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## Application Note #6:

# **Building an effective high power single 21" subwoofer**

Eighteen Sound Technical Department  
July, 2008

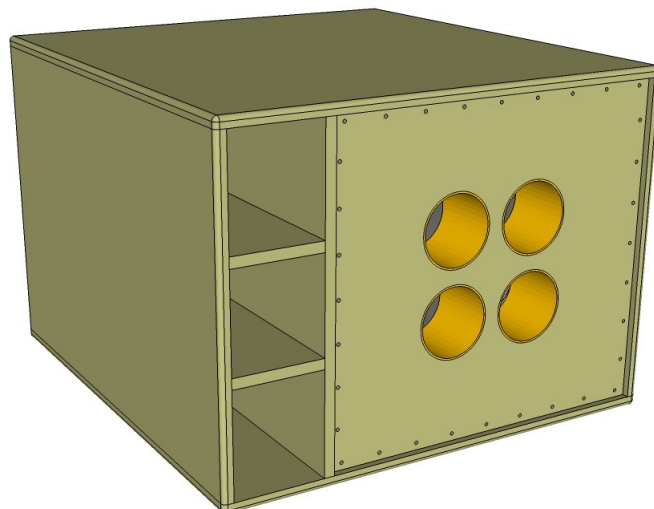
## 21" Subwoofer kit

- 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
- 1500W continuous pink noise, 7000W peak power
- Reinforced paper cone for high mechanical strength
- Double Silicon Spider
- Double Demodulating Rings



# 21" 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)

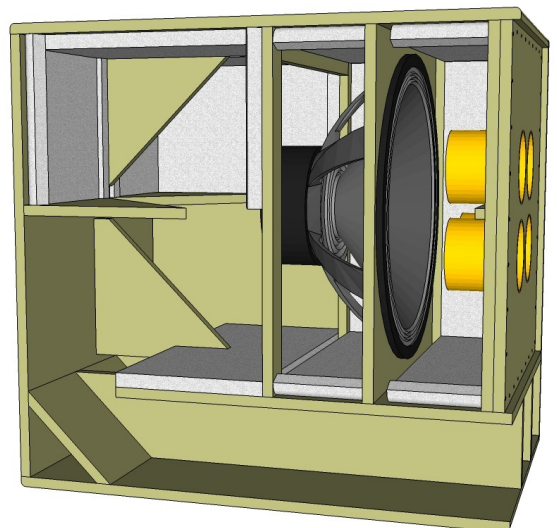
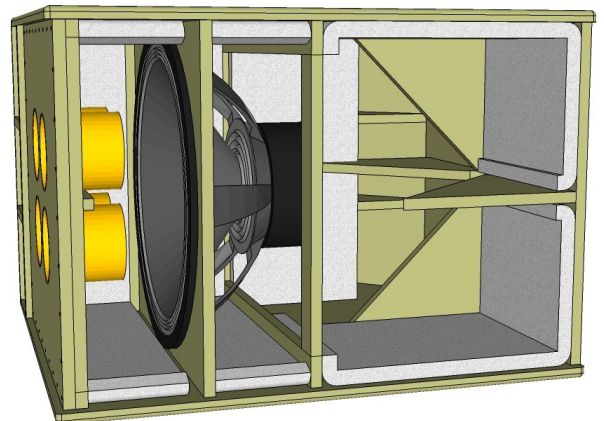
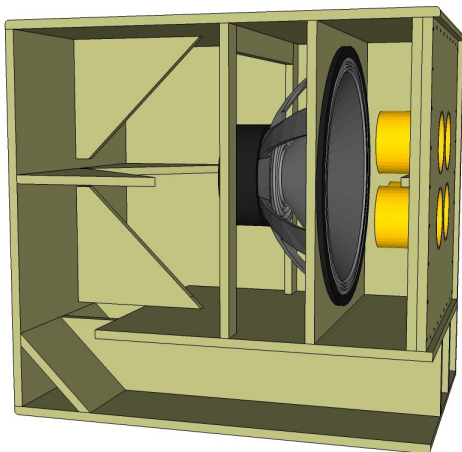
### GENERAL SPECIFICATIONS

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

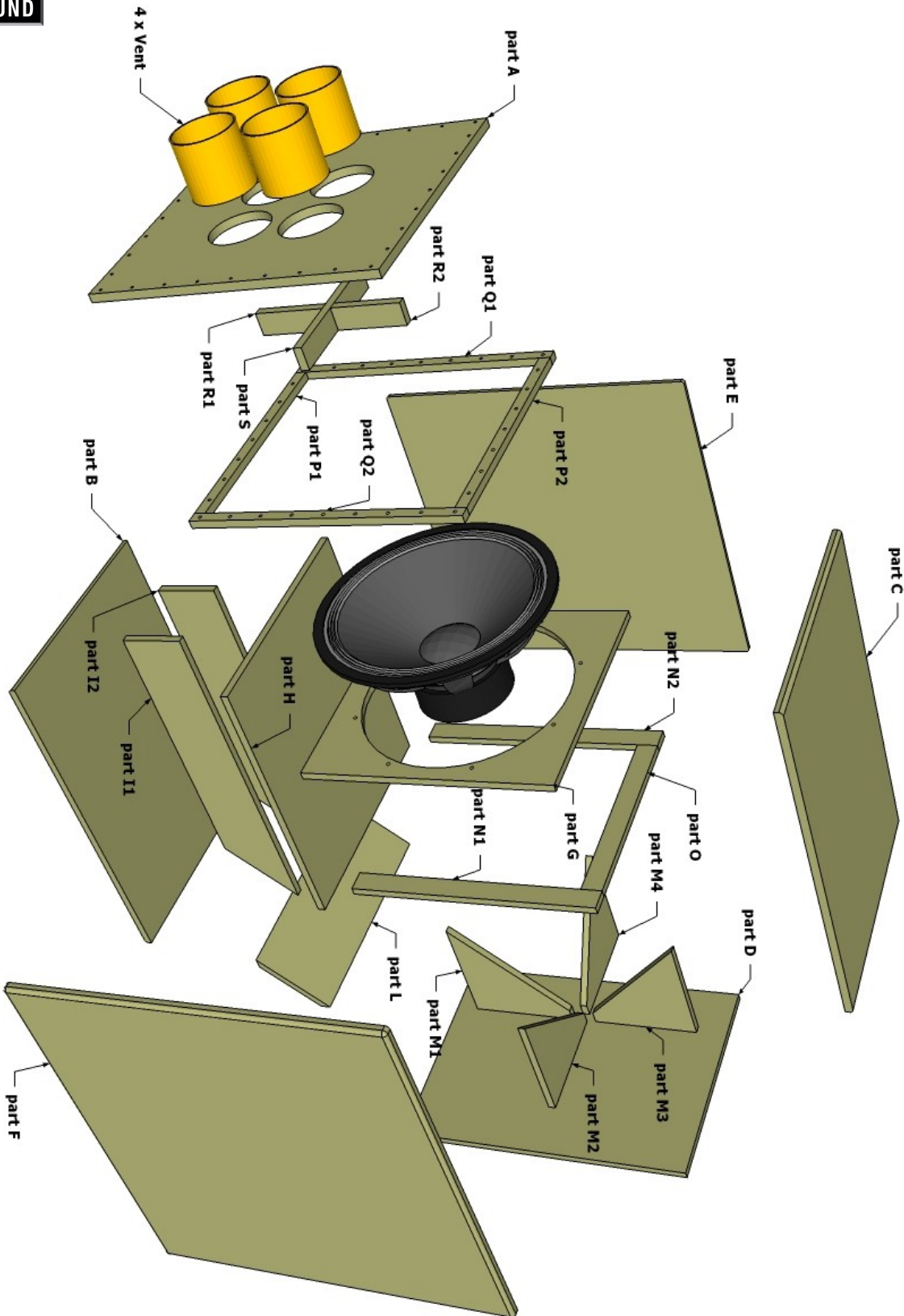
## 21" Subwoofer kit

- The enclosure should be made of baltic birch plywood (18mm thickness).
- M4 and M6 bolts should be used; 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

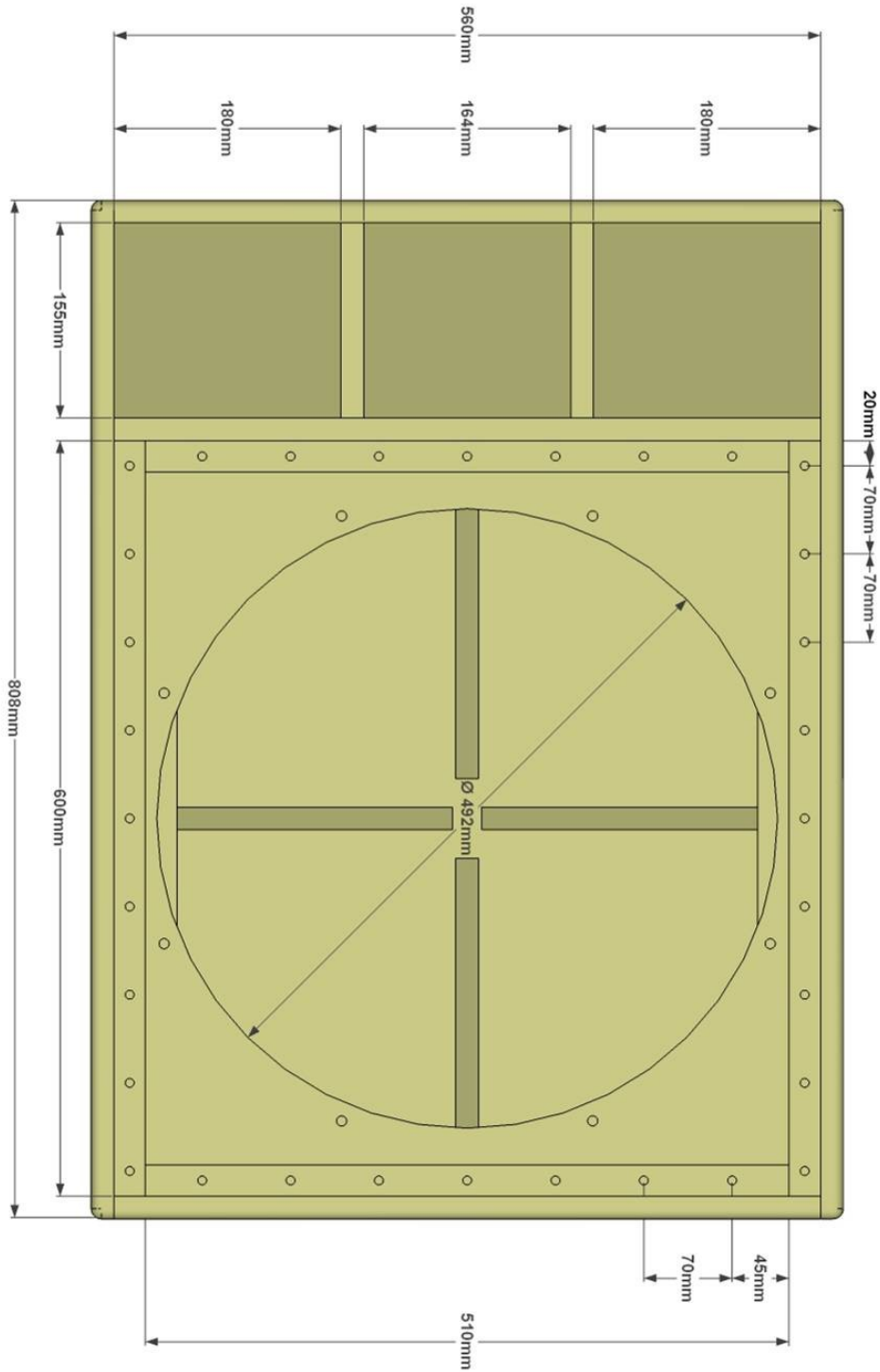


# 21" Subwoofer kit

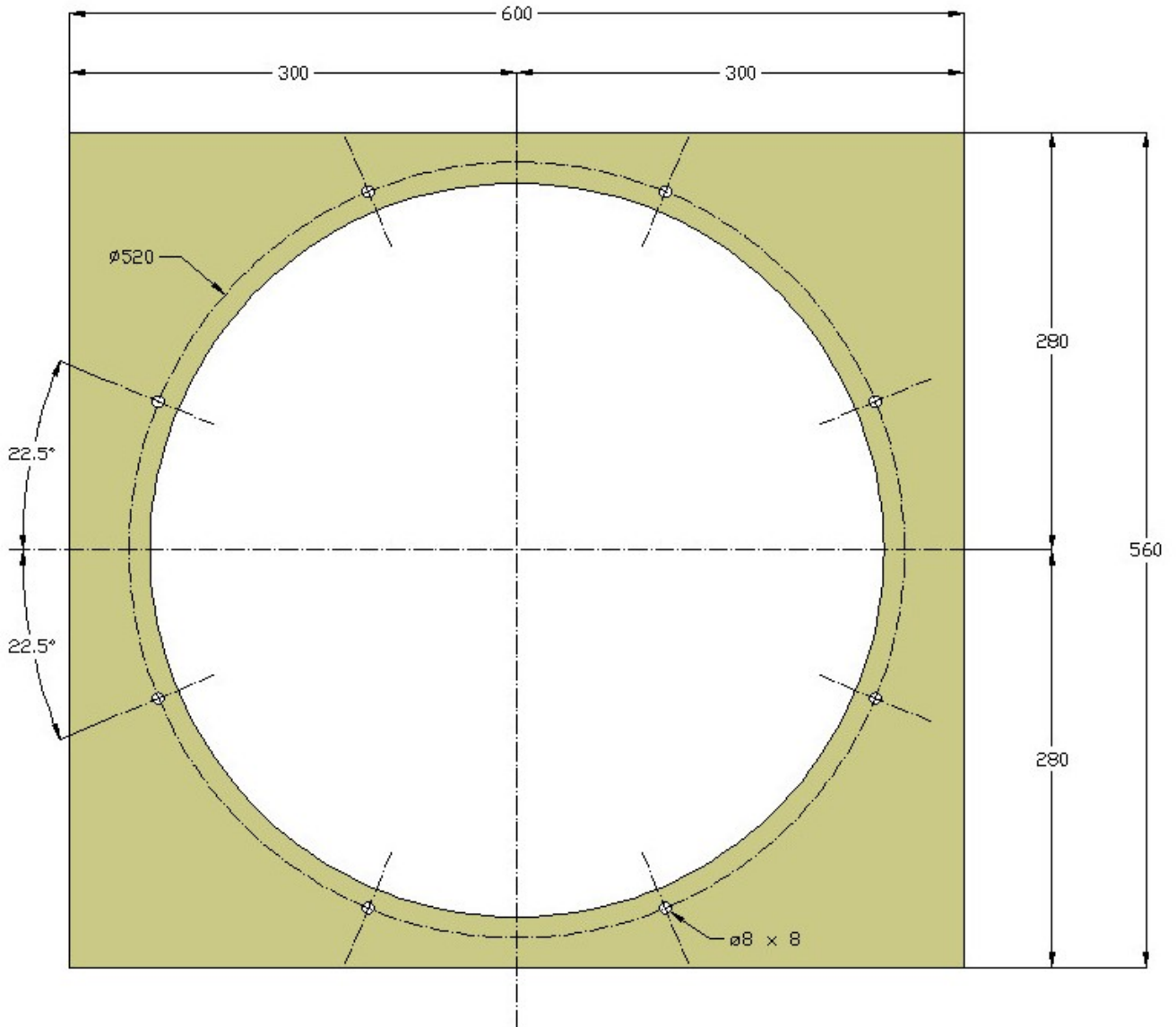


Exploded view

## Front view



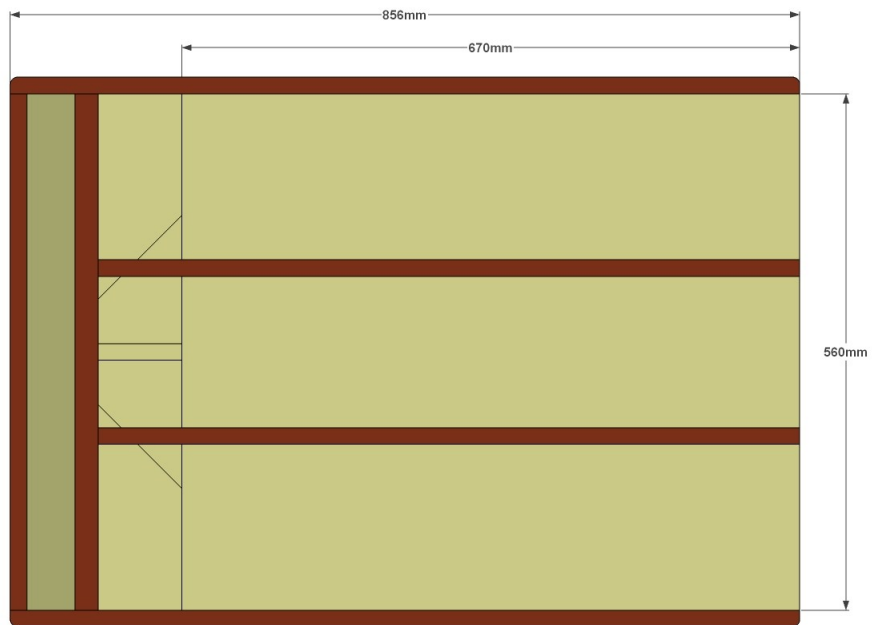
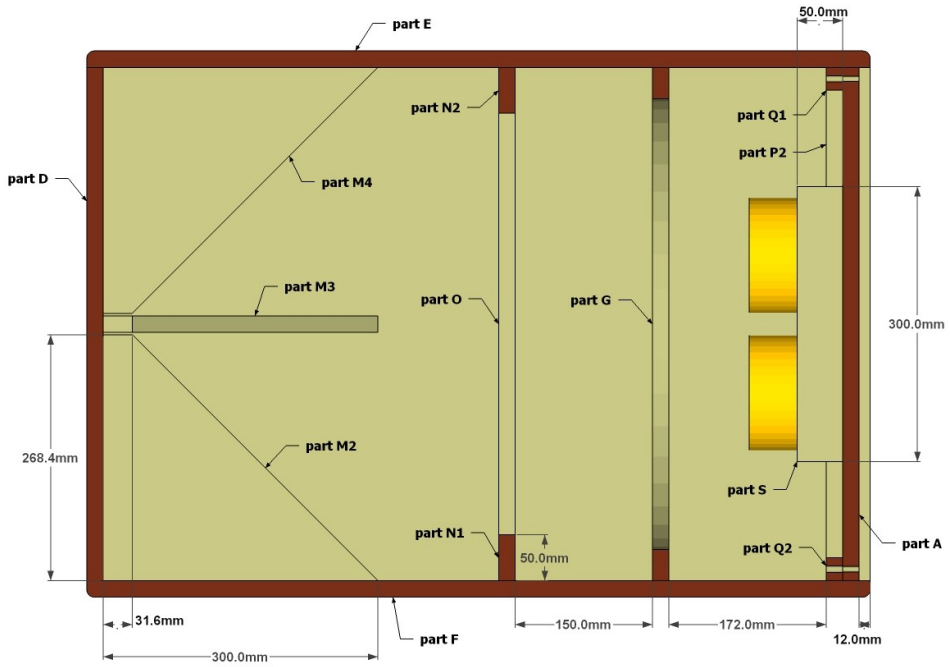
## Front panel bolt holes



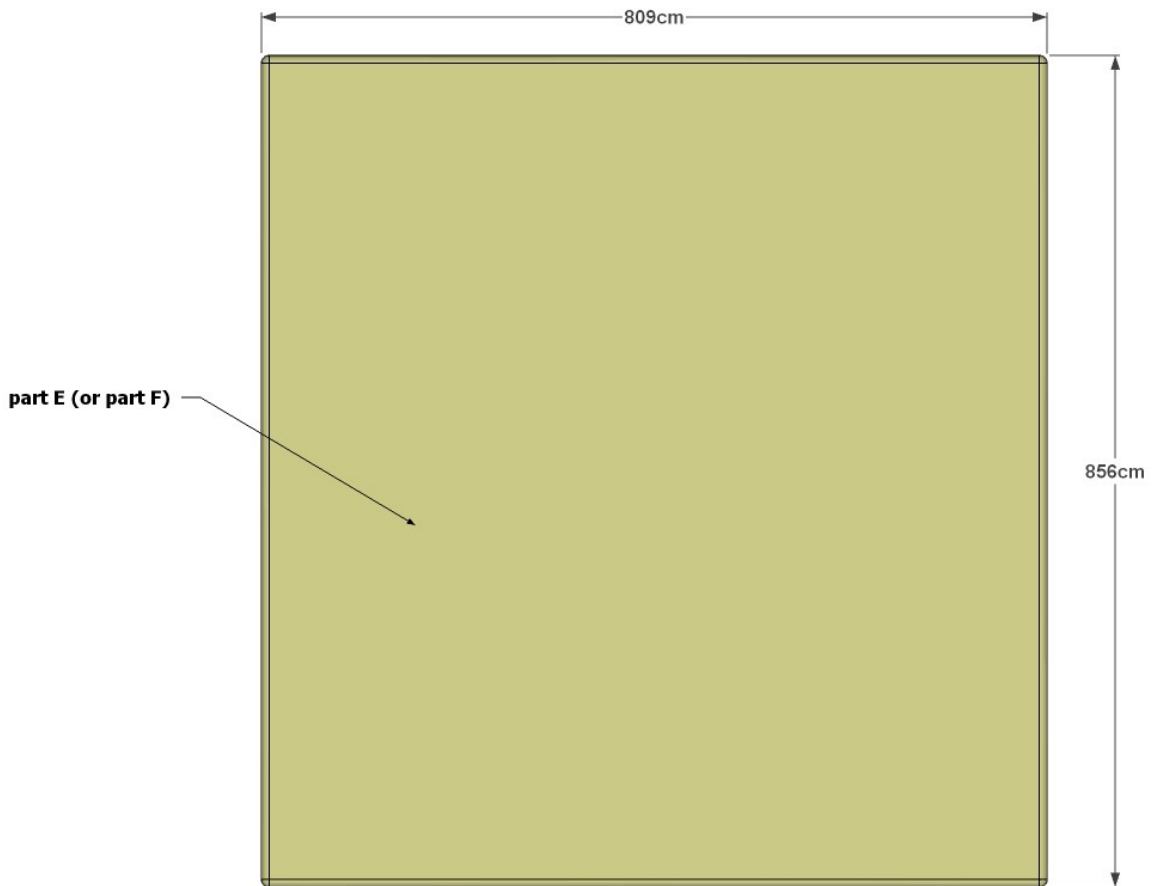




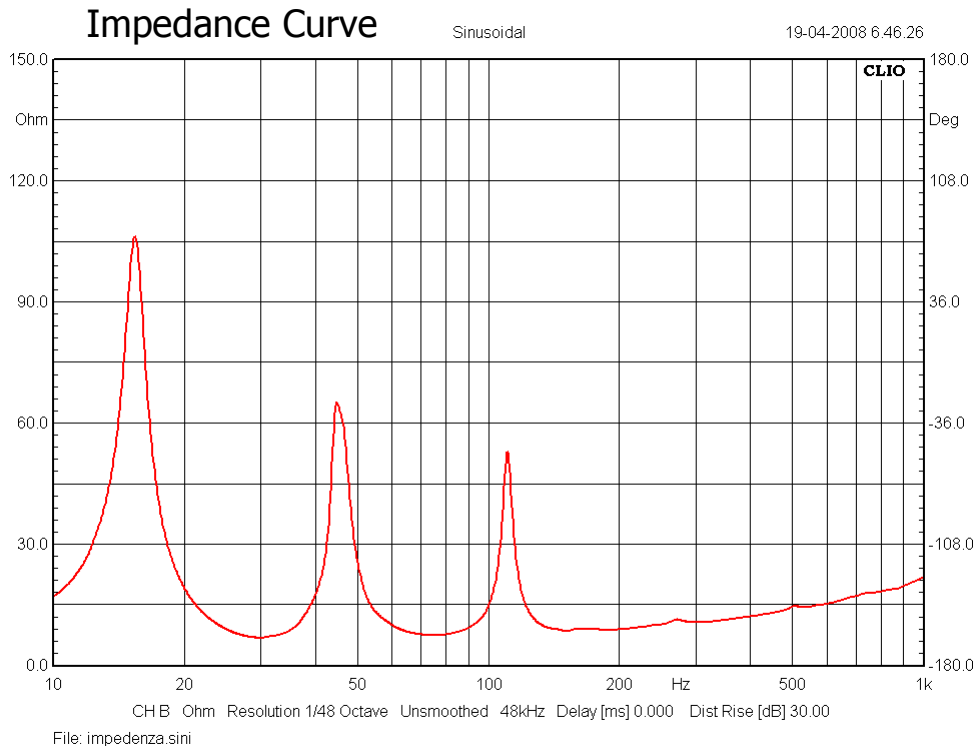
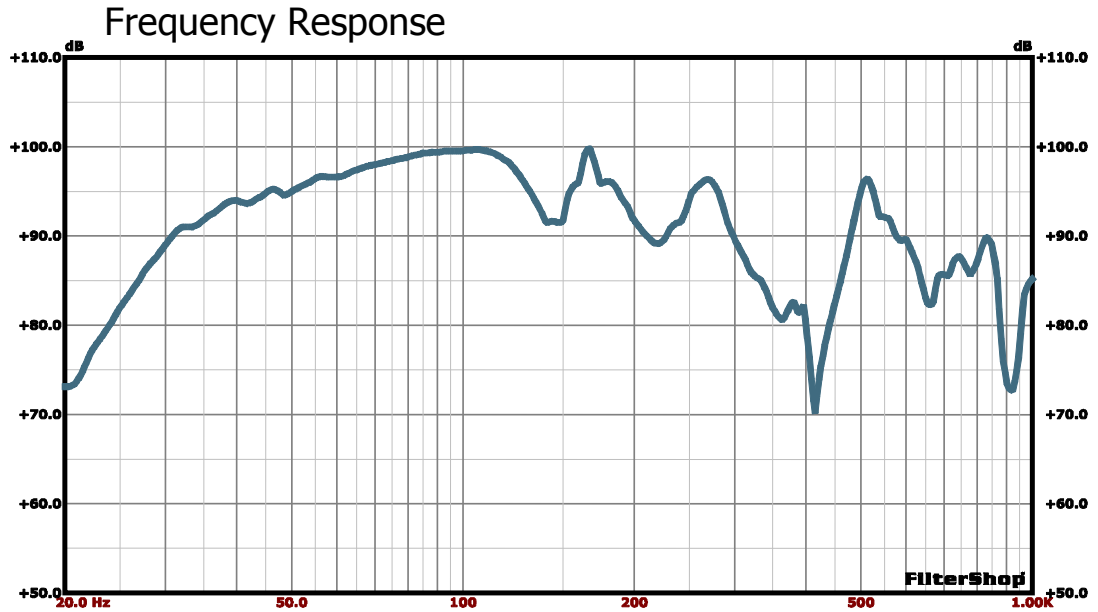
## Side section



## Top – Bottom view

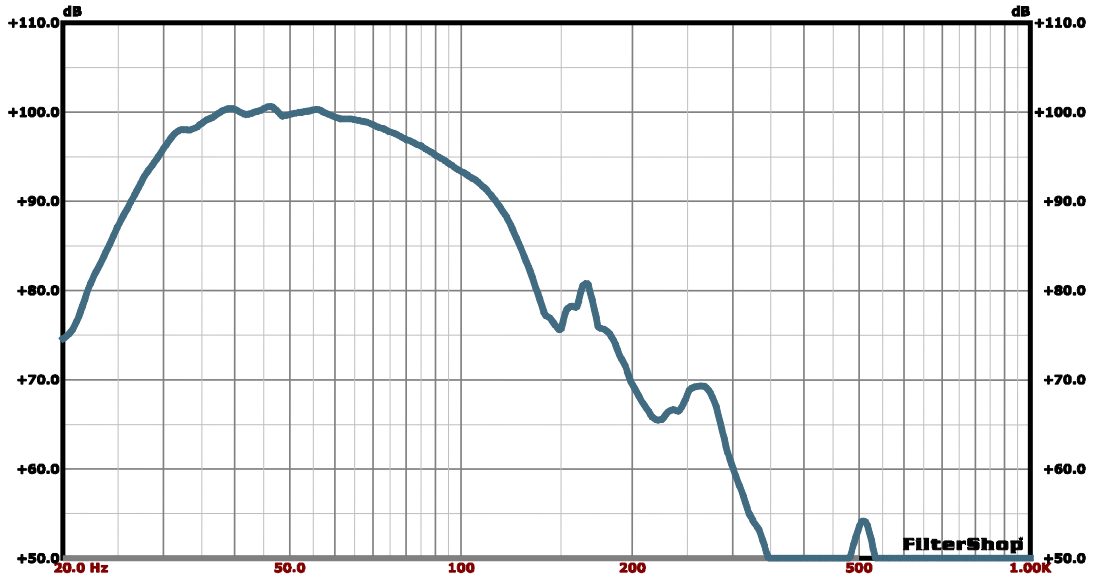


## Unfiltered Frequency Response, 2.83V/1m and relative Input Impedance Curve with 21LW1400 Loudspeaker

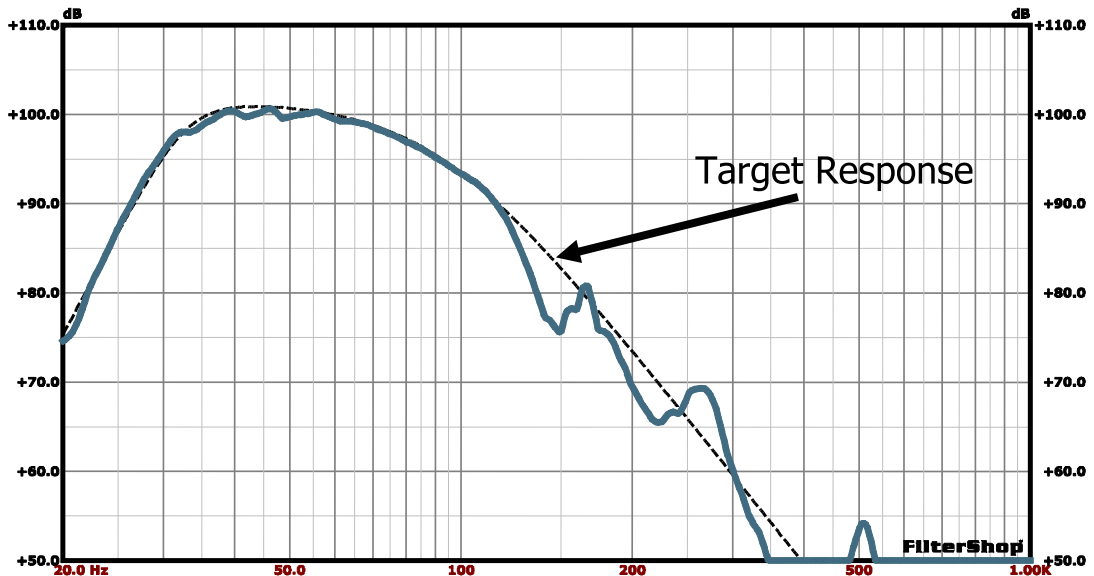


## Processed Frequency Response

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