# 221ID – IPAL Subwoofer System

DOUBLE 21'' MANIFOLDED BAND-PASS ACTIVE SUBWOOFER

# Components & Specifications

- 2 x 21ID – Ipal compatible subwoofer
- Powersoft IPALMOD with DSP4 2CH
- Pressure Sensor

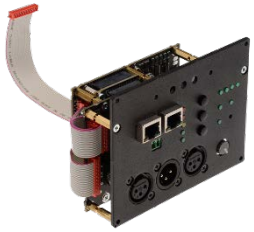
**21iD**

## General Specifications

| | |
|---|---|
| Nominal Diameter | 533 mm (21 in) |
| Rated Impedance | 2 Ohm |
| AES Power | 1800 W |
| Program Power | 3600 W |
| Peak Power | 10000 W |
| Sensitivity | 94,2 dB |
| Frequency Range | 29 ÷ 1600 Hz |
| Power Compression @-10dB | 180W 0,7 dB |
| Power Compression @-3dB | 900W 1,3 dB |
| Power Compression @Full Power | 1800W 2,2 dB |
| Max Recomm. Frequency | 120 Hz |
| Recomm. Enclosure Volume | 120 ÷ 250 lt. (4,24 ÷ 8,83 cu.ft) |
| Minimum Impedance | 2 Ohm |
| Max Peak To Peak Excursion | 70 mm (2,76 in) |
| Voice Coil Diameter | 135 mm (5,31 in) |
| Voice Coil winding material | Copper |
| Suspension | Triple Roll, Polycotton |
| Cone | Straight ribbed carbon fiber loaded cellulose |

| | |
|---|---|
| Fs | 38 Hz |
| Re | 1,3 Ohm |
| Sd | 0,166 sq.m (257,30 sq.in) |
| Qms | 5,60 |
| Qes | 0,24 |
| Qts | 0,23 |
| Vas | 143 lt. (5,05 cu.ft) |
| Mms | 489 gr. (1,08 lb) |
| BL | 25,20 Tm |
| Linear Mathematical Xmax | ±14 mm (±0,55 in) |
| Le (1kHz) | 1,08 mH |

**IPALMOD**



**DSP4**

| AC Mains Power | |
|---|---|
| Power supply | Universal regulated, switch mode, with PFC |
| Nominal power requirement | AC 100 V - 240 V, 50/60Hz |
| Operating range | 80 - 278 $V_{rms}$ |
| Power consumption | |
| IDLE (energy save) | 21 W |
| Average | 400 VA |
| Efficiency @ 1/4 max power | 81% |
| Inrush current | 34.5 $A_{peak}$ (7 $A_{peak}$ after 5 s) |

| Audio | |
|---|---|
| Number of output channels | 1 |
| Gain | 32 dB |
| Dynamic Range (A-Weighted @ 8 Ω) | 65 dB |
| Output Noise (A-Weighted @ 8 Ω) | -44 dB |
| Frequency Response ( -3 dB , 1 W @ 4 Ω) | 10 Hz - 620 Hz |
| THD+N (from 0.1 W to Full Power) | < 0.6% (typical < 0.4%) |
| DIM (from 0.1 W to Full Power) | < 1.6% (typical < 0.8%) |

| Output Stage | |
|---|---|
| Maximum output power | 8500 W |
| Maximum unclipped output voltage | 195 $V_{peak}$ |
| Maximum output current | 120 $A_{peak}$ |

| Virtual speaker® mode | |
|---|---|
| Thiele-Small paramters | Qes - Qms - Vas - Sd - Fs - Re |
| Electromechanical model parameters | Qes - Qms - Vas - Sd - Fs - Re |

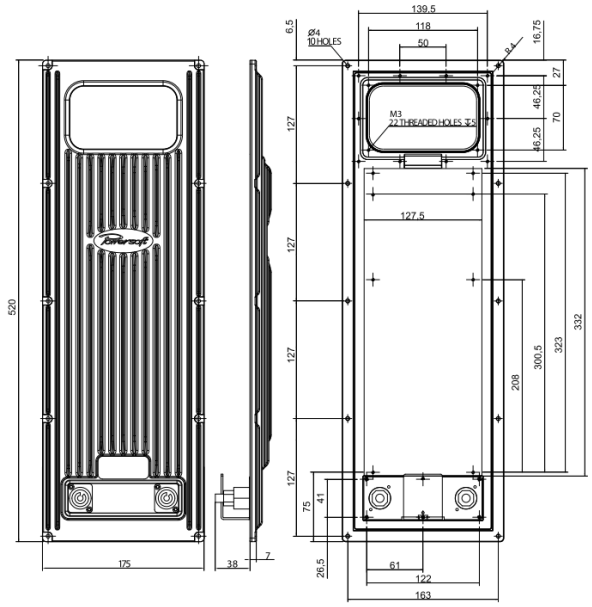
| Differential Pressure Control® Mode | |
|---|---|
| Impedance control parameters | Bandwidth, added Re |
| Pressure control parameters | Bandwidth, slope, gain |

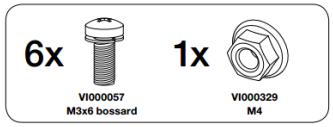
| DSP | |
|---|---|
| Equalizer | Raised-cosine, custom FIR, parametric IIR: peaking, hi/lo-shelving, all-pass, band-pass, band-stop, hi/lo-pass |
| Crossover | linear phase (FIR), hybrid (FIR-IIR), Butterworth, Linkwitz-Riley, Bessel: 6 dB/oct to 48 dB/oct (IIR) |
| Limiters | TruePower™, RMS voltage, RMS current, Peak limiter, Excursion limiter, Current clamp, Brownout limiter, thermal |
| Metering | Input & output voltage, pressure, peak & average current, peak & average power, excursion, temperature |

18 EIGHTEEN SOUND PROFESSIONAL LOUDSPEAKERS

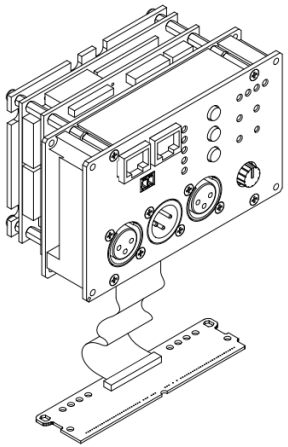
# IPALMOD Components

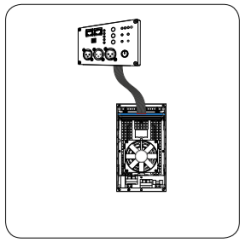
## HEATSINK LARGE HS000L01

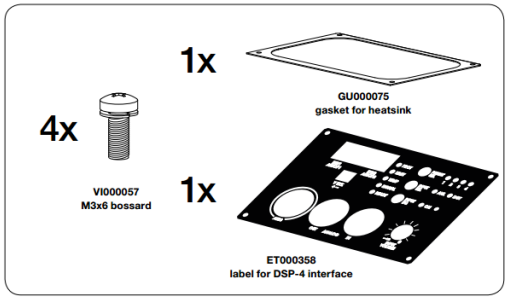


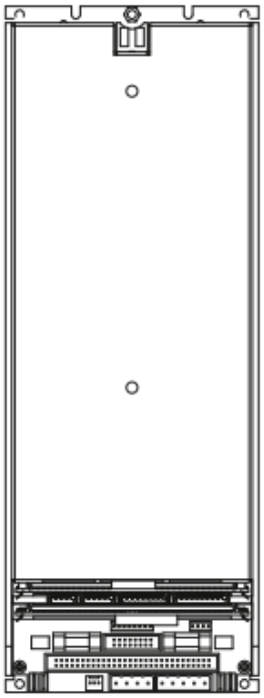

## DSP4 2CH DSP40001





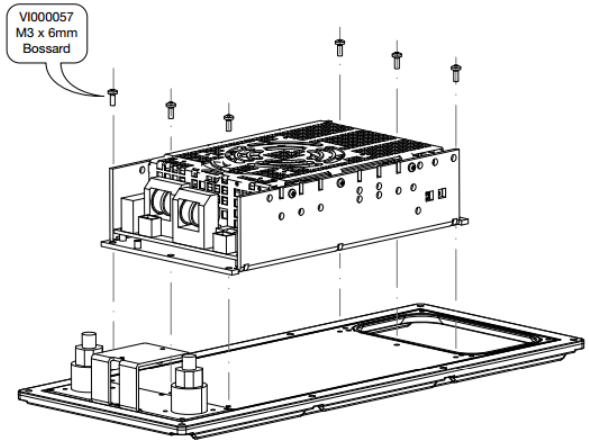



## IPALMOD PF000193

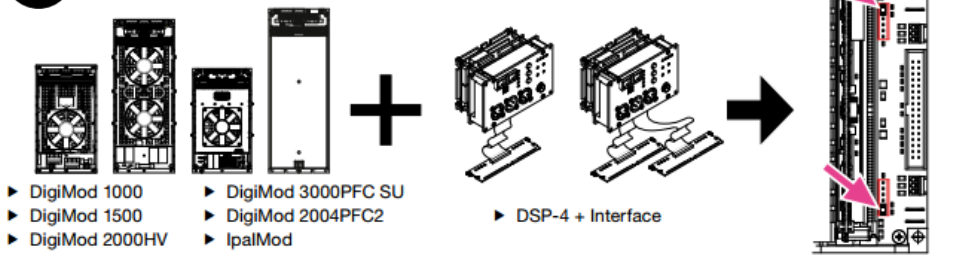


# IPALMOD Assembly- I

**1**

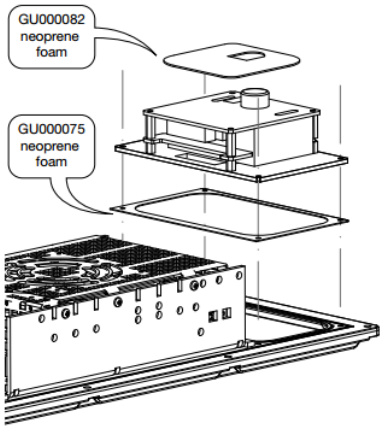


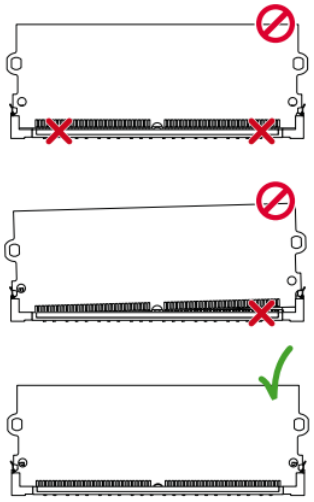

**2**



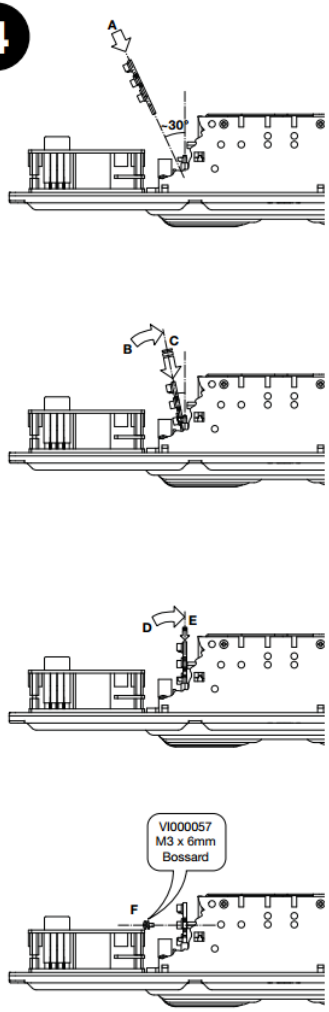

- DigiMod 1000
- DigiMod 1500
- DigiMod 2000HV
- DigiMod 3000PFC SU
- DigiMod 2004PFC2
- IpalMod
- DSP-4 + Interface

**3**



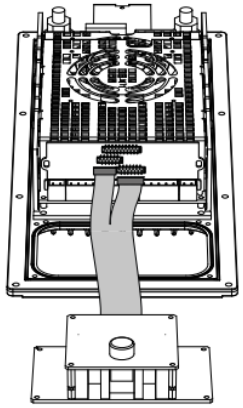



**4**

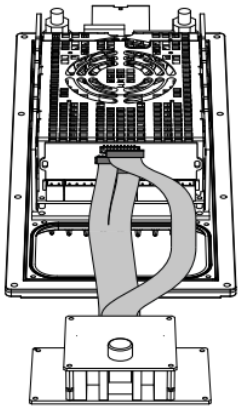


# IPALMOD Assembly- II

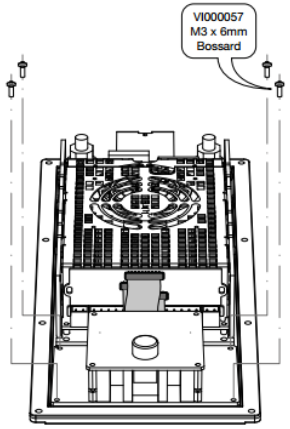
5

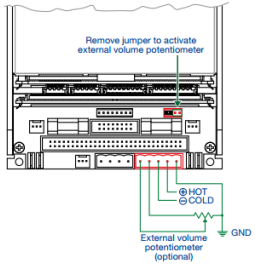


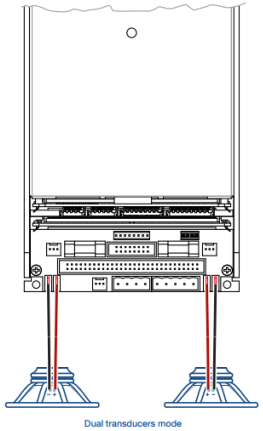
6

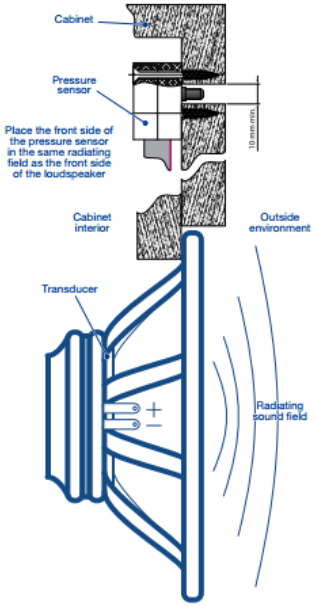


7




Please refer to Powersoft manuals for more detailed information and schematics about the iPAL system, Integration Kit assembly and DSP4:

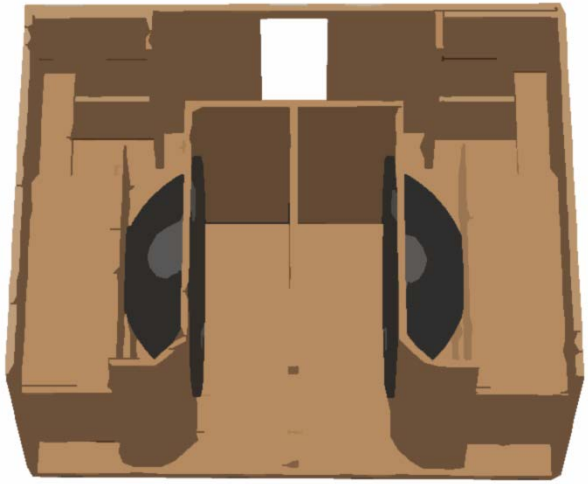
http://www.powersoft-audio.com/en/docman/658-ipalmod-user-guide/file
http://www.powersoft-audio.com/en/docman/1102-digimod-ik-user-guide-1/file
http://www.powersoft-audio.com/en/docman/648-dsp-4-user-guide/file

# KEY FEATURES

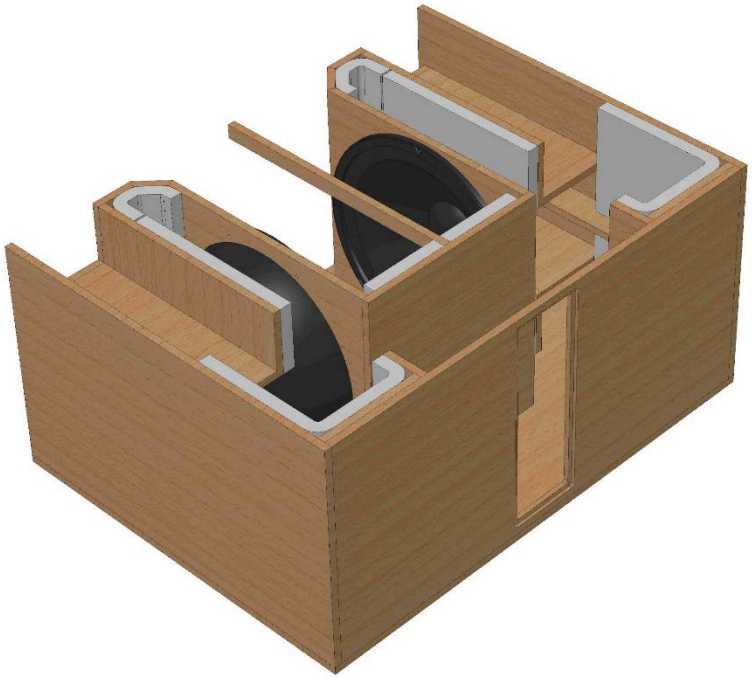
- The enclosure should be made of Baltic birch plywood (18mm thickness)
- Bolts are M6x35mm (M6 T-Nuts recommended)
- Handling and rigging are user's choice

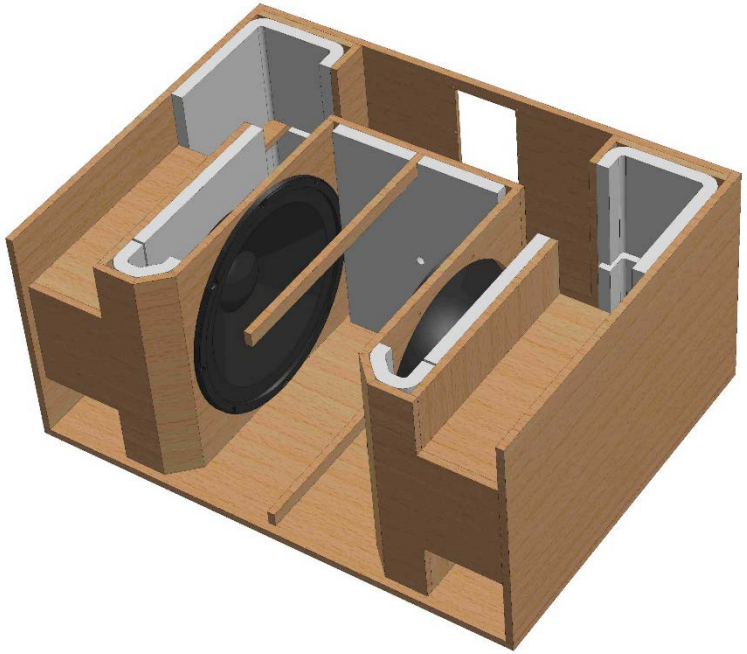
# BILL OF MATERIALS

| Name | QTY |
|---|---|
| 21iD (022212N000) | 2 |
| iPALMOD (PF000193) | 1 |
| DSP4 2CH + Interface(DSP40001) | 1 |
| Heatsink Large (HS000L01) | 1 |



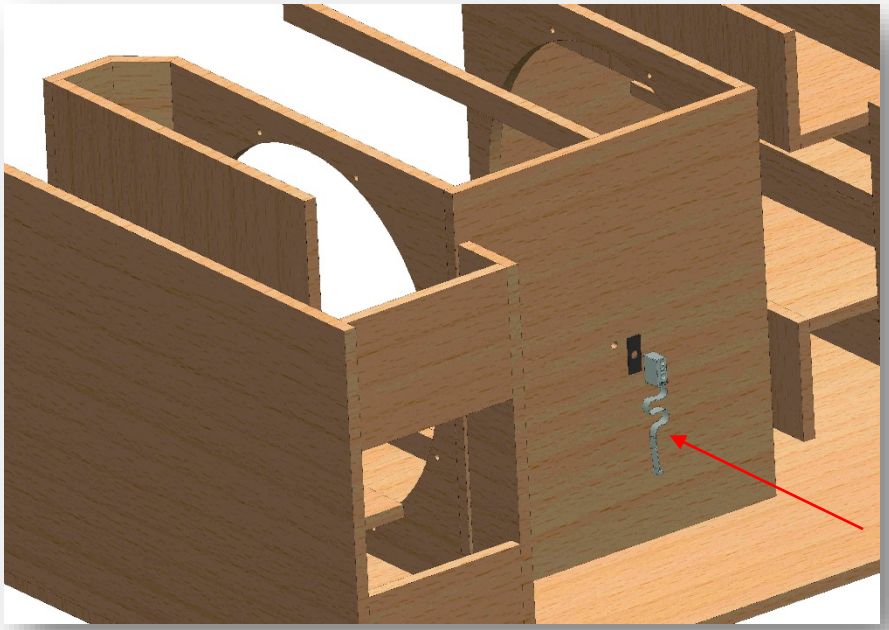
# DAMPENING MATERIAL

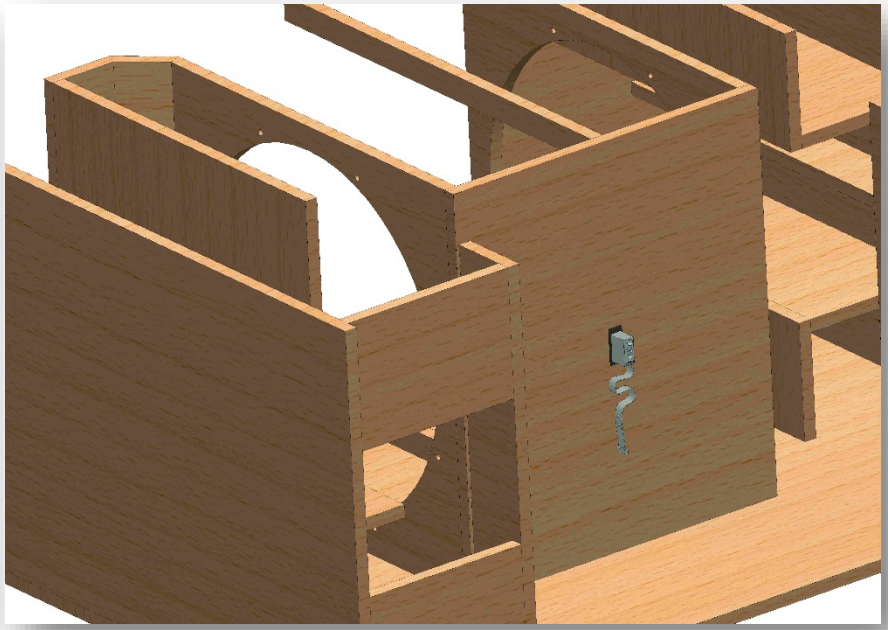




- An high density dampening material, such as Dacron or other synthetic fibers, is required for better performance;
- Please refer to the drawing as a guide;

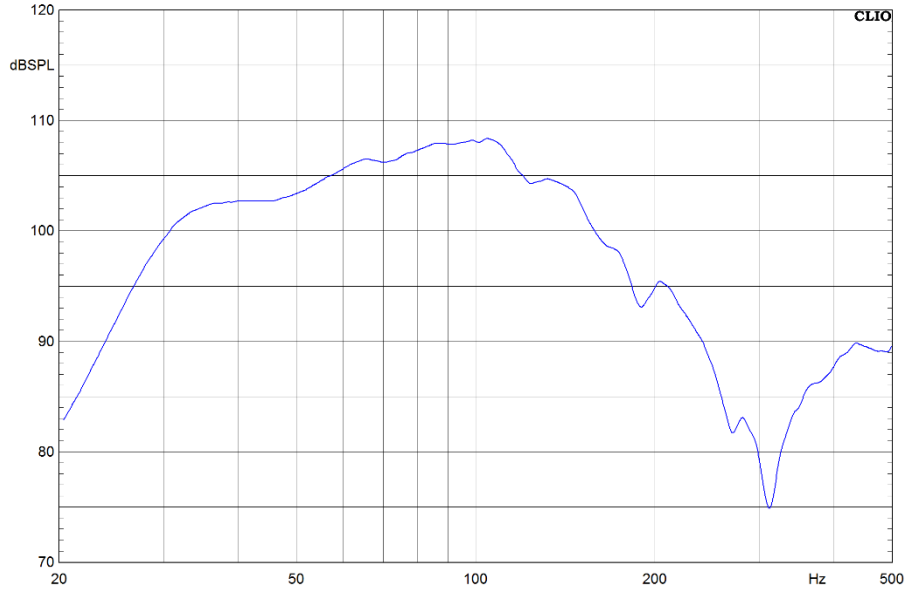
# PRESSURE SENSOR POSITIONING



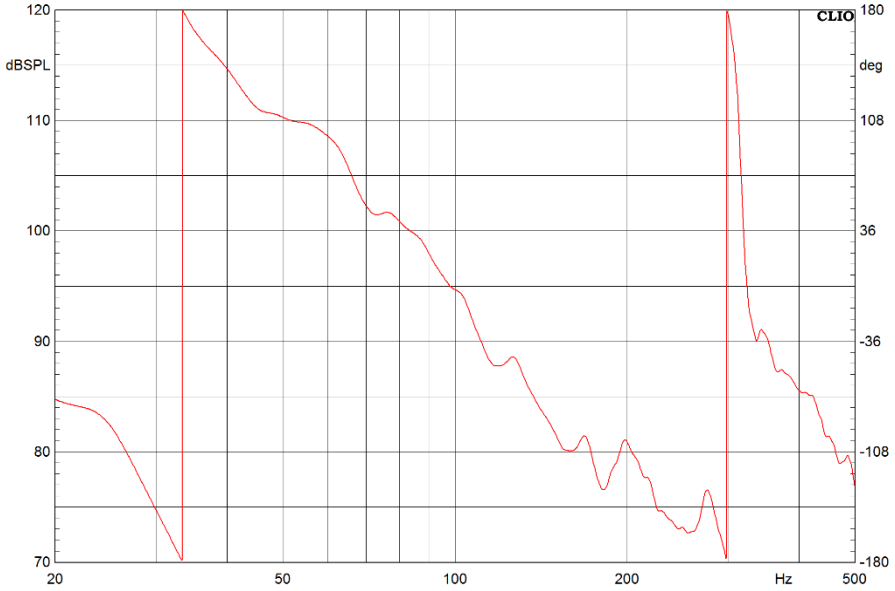


- As show in the example the sensor should be fixed in the 10mm diameter hole with a neoprene (or other expanded rubber) gasket to avoid air-leakage;
- Be careful when fixing the sensor, screwing too much could damage the housing;
- Sensor's hole position is specified in ''G'' Panel drawing

# UNFILTERED MAGNITUDE RESPONSE 1W/1M AND RELATIVE PHASE RESPONSE

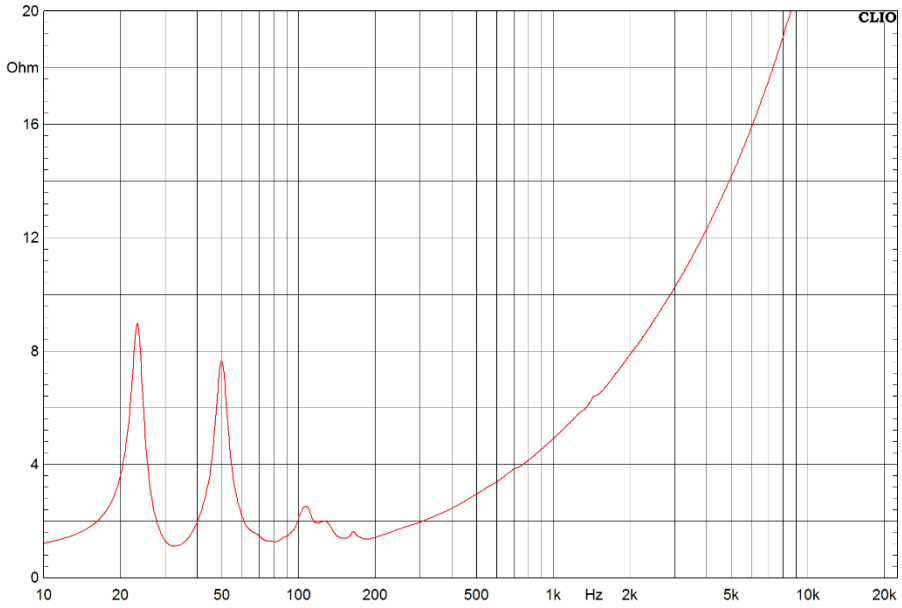



MAGNITUDE RESPONSE

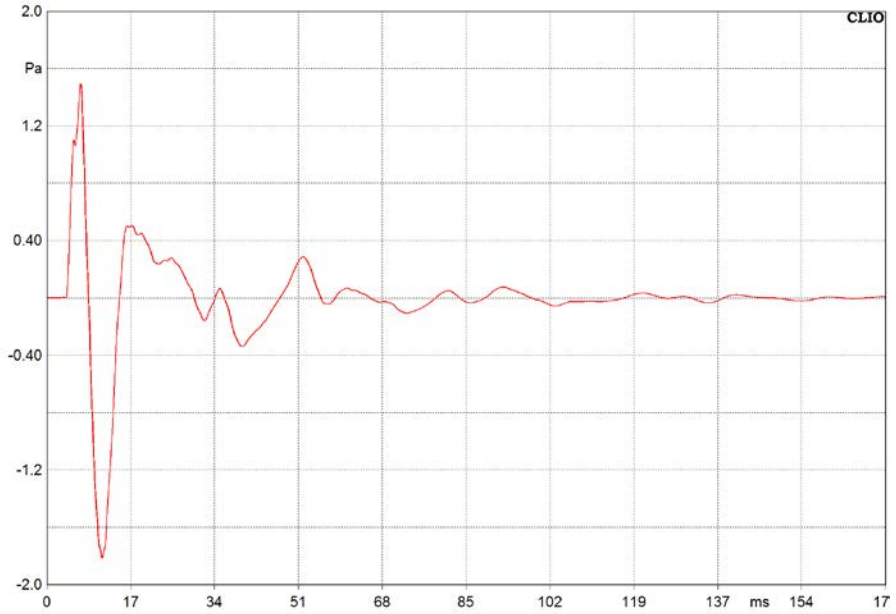



PHASE RESPONSE

# IMPEDANCE AND STEP RESPONSE

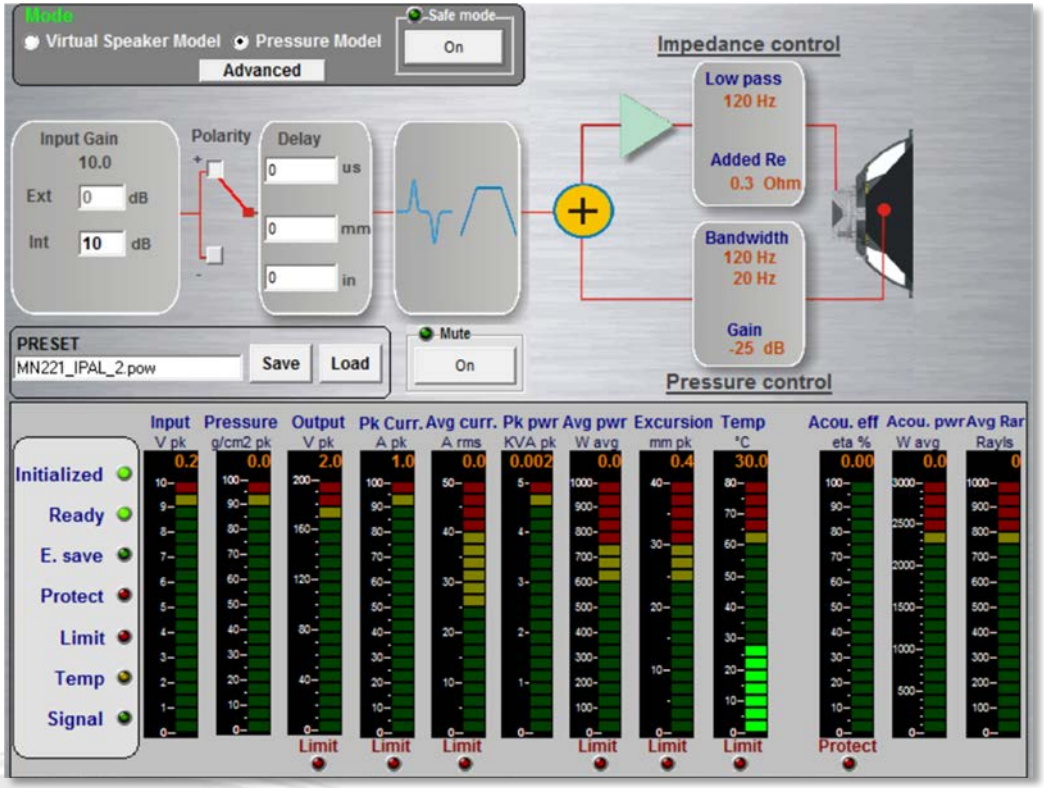


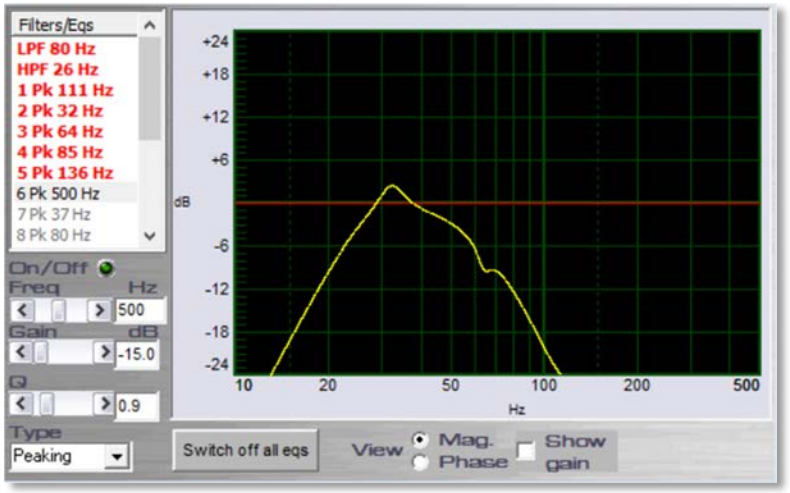

IMPEDANCE




STEP RESPONSE

# POWER CONTROL MANAGER SETUP




**PRESSURE MODEL**

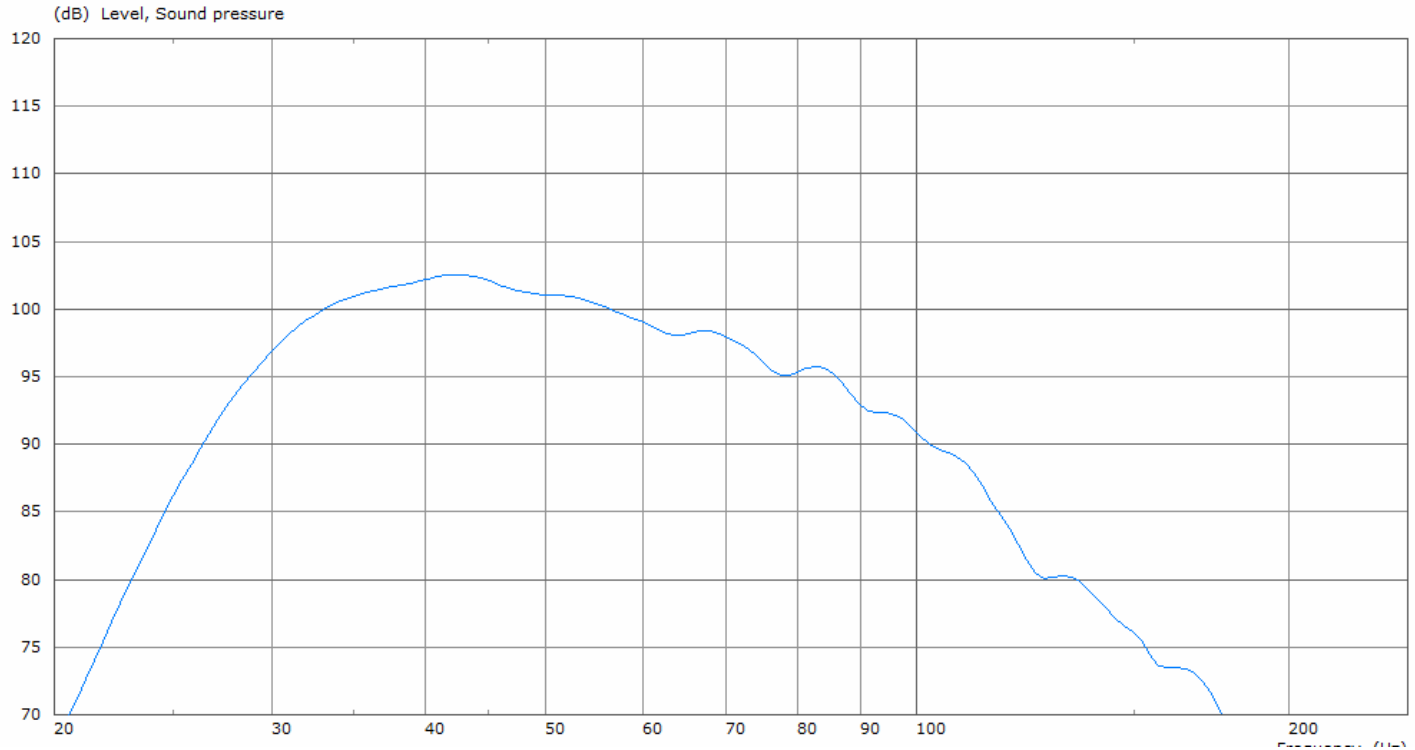
NECESSARY PROCESSOR SETTINGS:

LPF: 80Hz LR 24dB/OCT
HPF: 26Hz BTW 24dB/OCT
Pk: 111Hz -8dB Q: 1.6
Pk: 32Hz +4dB Q: 4
Pk: 64 -3dB Q: 7.5
Pk: 85 -2.5dB Q: 1.5
Pk: 1136Hz -3dB Q: 6

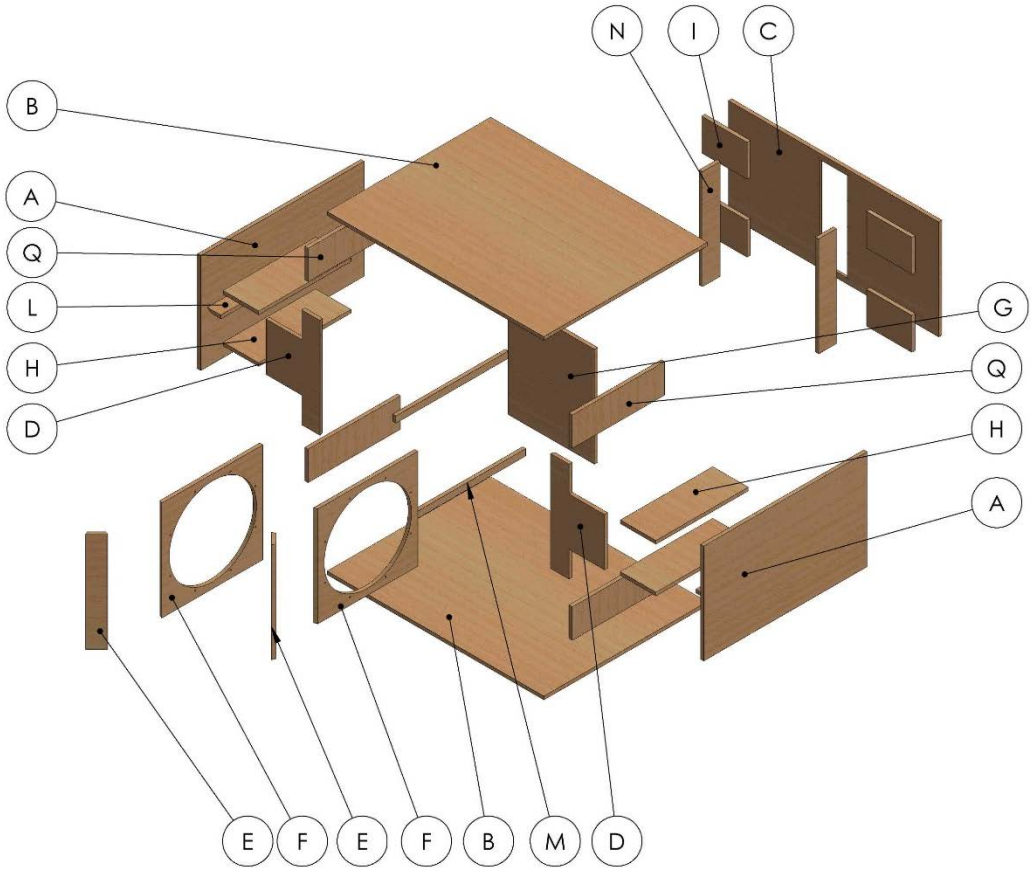
Impedance control:
Low pass: 120Hz
Added Re: 0,3 Ohm

Pressure control:
Bandwidth: 20 to 120Hz
Gain: -25dB

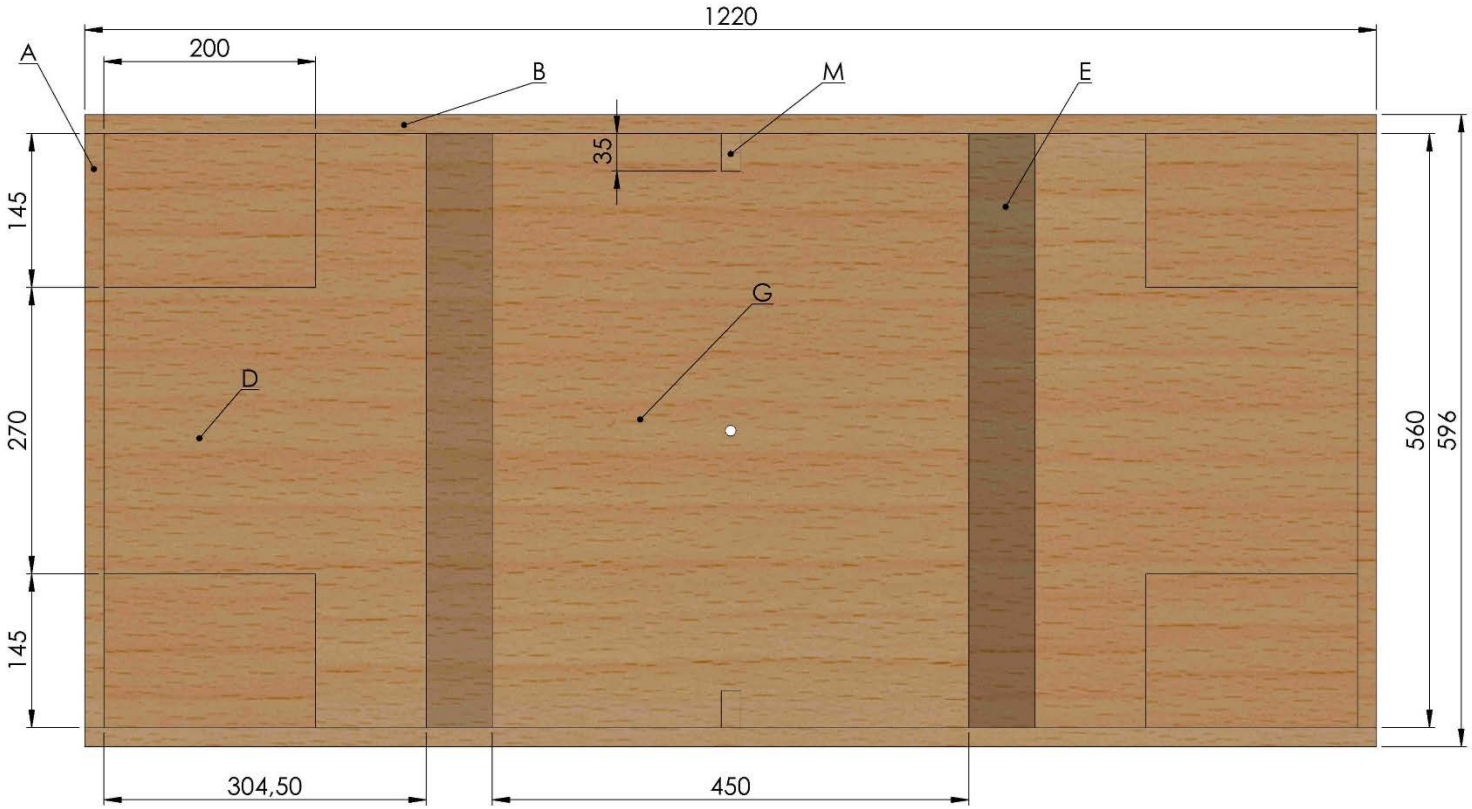
# FILTERED MAGNITUDE RESPONSE 1W/1M



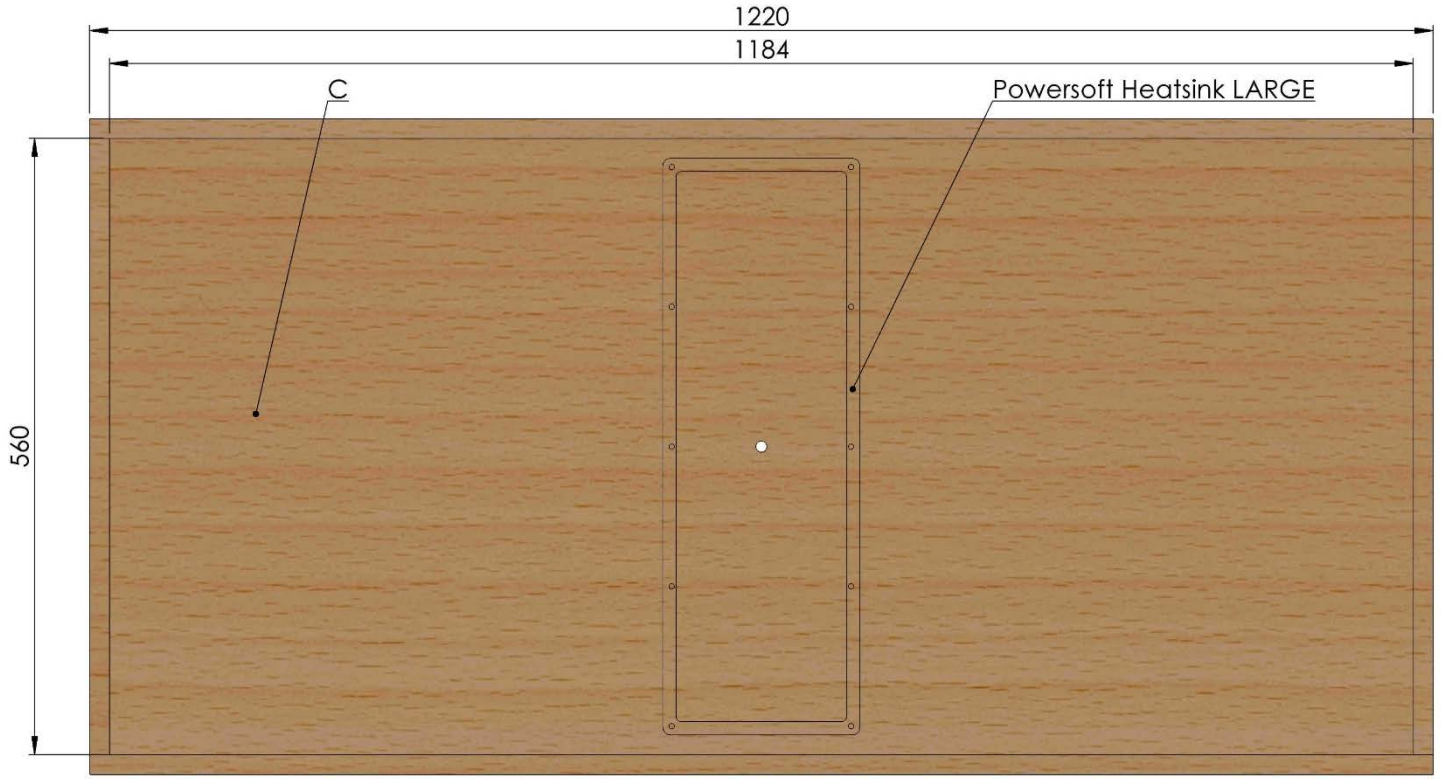
# EXPLODED VIEW



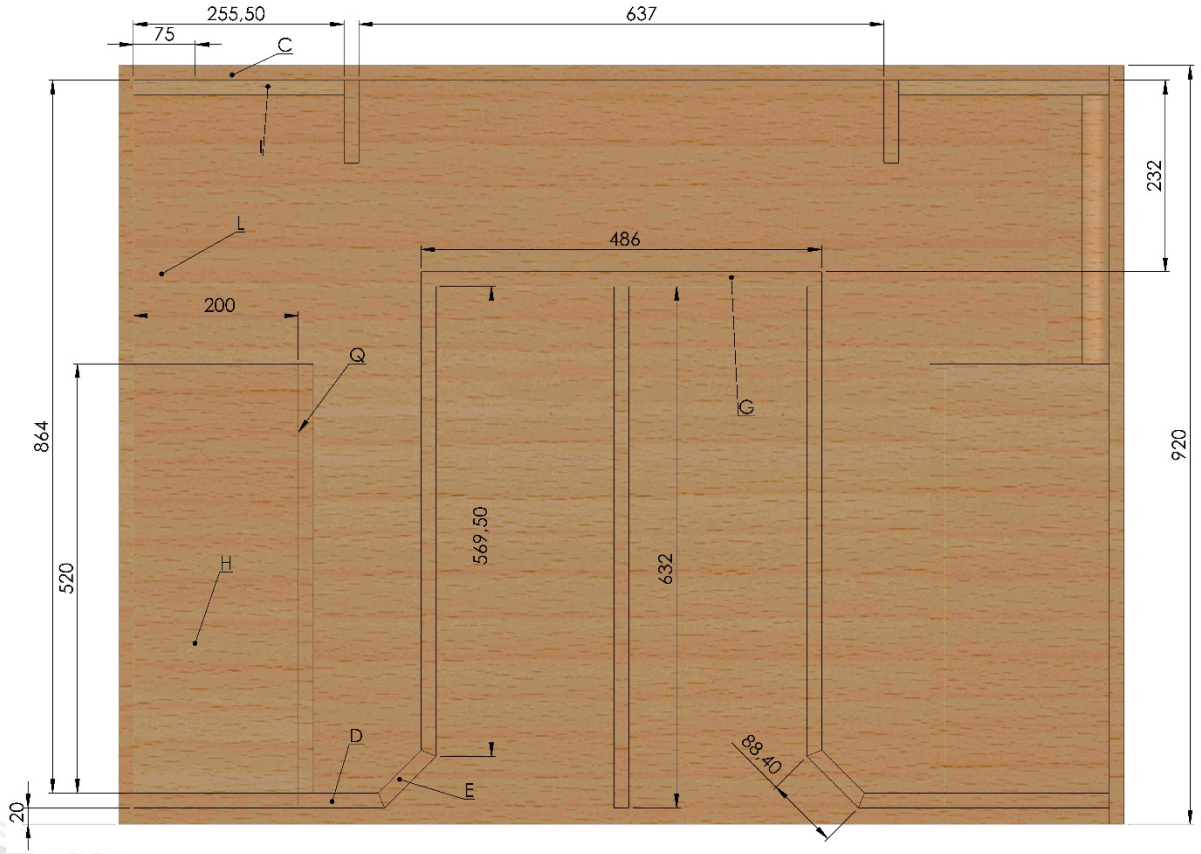
# FRONT VIEW



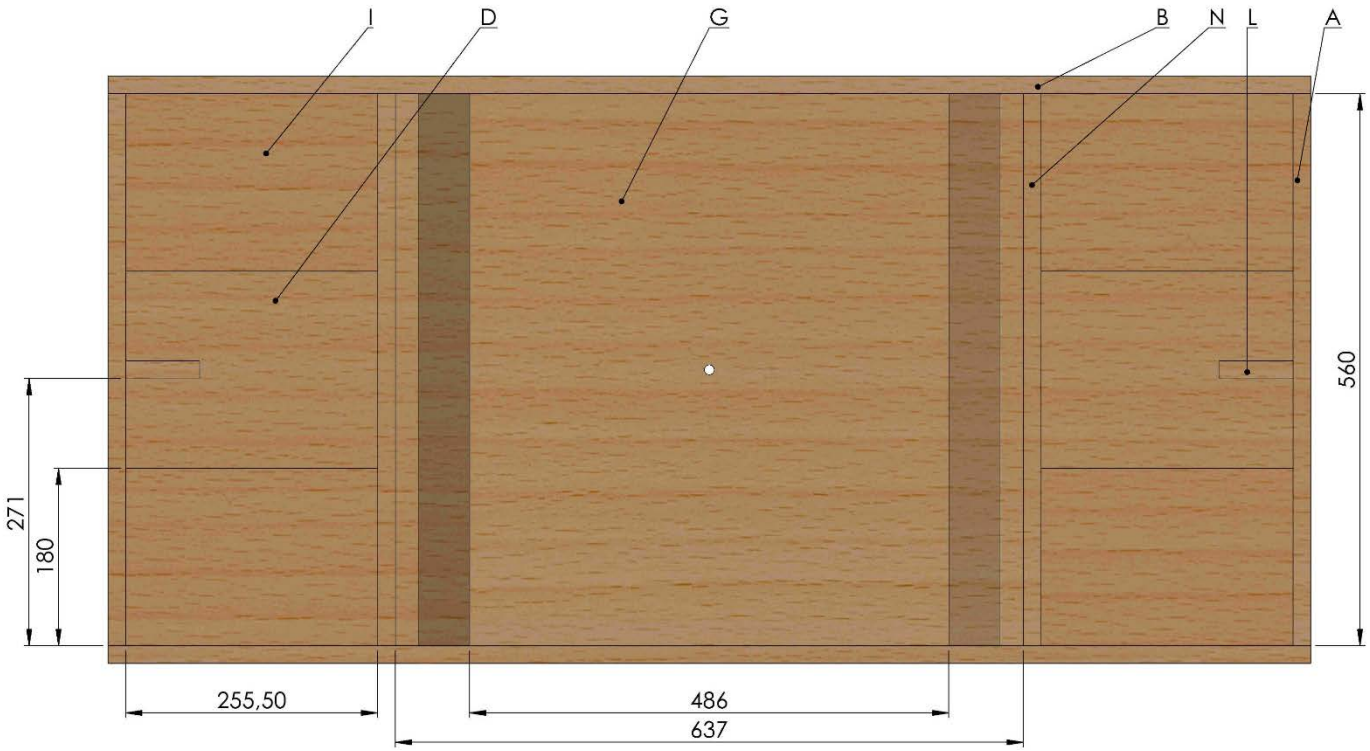
# BACK VIEW



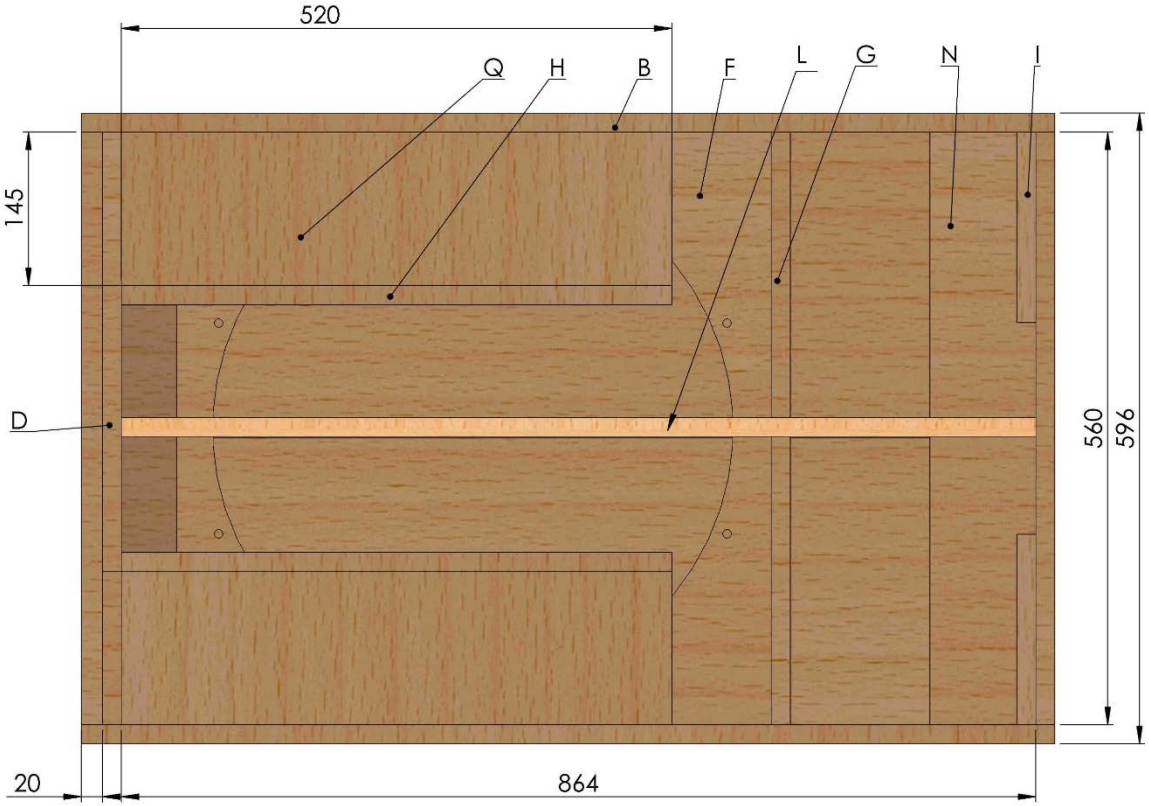
# TOP SECTION



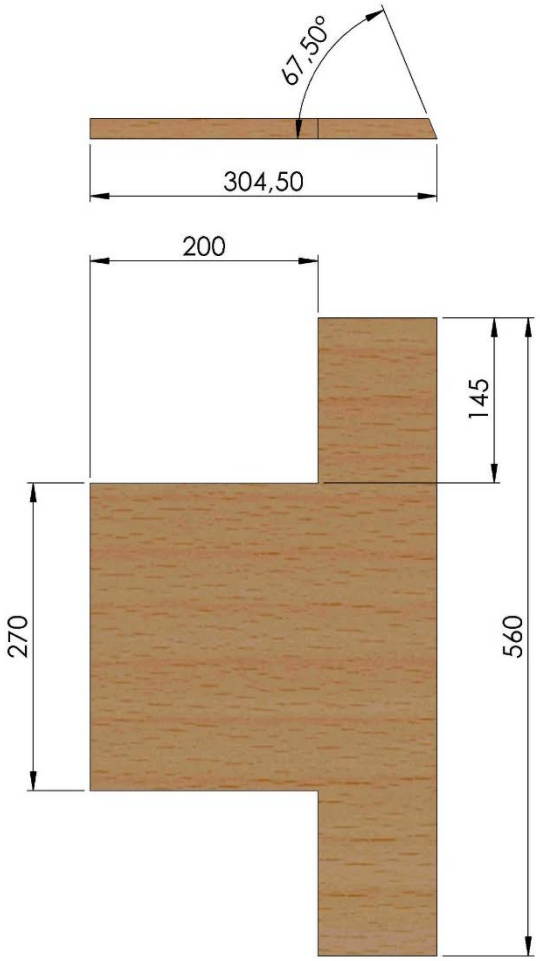
# BACK SECTION



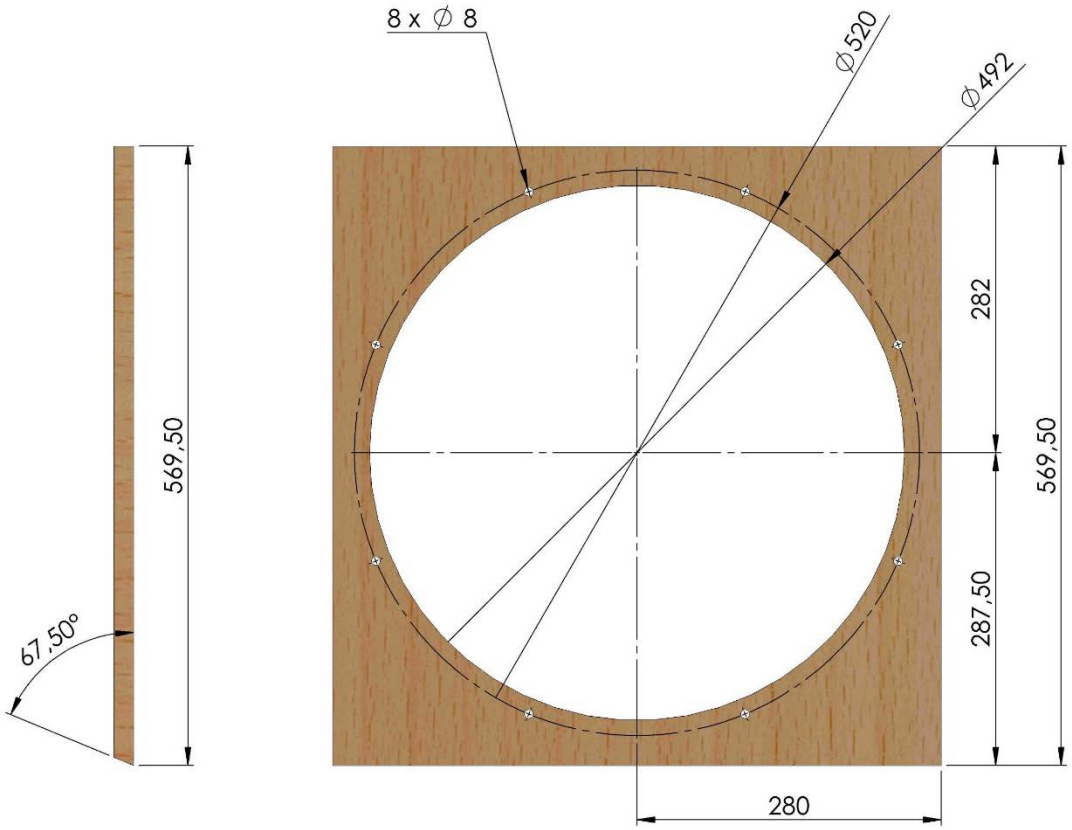
# SIDE SECTION



# DETAILS: Panel D



# DETAILS: 21 Baffle



EIGHTEEN SOUND via Botticelli 8 | 42124 – Reggio Emilia
Italy ph. +39 0522 1861800 | fax. +39 0522 1861801
info@eighteensound.com | www.eighteensound.com