



**Eighteen Sound  
a AEB S.r.l. Company**

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## Application Note #6:

# **Building an effective, high power, single 21", Band-Pass subwoofer.**

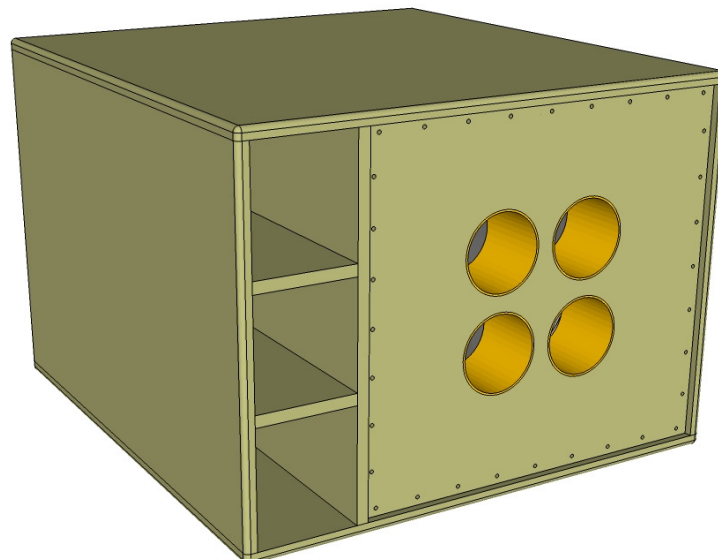
Eighteen Sound Technical Department  
July, 2008

# 21" Band-Pass Subwoofer kit

- High performance 21" subwoofer system.
- Double Reflex Band-Pass design for high output, extended low frequency response
- Over damped design for better transient response.
- Compact box dimension.
- Large vent section area for air turbulence and port compression reduction.
- Easy to build design
- Internal bracing for cabinet loss reducing

•**21LW1400** woofer key features:

- 4" interleaved sandwich voice coil
- High motor strength driver, ideally suited for high loading use
- 800W continuous pink noise, 7000W peak power
- Reinforced paper cone for high mechanical strenght
- Double Silicon Spider
- Double Demodulating Rings



# 21" Band-Pass Subwoofer kit

## 21LW1400



### THIELE SMALL PARAMETERS

Fs	28 Hz
Re	5 Ohm
Sd	0,1662 sq.mt. (257,6 sq.in.)
Qms	9,32
Qes	0,242
Qts	0.235
Vas	385 lt. (13,6 cuft)
Mms	296 gr. (0,65 lb)
BL	33,5 Tm
Linear Mathematical Xmax (9)	± 9,5 mm (± 0,37 in)
Le (1kHz)	2,85 mH
Ref. Efficiency 1W@1m (half space)	98,0 dB

### MOUNTING INFORMATIONS

Overall diameter	545 mm (21,46 in)
N. of mounting holes	8
Mounting holes diameter	10 mm (0,39 in)
Bolt circle diameter	520 mm (20,47 in)
Front mount baffle cutout ø	492 mm (19,37 in)
Rear mount baffle cutout ø	490 mm (19,29 in)
Total depth	256,3 mm (10,1 in)
Flange and gasket thickness	14 mm (0,55 in)
Net weight	19,2 kg (42,38 lb)
Shipping weight	20,6 kg (45,47 lb)
CardBoard Packaging dimensions	550 x 550 x 300 mm (21,65 x 21,65 x 11,8 in)

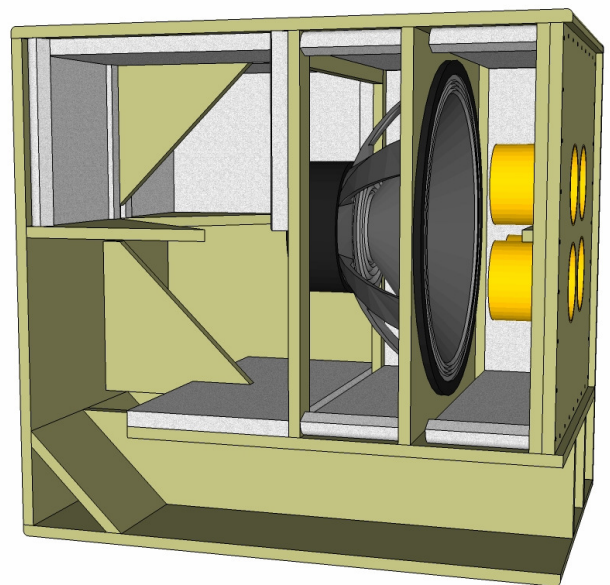
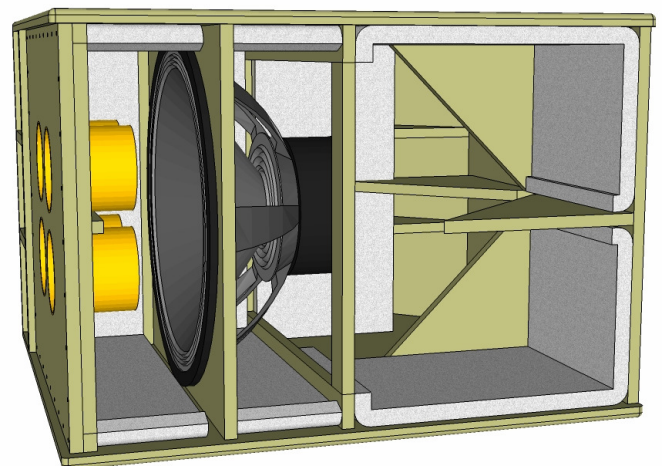
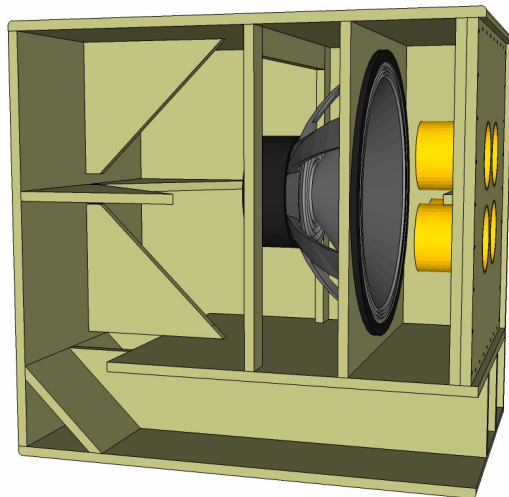
### GENERAL SPECIFICATIONS

NOMINAL DIAMETER	533 mm (21 in)
RATED IMPEDANCE	8 Ohm
CONTINUOUS PINK NOISE (1)	1500 W
CONTINUOUS POWER (2)	800 W
PROGRAM POWER (3)	1600 W
PEAK POWER (4)	7000 W
SENSITIVITY (5)	99 dB
FREQUENCY RANGE (6)	24 - 2000 Hz
POWER COMPRESSION @-10DB (7)	(80 W) 0,6 dB
POWER COMPRESSION @-3DB	(400 W) 1,5 dB
POWER COMPRESSION @FULL POWER	(800 W) 2,2 dB

# 21" Band-Pass Subwoofer kit

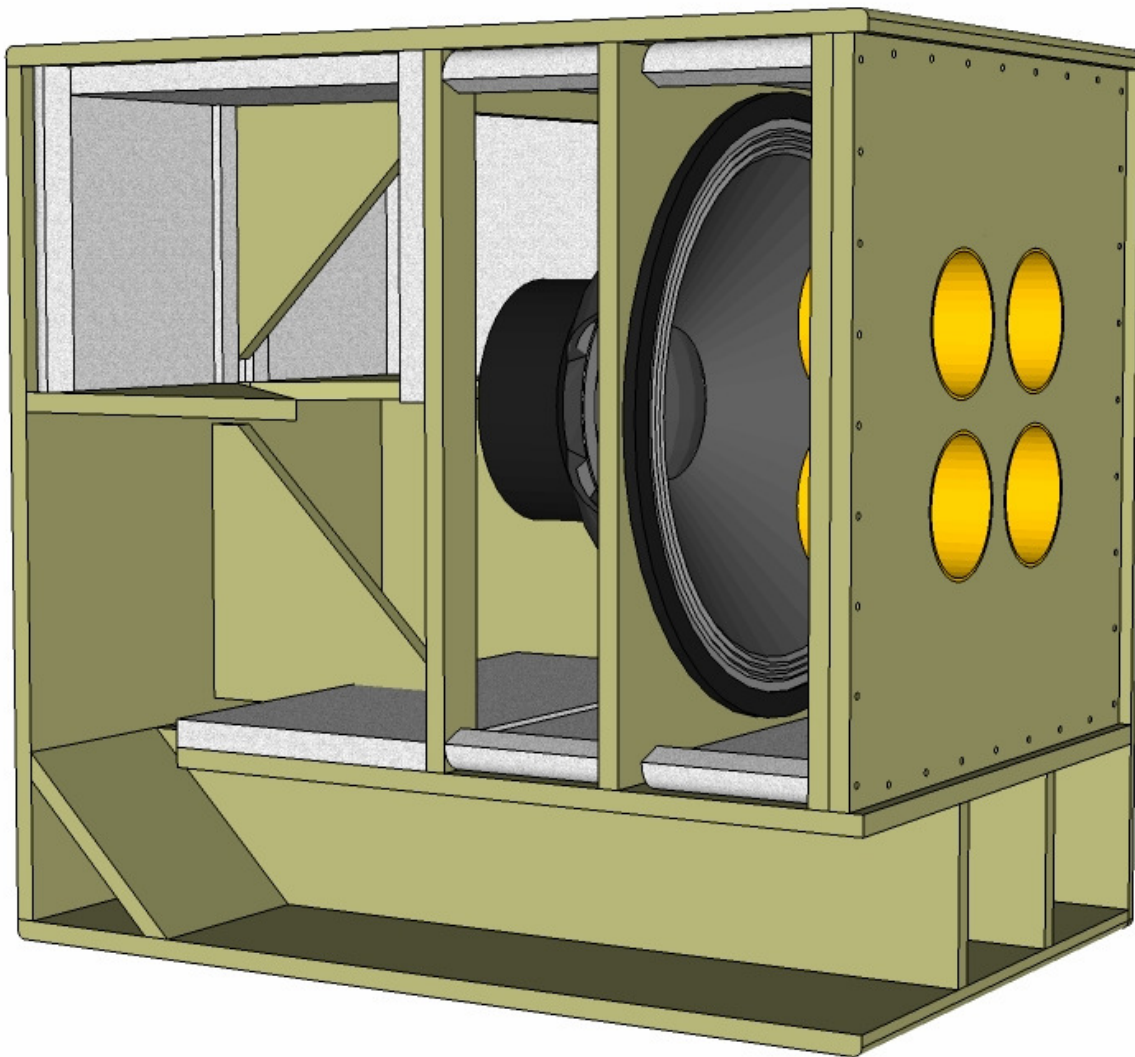
- The enclosure should be made of baltic birch plywood (18mm thickness).
- It should be used M4 and M6 bolts, proper length must be chosen: M6 is appropriate for speaker and M4 is suitable for frontal cover.
- Steel M4 and M6 T-Nuts are recommended.
- Handling, rigging and connectors are at user's choice. It's very important that their placement should not influence in any way the proper vent functionality.
- Accurate damping of the cabinet interior, as suggested in the pictures below, is highly recommended: high density synthetic fiber or Polyurethane foam should be used

## Internal view

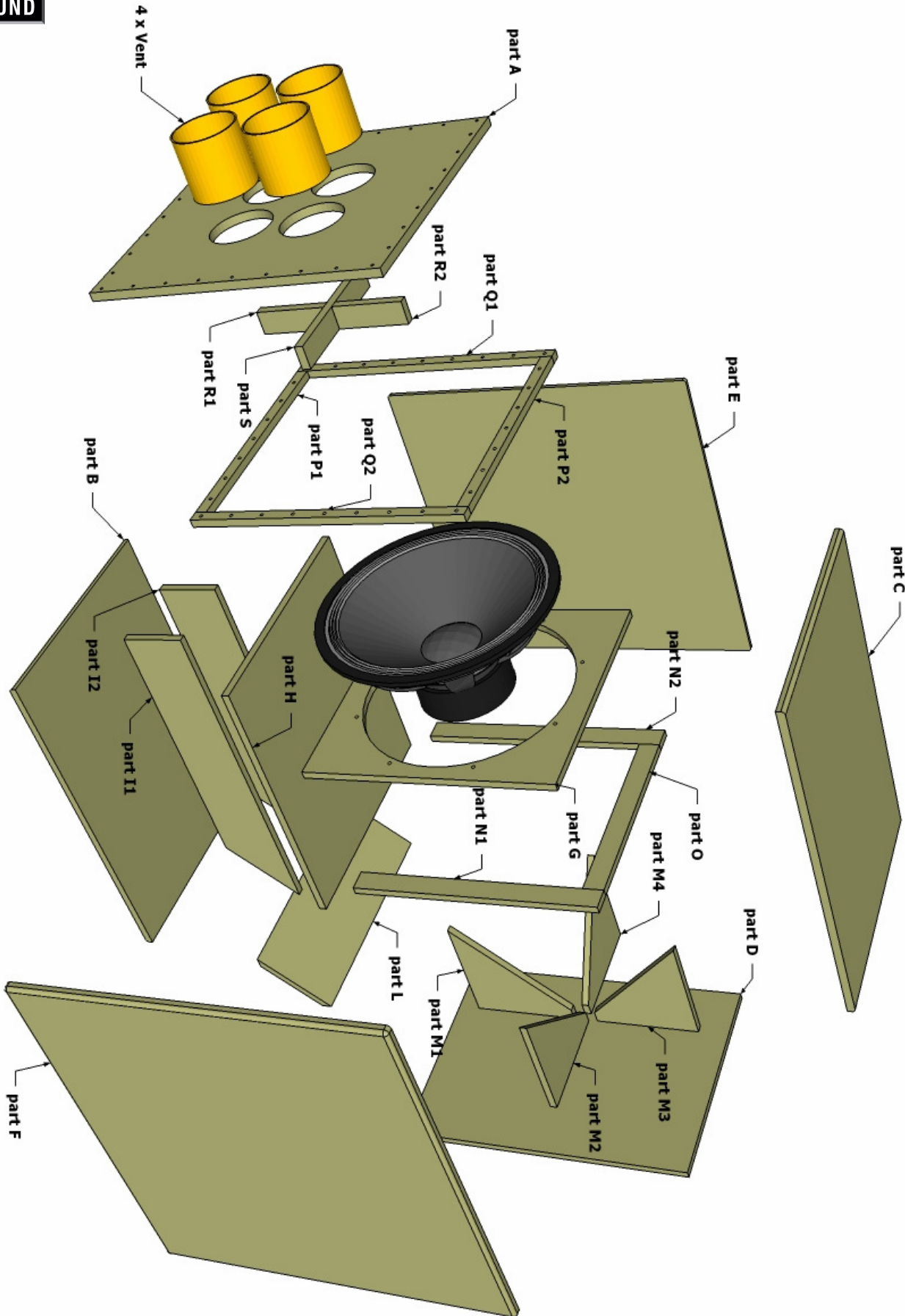


# 21" Band-Pass Subwoofer kit

## Internal View



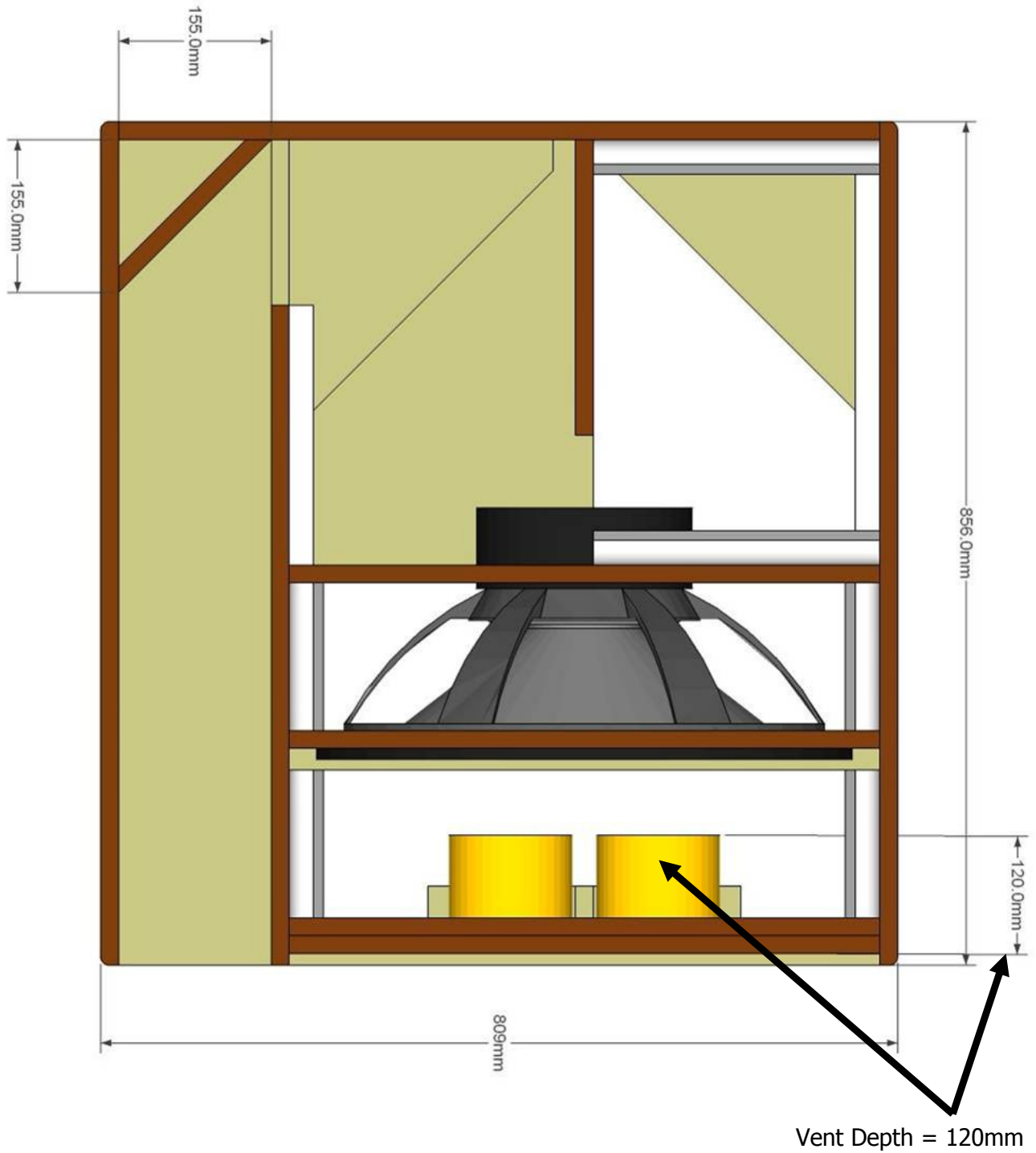
# 21" Band-Pass Subwoofer kit



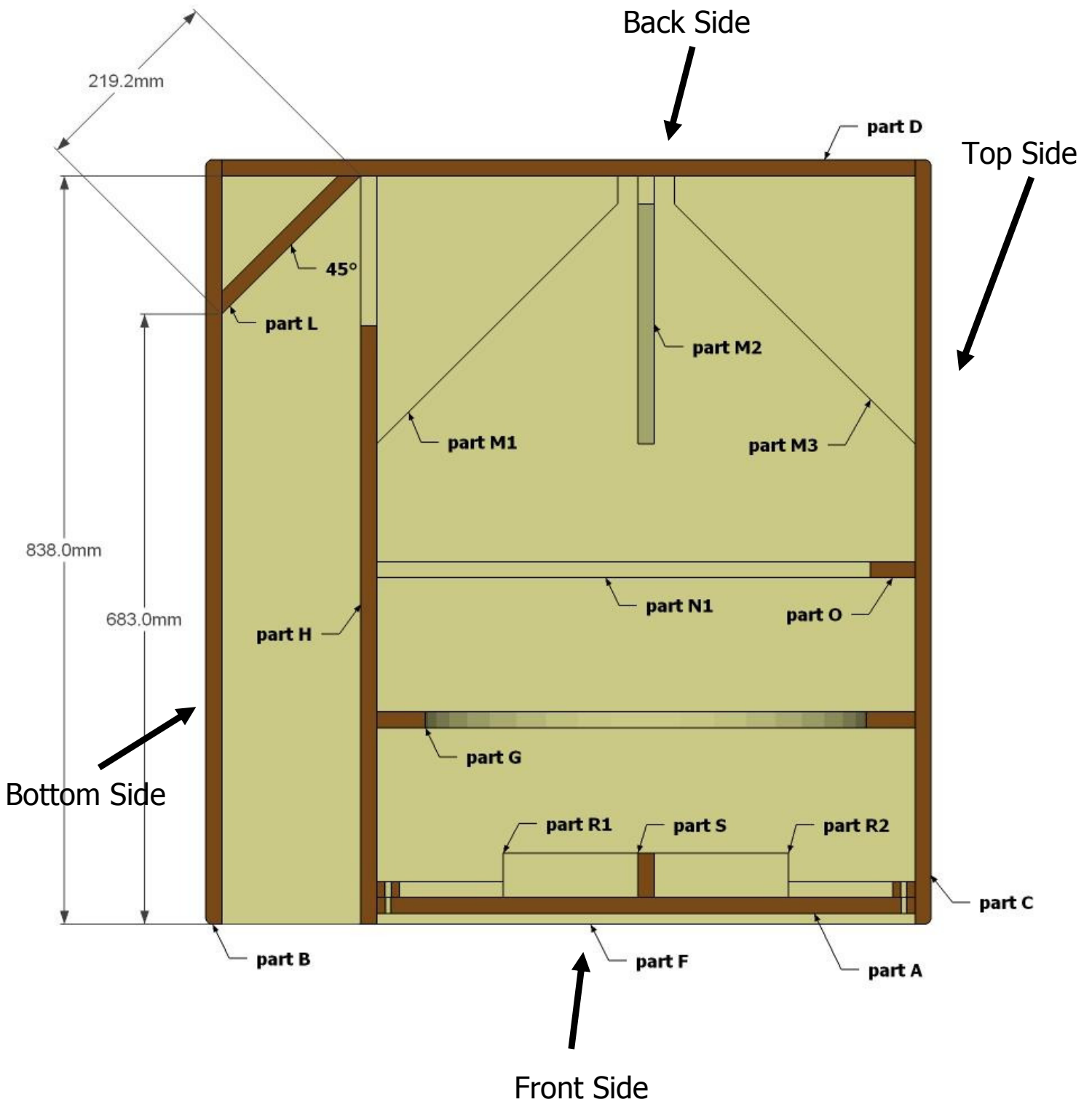
**Exploded view**

# 21" Band-Pass Subwoofer kit

## Side Section



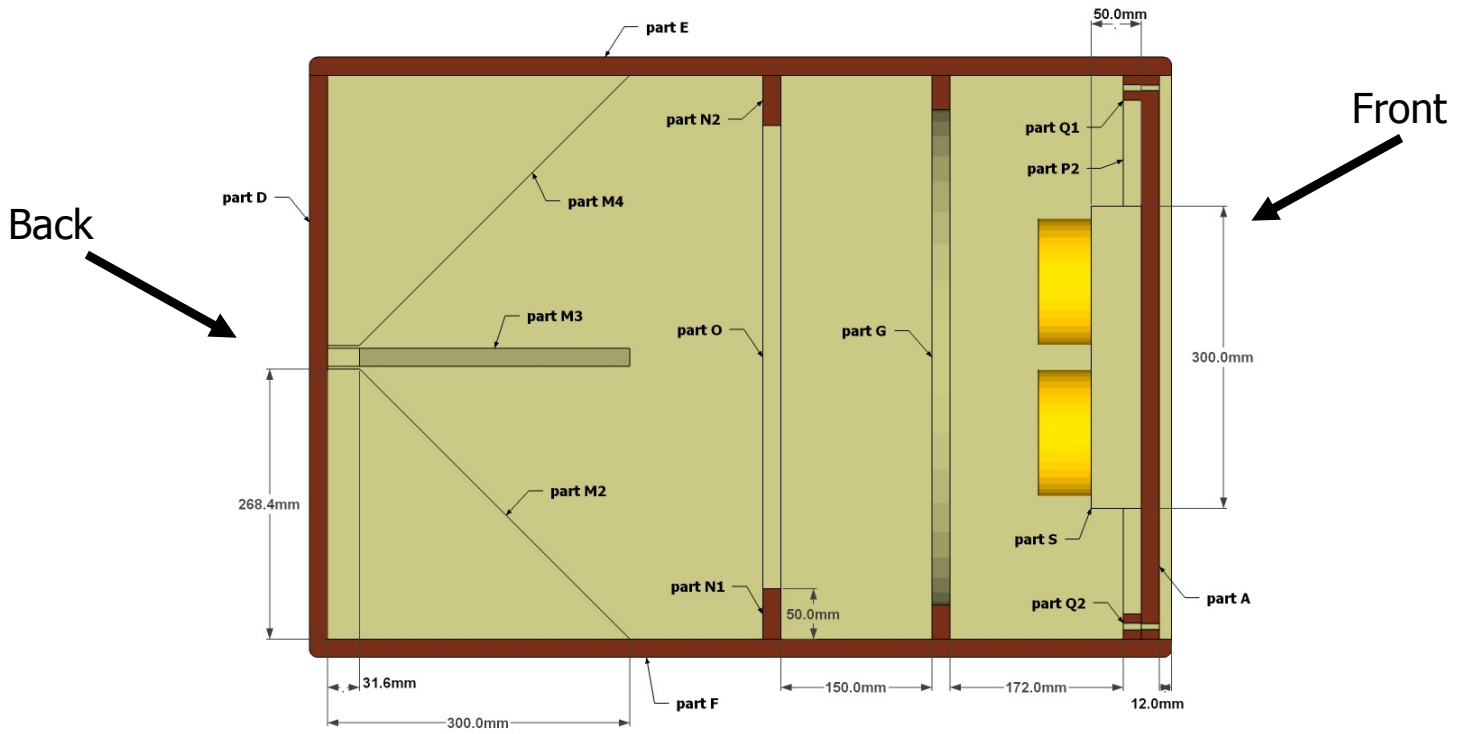
## Side Section



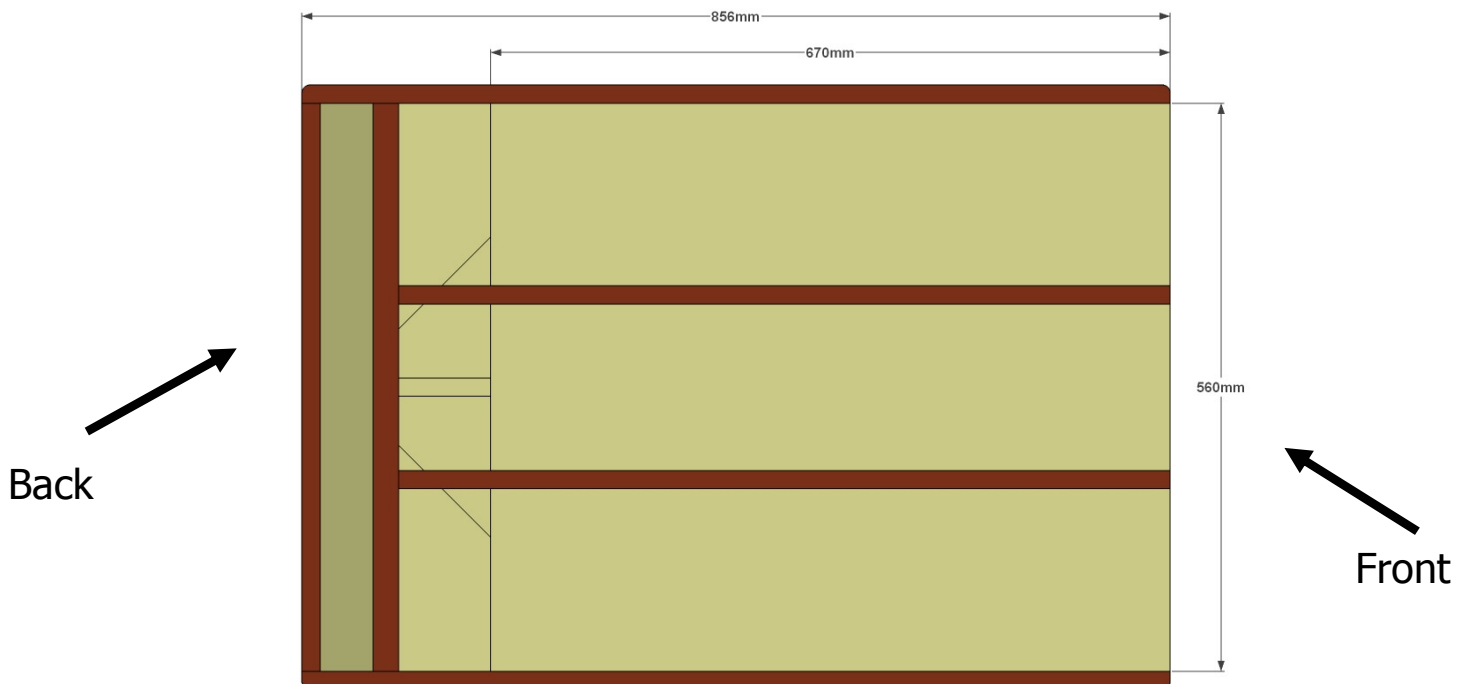


# 21" Band-Pass Subwoofer kit

## Top Section

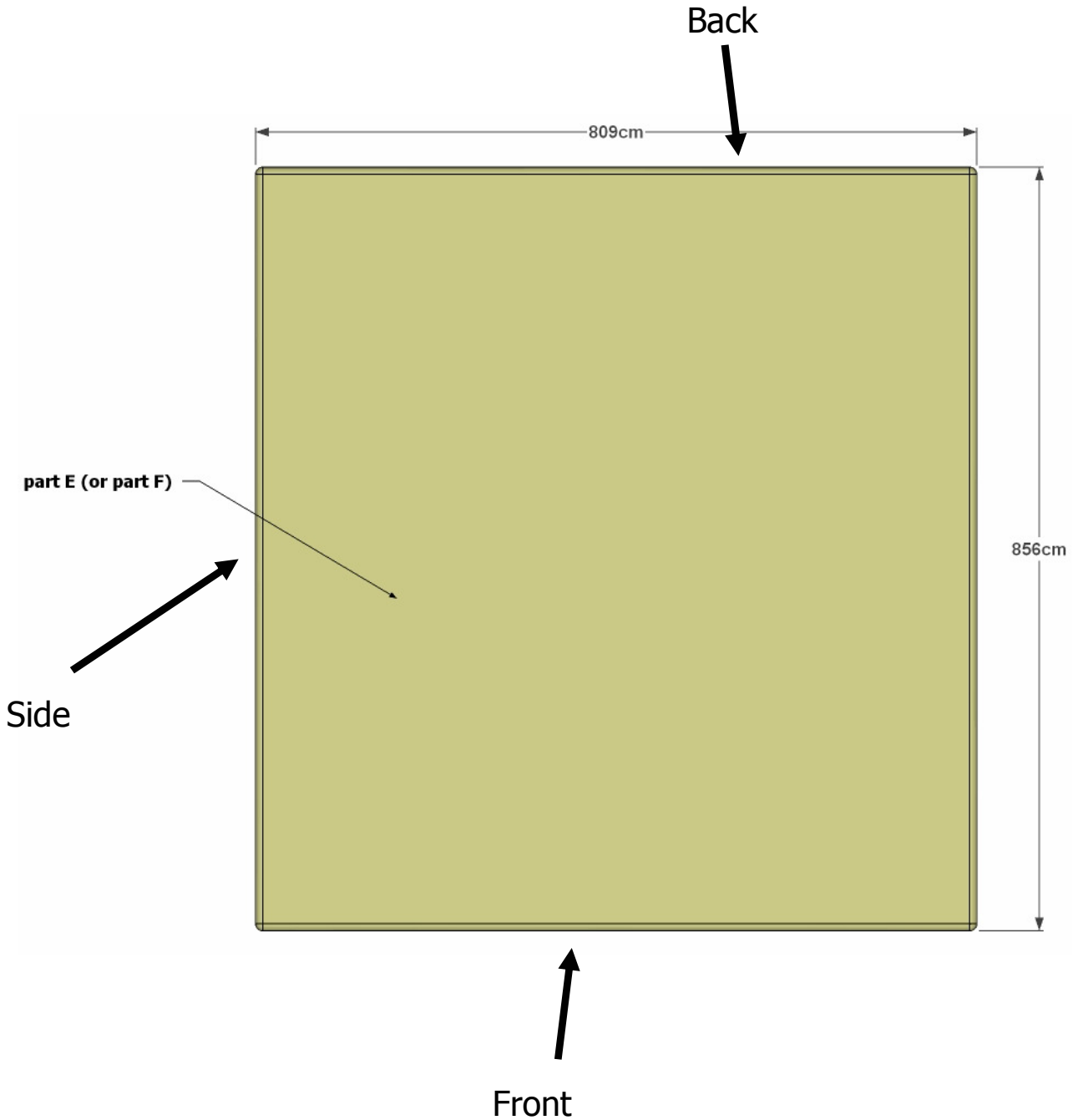


## Bottom Section



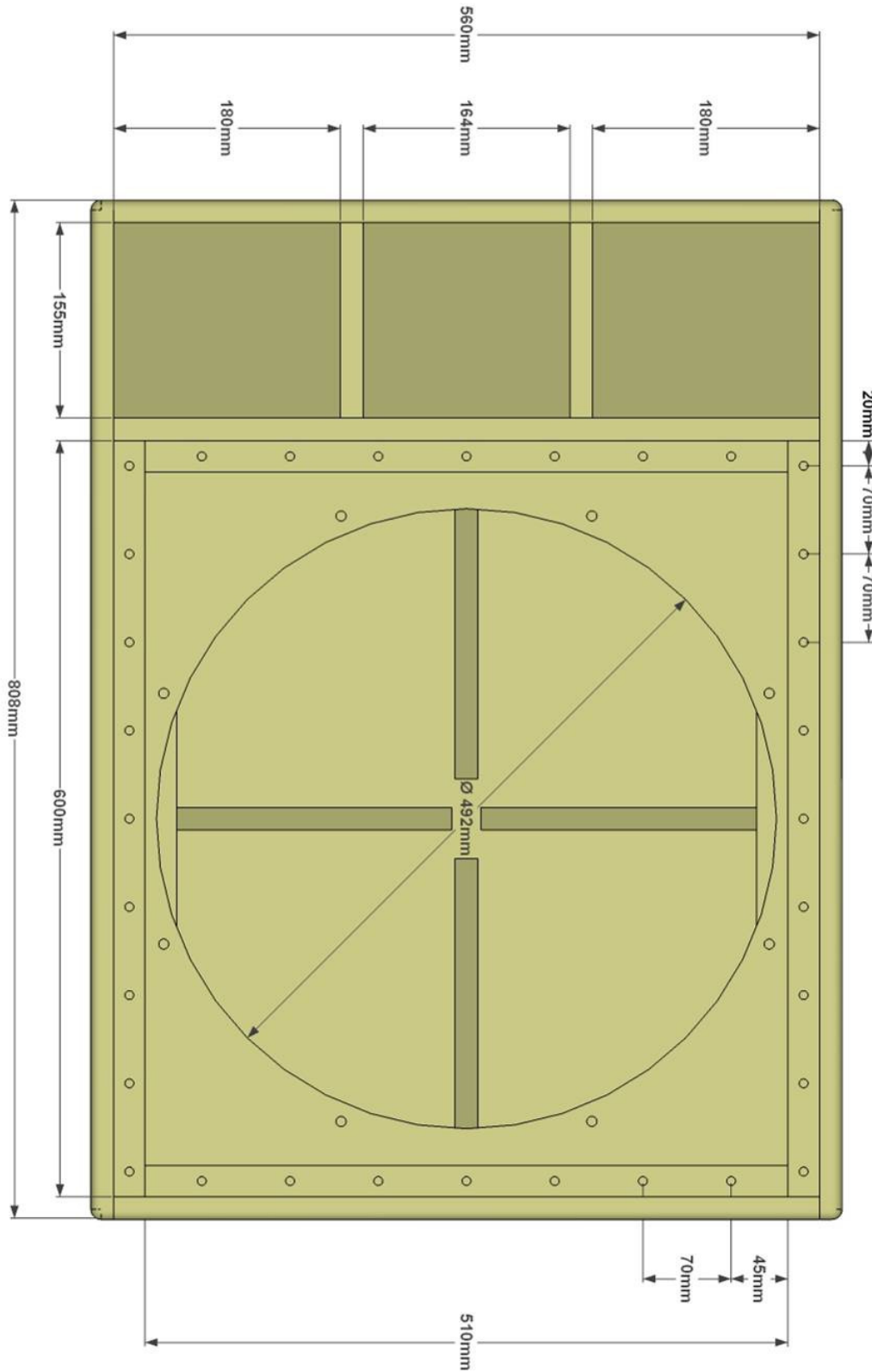
# 21" Band-Pass Subwoofer kit

## Top – Bottom view



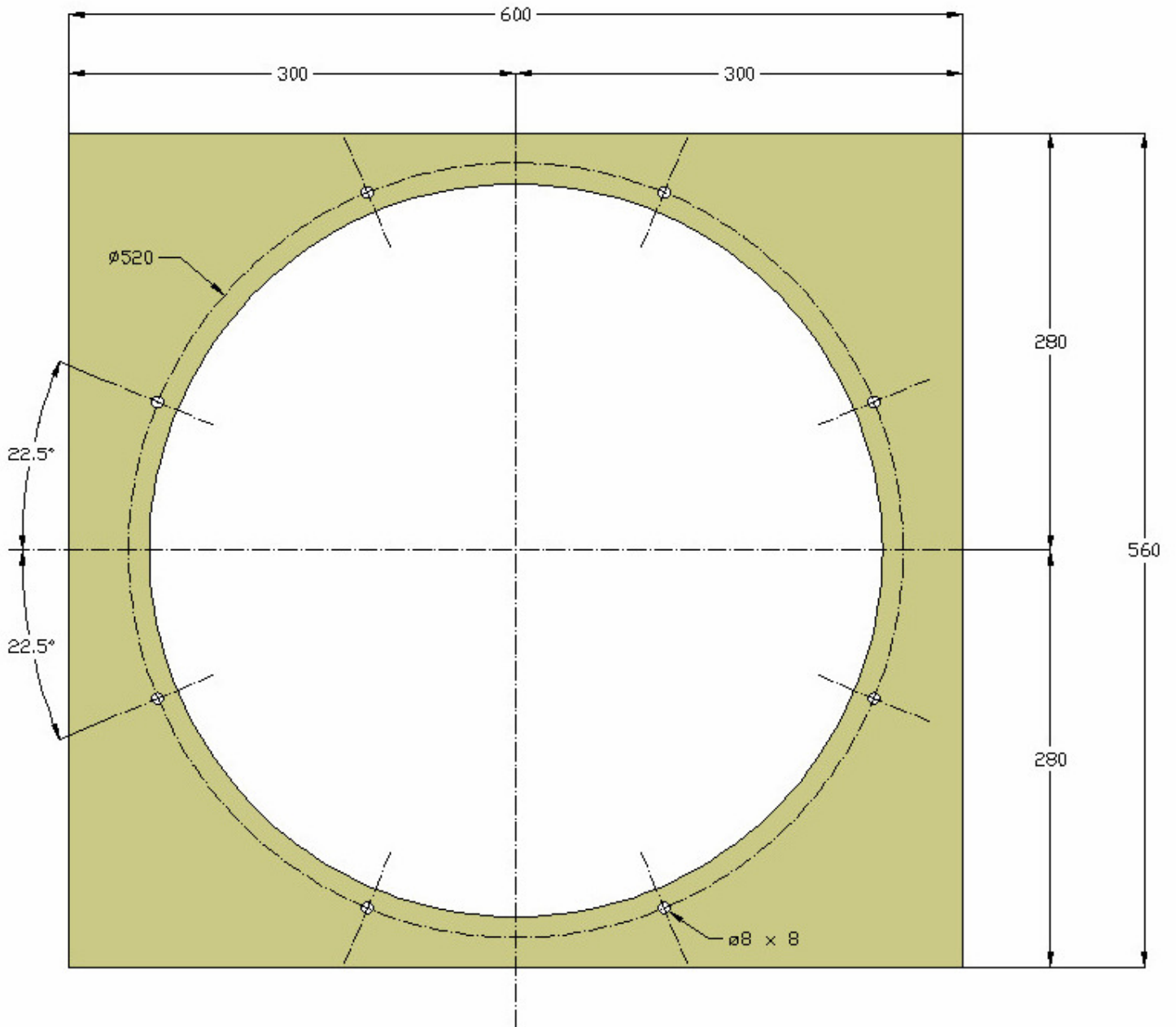
# 21" Band-Pass Subwoofer kit

## Front view

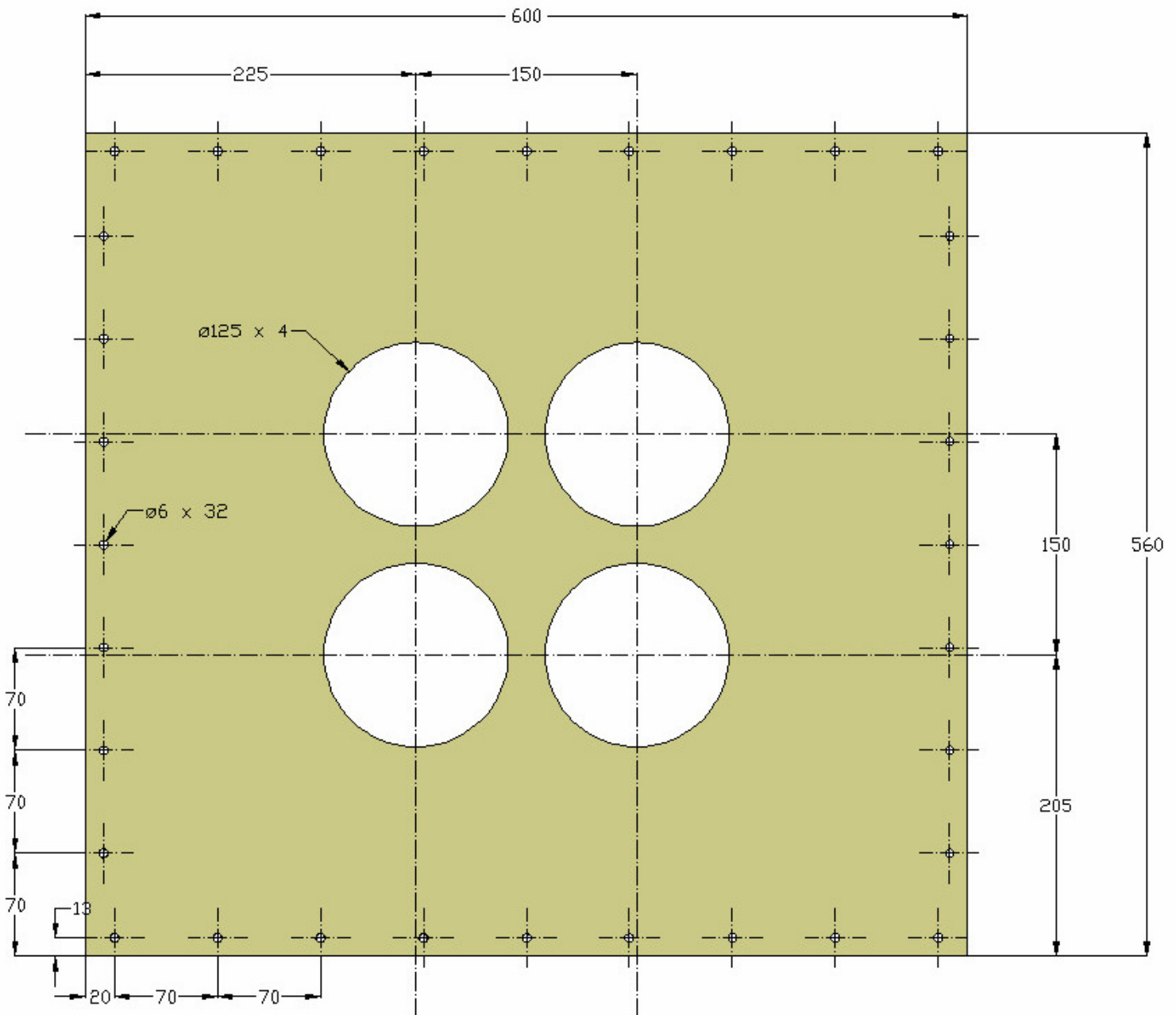


# 21" Band-Pass Subwoofer kit

## Front panel bolt holes



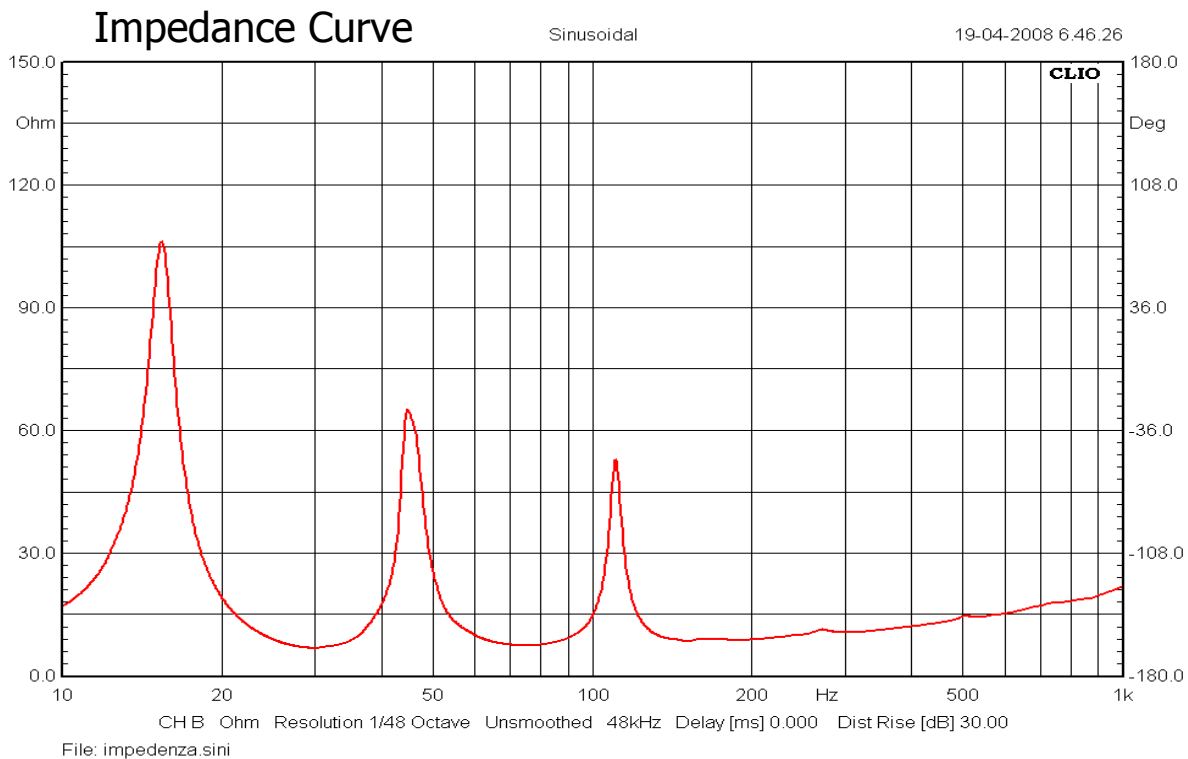
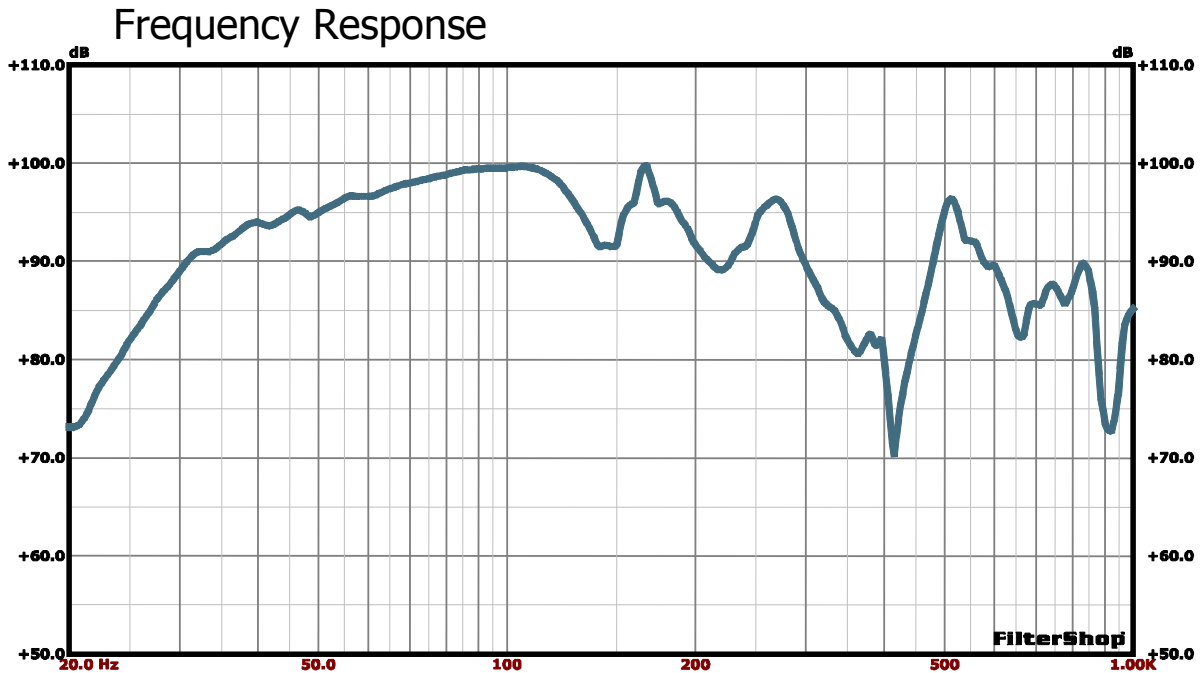
## Front panel bolt holes



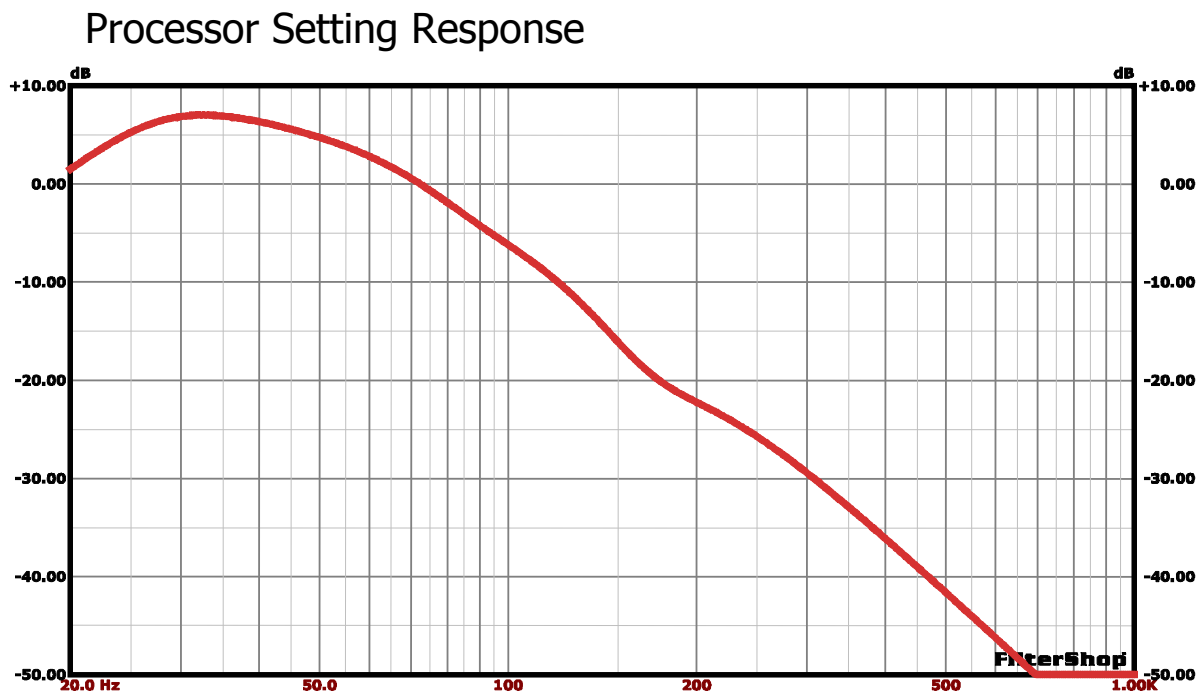
NOTE: The Vent can also be made with 5" Standard PVC Pipes (127mm). In this case, the 4 holes should be augmented to 127mm and the length should be increased of about 6mm.

# 21" Band-Pass Subwoofer kit

**Unfiltered Frequency Response, 2.83V/1m and relative Input Impedance Curve with 21LW1400 Loudspeaker**



## Processing Guidelines and Processor Response



### Necessary Processor Settings with 21LW1400 Loudspeaker

High pass: Butterworth **2nd** order, 12dB/Oct @ 28 Hz

Parametric EQ **Eq1:** F= 28 Hz - Gain= +5 dB - Q= 1.2

**Eq2:** F= 90 Hz - Gain= - 5 dB - Q= 1.5

**Eq3:** F= 170 Hz - Gain= - 5 dB - Q= 2

Low pass: Butterworth **3th** order, 18dB/Oct @ 85 Hz

Polarity: Positive (+)

Limiter: @ +10dBu, 100ms Atk. Time, X4 Release Time

Output Gain: + 5dB

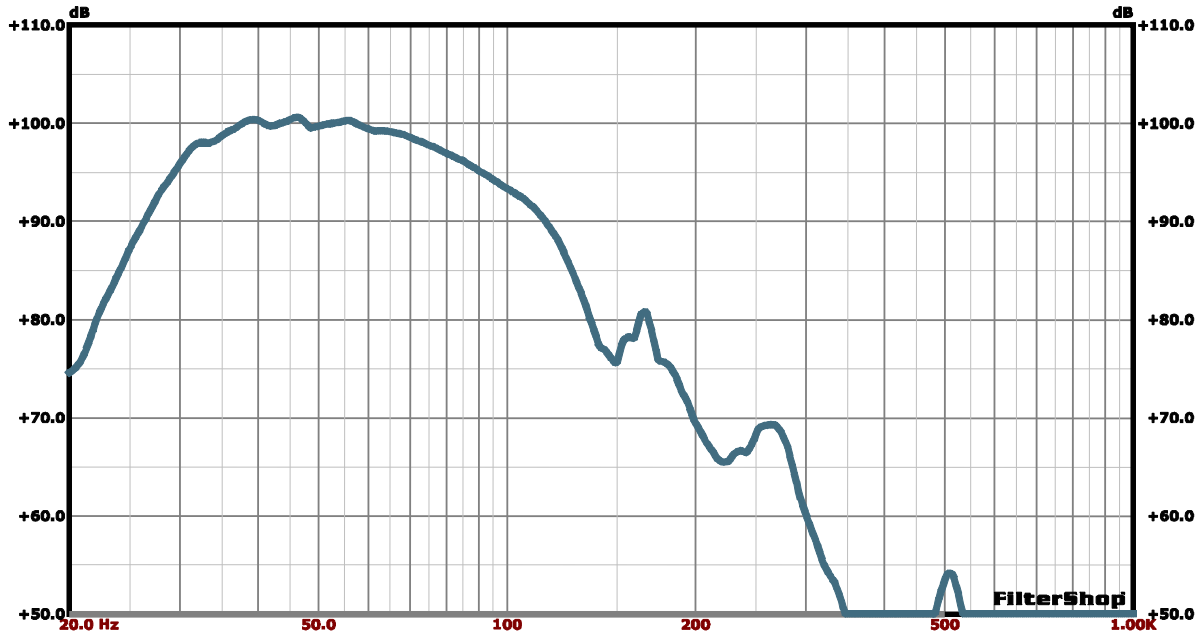
Processing Parameters Referred to XTA DP224/DP226/DP448 Processors

Required Amplifier for proper driving, approx.: 2000W @ 8 Ohm and Gain 32dB

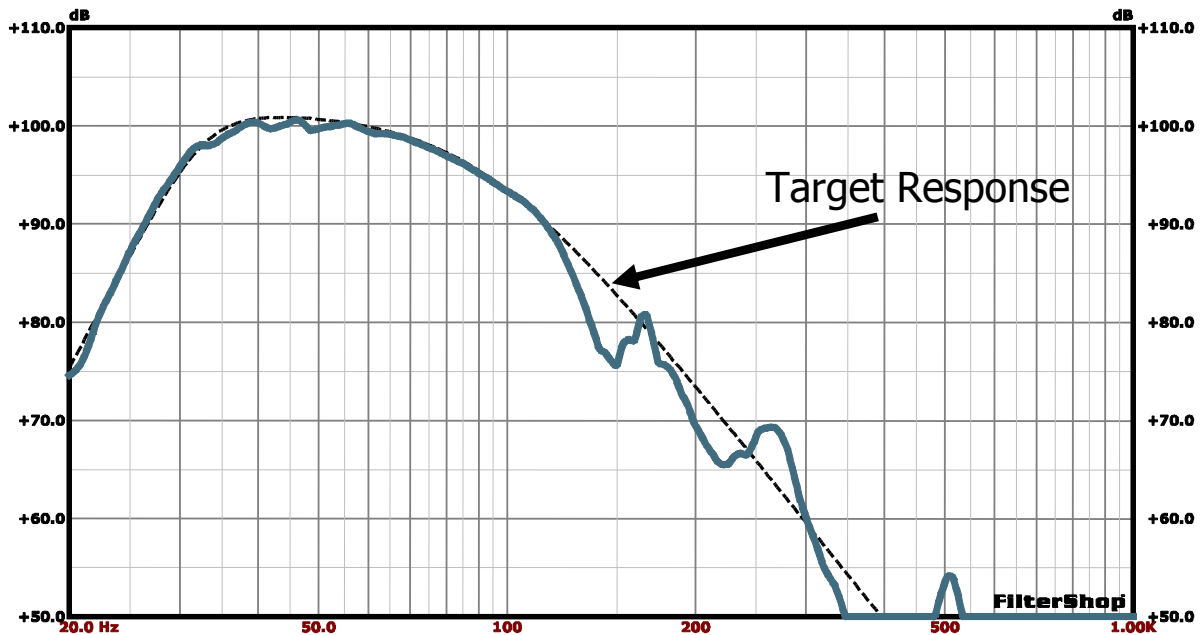
Gain and Limiter Values need to be properly adjusted if different gain amplifier is being used

## Processed Frequency Response

Processed Subwoofer Response



Processed Subwoofer Response with Target Response Matching



The Reference Target Response is an Acoustical Band-Pass Response of a total 10th order. High Pass=Butterworth 6th Order @ 34Hz, Low-Pass=Linkwitz-Riley 4th Order @ 100Hz