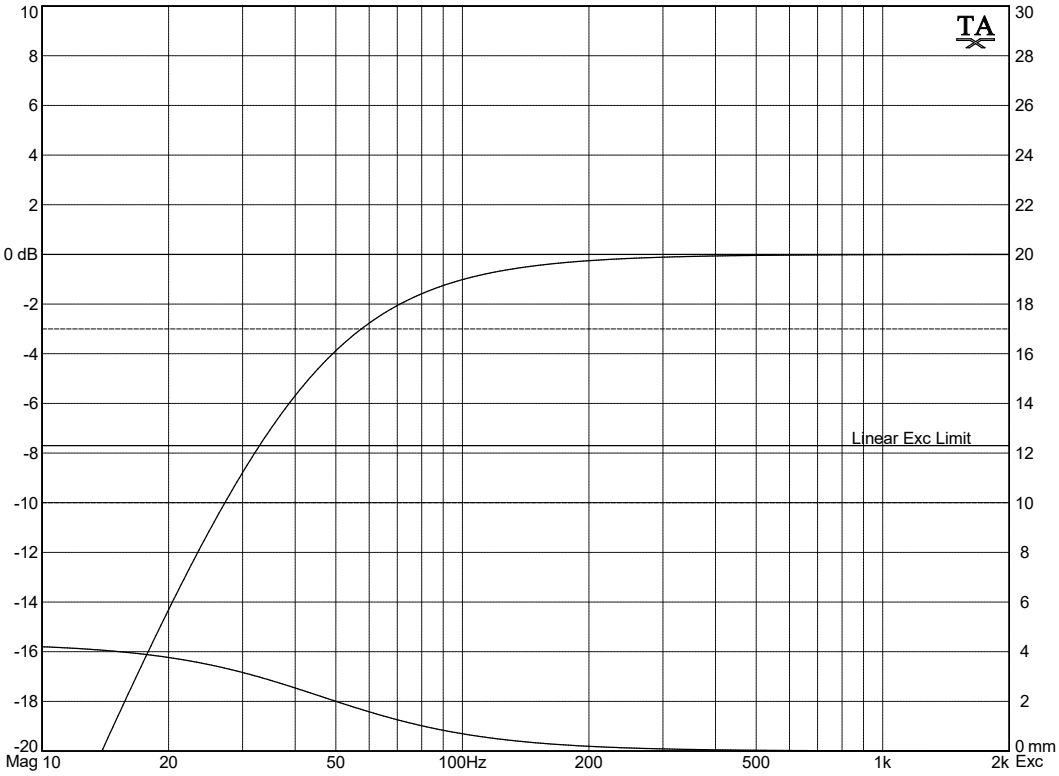
My Address, line 1
My Address, line 2
My Country My Phone

System Name:

4th Order Vented Box

Designer: Cora Moyers
Title:

Rev Date: Rev:



Driver Parameters

Driver: **Dayton Audio** **RSS265HO-10**

Nominal Diameter	D =	0	in
Nominal Power	P =	0	Watts
Sensitivity (1W/1m)	SPL =	87.2	dB SPL
Free Air Resonance	f(s) =	26.9	Hz
Total Q	Q(ts) =	0.35	
Electrical Q	Q(es) =	0.39	
Mechanical Q	Q(ms) =	4.02	
Equivalent Volume	V(as) =	1.038	cu ft
Nominal Impedance	Z =	0	Ohms
DC Resistance	R(e) =	0	Ohms
Max Thermal Power	P(t) =	600	Watts
Max Linear Excursion	X(max) =	12.3	mm
Max Excursion	X(lim) =	0	mm
Voice Coil Diam.	D(vc) =	0	mm

Driver Notes:

NOTE: Reference Efficiency was calculated based on the 1W/1m sensitivity.

System Notes:

Box Parameters

System Type: **4th Order Vented Box**

Box Volume	V(B) =	0.7	cu ft
Closed Box Q	Q(tc) =	0.5515	
Box Frequency	F(B) =	0	Hz
Min Rec Vent Area	S(vMin) =	0	sq in
Vent Surface Area	S(v) =	0	sq in
Vent Length	L(v) =	0	in
Compliance Ratio	alpha =	1.483	
Box Loss Q	Q(B) =	7	

System Parameters

No. of Drivers	N =	1	
Isobaric Factor	I =	1	(1=normal, 2=iso)
Input Power	P(in) =	45	Watts
SPL Distance	D =	1	m

My Address, line 1
My Address, line 2
My Country My Phone

System Name:

4th Order Vented Box

Designer: Cora Moyers
Title:

Rev Date: Rev: