



Eighteen Sound  
a AEB S.p.a. Company

Via dell'Industria 20  
45025 Cavriago  
Reggio Emilia  
Italy

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# Application Note #12:

## Building an effective, 12” BandPass Subwoofer

Eighteen Sound Technical Department  
July, 2012

## **Single 12", Dual Reflex, Band-Pass Subwoofer kit**

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### **•The System**

This proposed loudspeaker system is a compact band pass enclosure that can deliver powerful and clean bass sound. The frequency extension can range from 38Hz to 120Hz although the DSP presets suggest to use it from 40Hz to 100Hz.

The system can be suitable for a range of applications where powerful and well defined low frequency reproduction is required for music reproduction in clubs, listening rooms and small disco.

The system philosophy is based on dual tuning reflex enclosure and its shape has been kept as simple as possible.

A well distributed internal disposition of damping material as Polyurethane foam or Polyester fiber is strongly required in order to avoid internal high order resonances. Additional equipping with handles, connection panel, frontal protection screen would be very useful for handling and flexibility on the use.

### **The Woofer**

The 12LW1400 is a very powerful and very well controlled high power 12" woofer. Its robust suspension system in conjunction with its high temperature 4" Aluminum Voice Coil allow it to handle very high power level, both thermal and mechanical: the interleaved sandwich voice coil allows for high thermal dissipation while double spider system allows for very well controlled large excursion.

#### **•12LW1400 woofer key features:**

- 100 mm (4") interleaved sandwich voice coil
- Heat dissipation via unique basket design
- 900W AES power handling
- 96 dB SPL 1W / 1m average sensitivity



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## 12LW1400 Data

### GENERAL SPECIFICATIONS

Nominal Diameter	300 mm (12 in)
Rated Impedance	8 Ohm
AES Power	900W
Program Power	1400 W
Peak Power	6000 W
Sensitivity	96 dB
Frequency Range	51 + 4000 Hz
Power Compression @-10dB	0,5 dB
Power Compression @-3dB	2,2 dB
Power Compression@Full Power	3 dB
Max Recomm. Frequency	1000 Hz
Recomm. Enclosure Volume	30 + 60 lt. (1,06 + 2,12 cuft)
Minimum Impedance	6,8 Ohm at 25°C
Max Peak To Peak Excursion	36 mm (1,4 in)
Voice Coil Diameter	100 mm (4 in)
Voice Coil Winding Material	aluminum
Suspension	Triple roll, Polycotton
Cone	Straight, Paper

### THIELE SMALL PARAMETERS

Fs	45 Hz
Re	5,2 Ohm
Sd	0,053 sq.mt. (82,15 sq.in.)
Qms	5
Qes	0,32
Qts	0,3
Vas	55 lt. (1,94 cuft)
Mms	88 gr. (0,19 lb)
BL	20 Tm
Linear Mathematical Xmax	± 8,25 mm (± 0,32 in)
Le (1kHz)	1,5 mH
Ref. Efficiency 1W@1m (half space)	1,5% (94 dB)

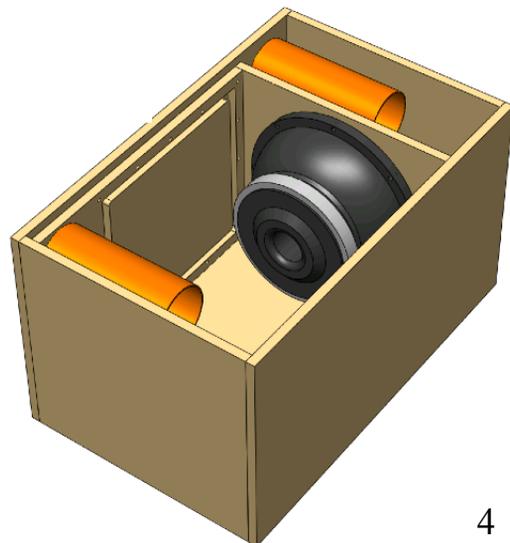
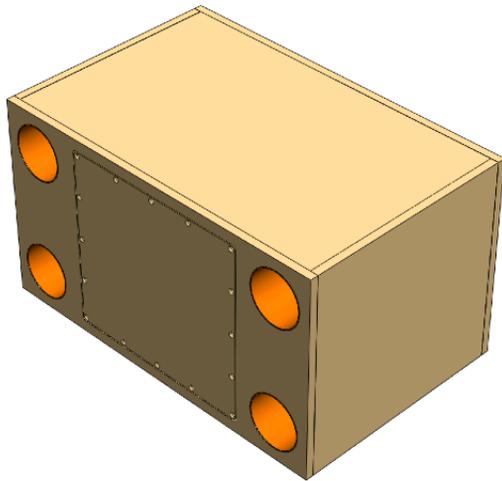
## Single 12", Dual Reflex, Band-Pass Subwoofer kit

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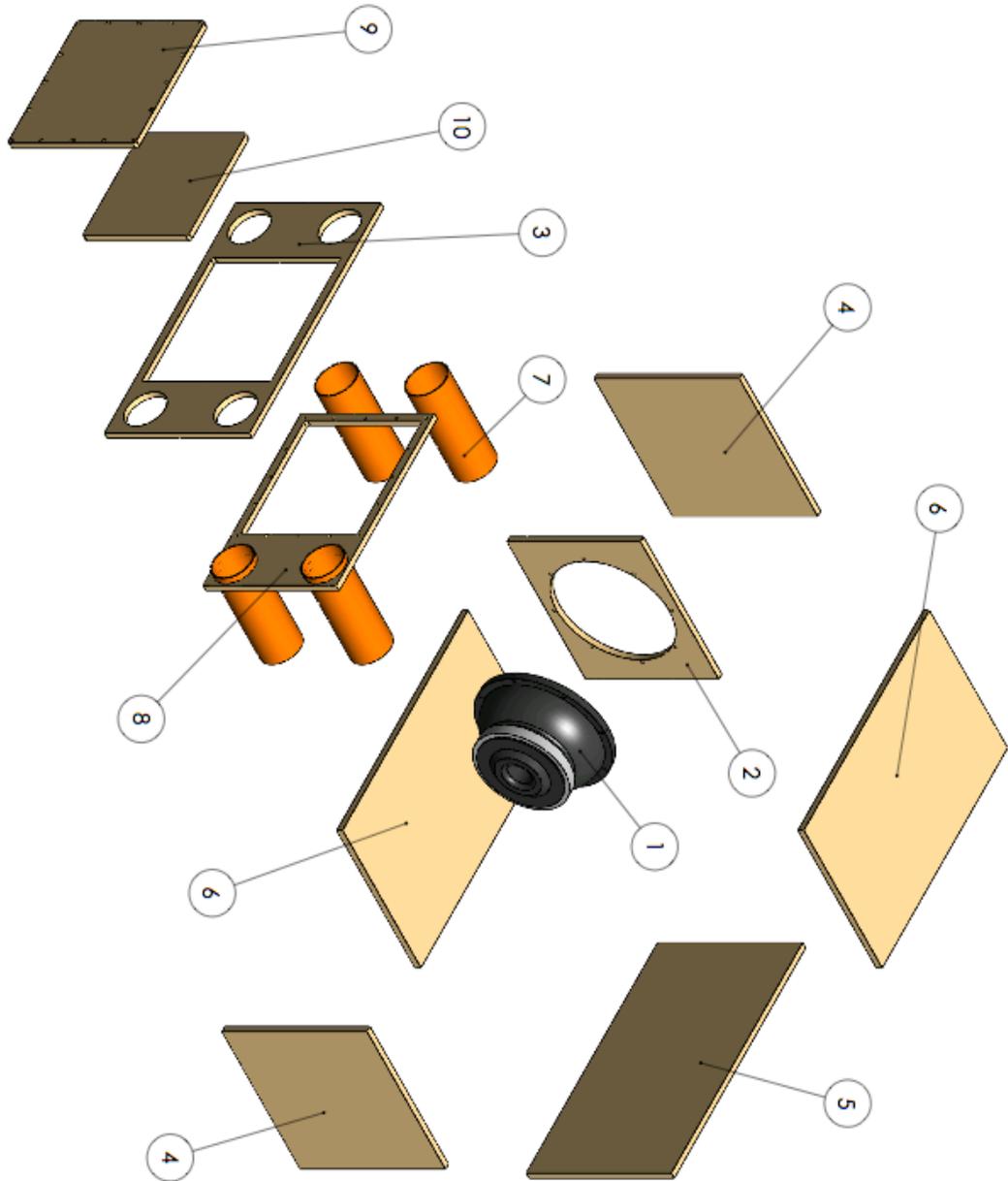
- The enclosure should be made of Baltic birch plywood (15mm thickness)
- Bolts are M6x35mm
- M6 T-Nuts are recommended
- Handling, rigging and connectors are user' s choice
- It' s recommended to well damping the cabinet interior
- High density dampening material such as Polyester fiber, Polyurethane foam or other synthetic fibers is required for eliminating high order internal resonances and then to obtain better performance

### Internal and external view

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# Single 12", Dual Reflex, Band-Pass Subwoofer kit



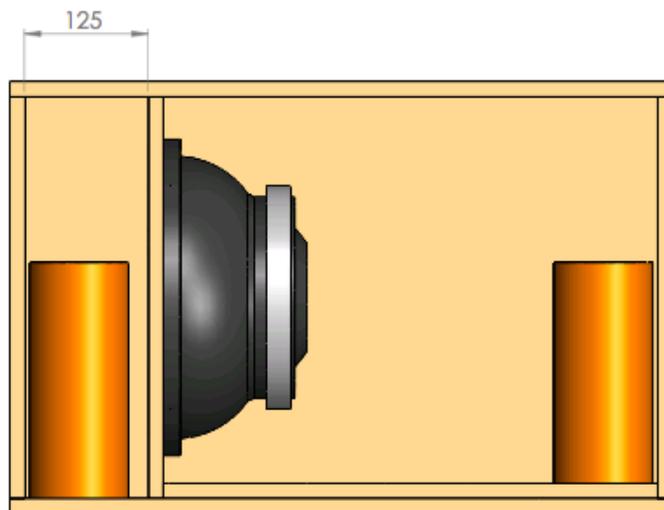
Exploded view

# Single 12", Dual Reflex, Band-Pass Subwoofer kit

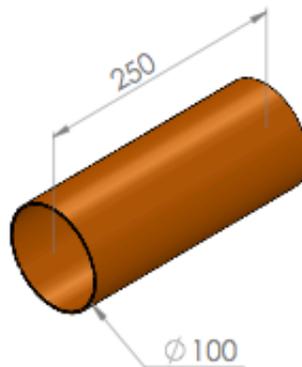
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Internal view and detail

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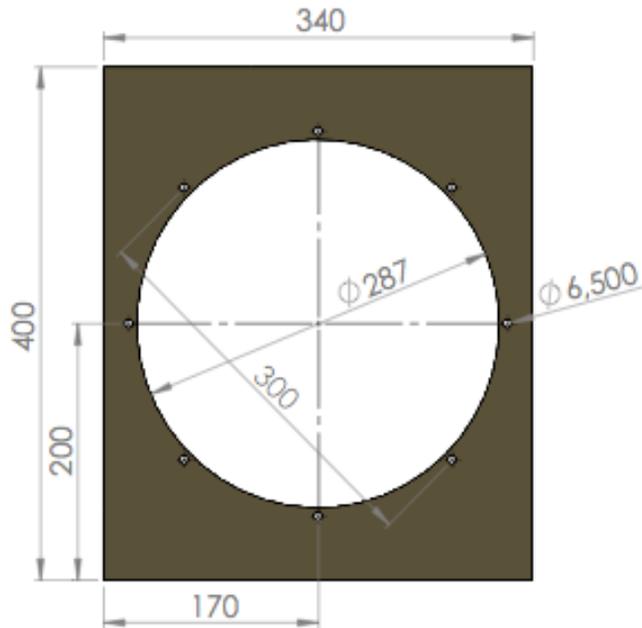
Pipe (part 7)



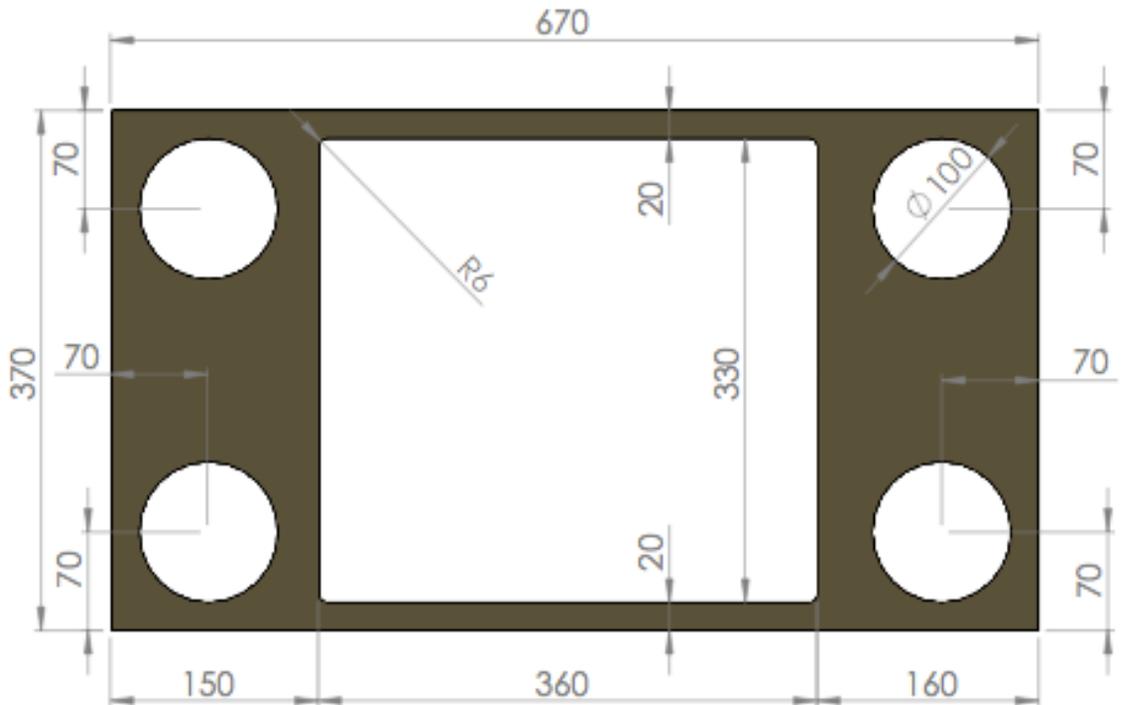
**Single 12", Dual Reflex, Band-Pass Subwoofer kit**

**Part Details**

Part 2



Part 3



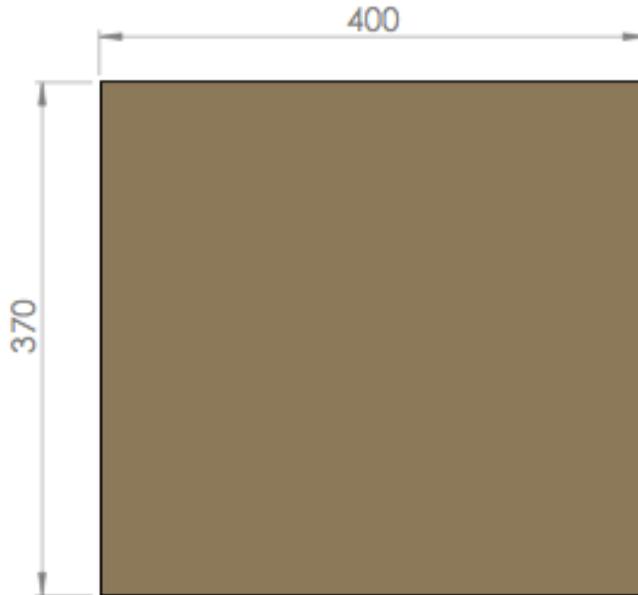
# Single 12", Dual Reflex, Band-Pass Subwoofer kit

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## Part Details

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Part 4



Part 5



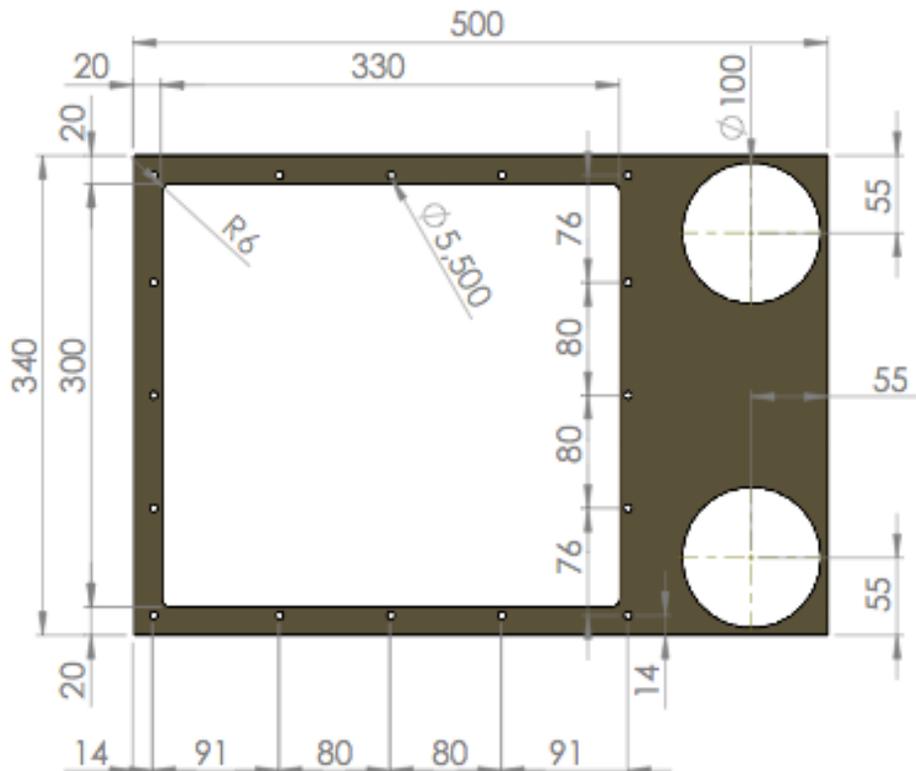
# Single 12", Dual Reflex, Band-Pass Subwoofer kit

## Part Details

Part 6



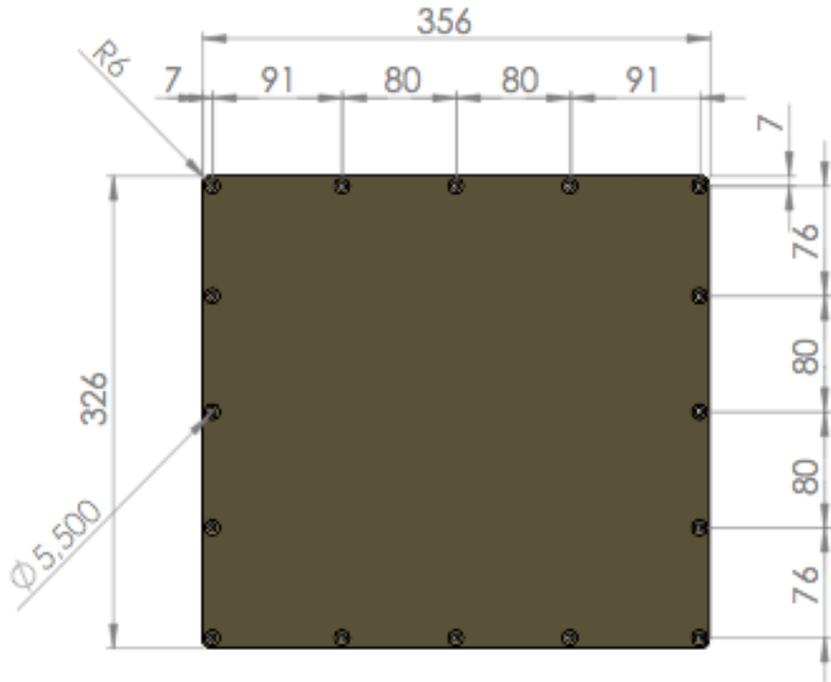
Part 8



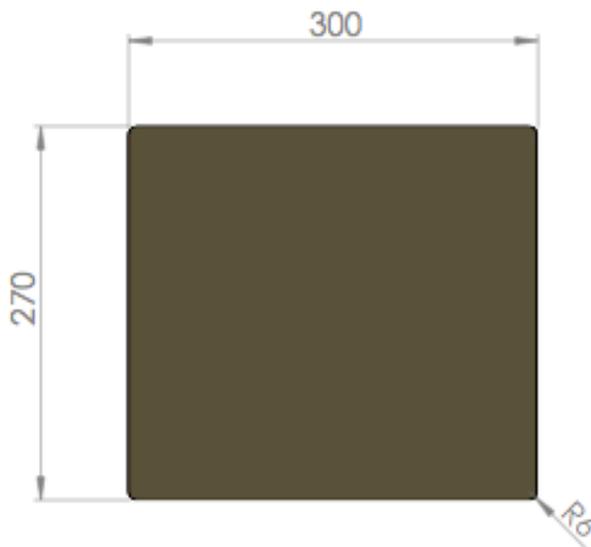
# Single 12", Dual Reflex, Band-Pass Subwoofer kit

## Part Details

Part 9



Part 10





## **Single 12", Dual Reflex, Band-Pass Subwoofer kit**

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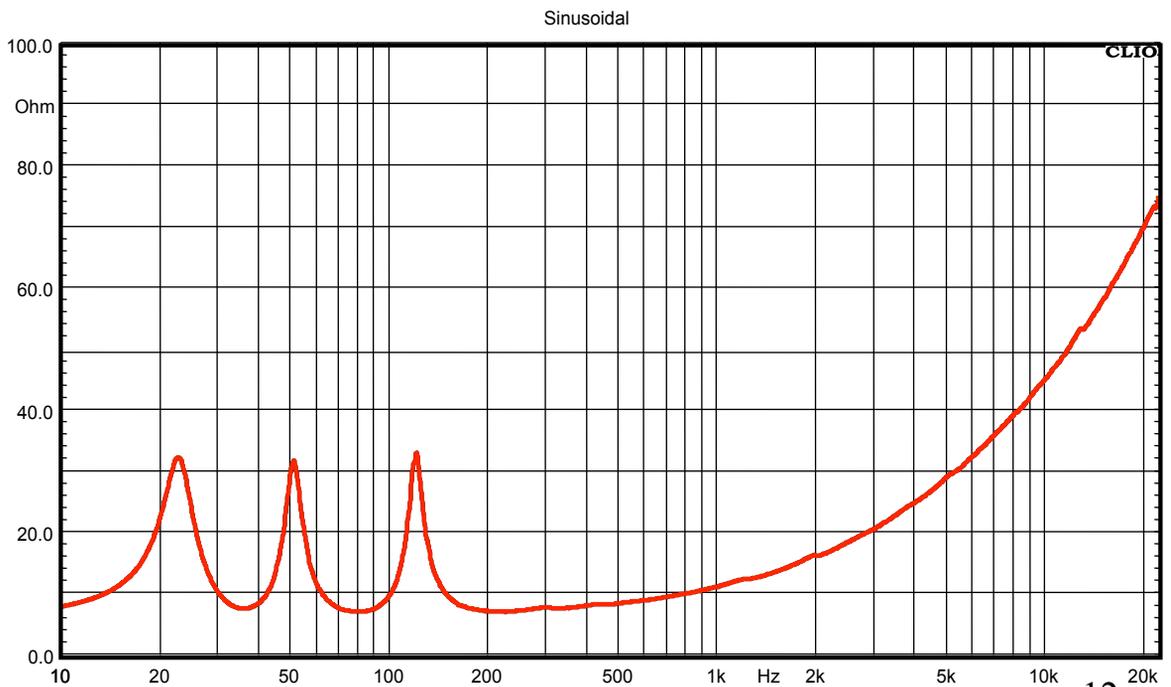
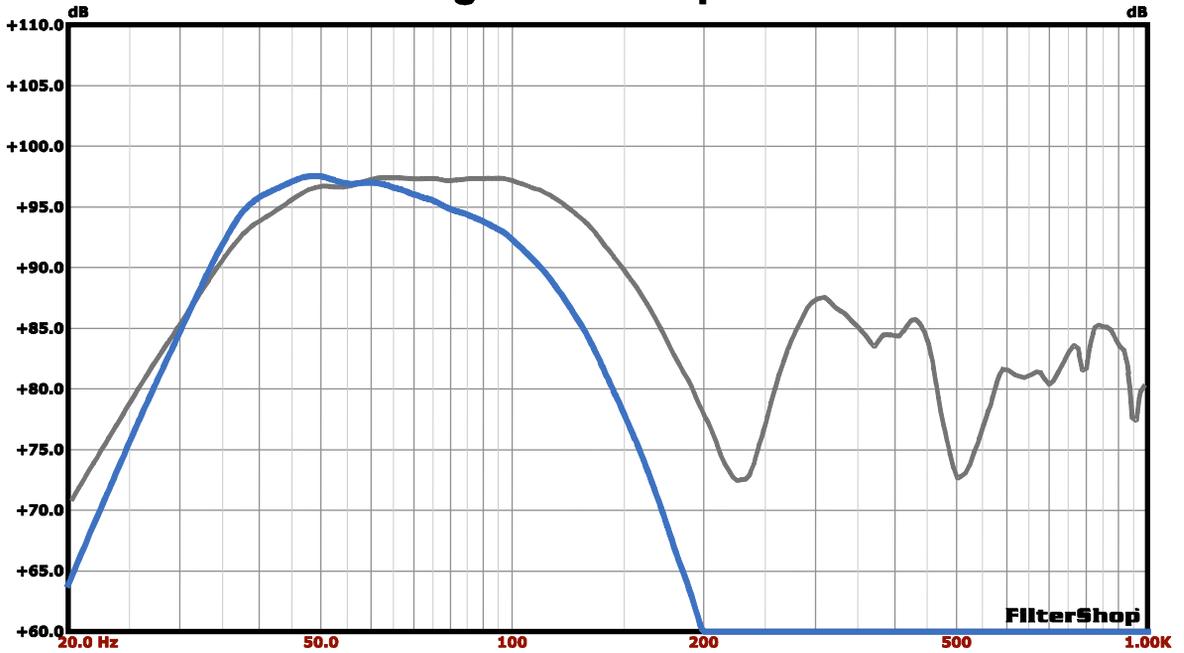
### **Measurements**

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# Single 12", Dual Reflex, Band-Pass Subwoofer kit

## Frequency response and Impedance

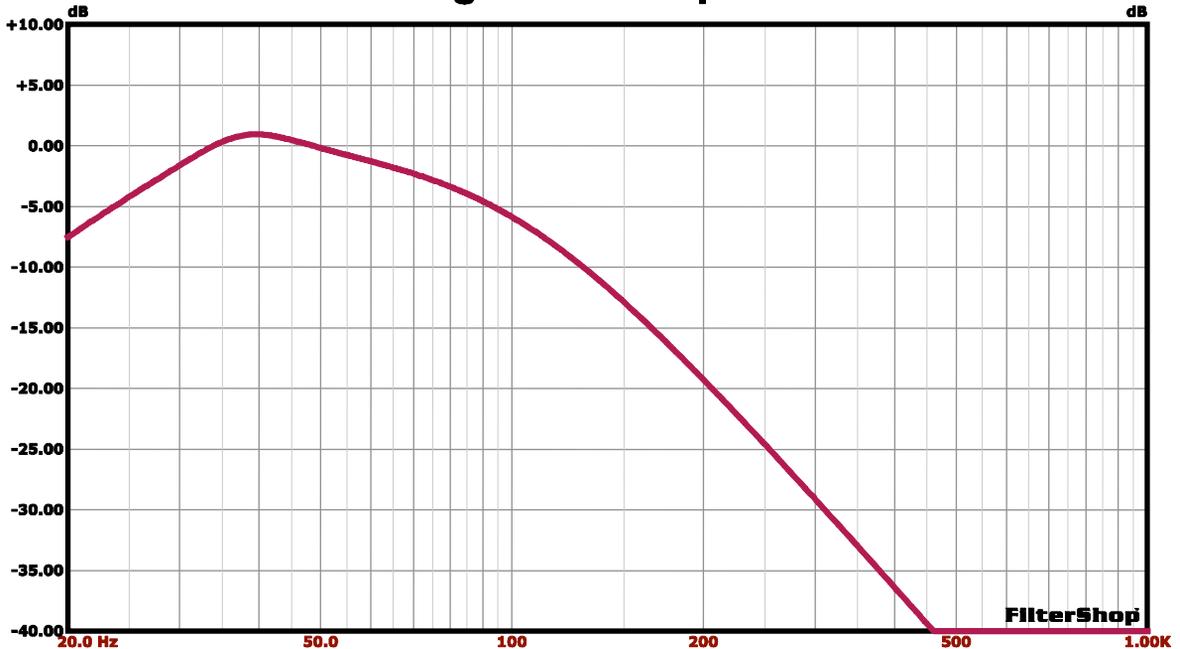
### Magnitude Response



# Single 12", Dual Reflex, Band-Pass Subwoofer kit

## DSP Processing Guidelines

### Magnitude Response



### Processor Setting Response

#### Necessary Processor Settings with 12LW1400 Loudspeaker

High pass: Butterworth **2nd** order, 12dB/Oct @ 30 Hz

Parametric EQ **Eq1:** F= 38 Hz - Gain= +3 dB - Q= 2.0

Low pass: Butterworth **3th** order, 18dB/Oct @ 100 Hz

Polarity: Positive (+)

Limiter: @ +9dBu, 100ms Atk. Time, X4 Release Time

Output Gain: + 0dB

Processing Parameters Referred to **XTA DP224/DP226/DP448** Processors

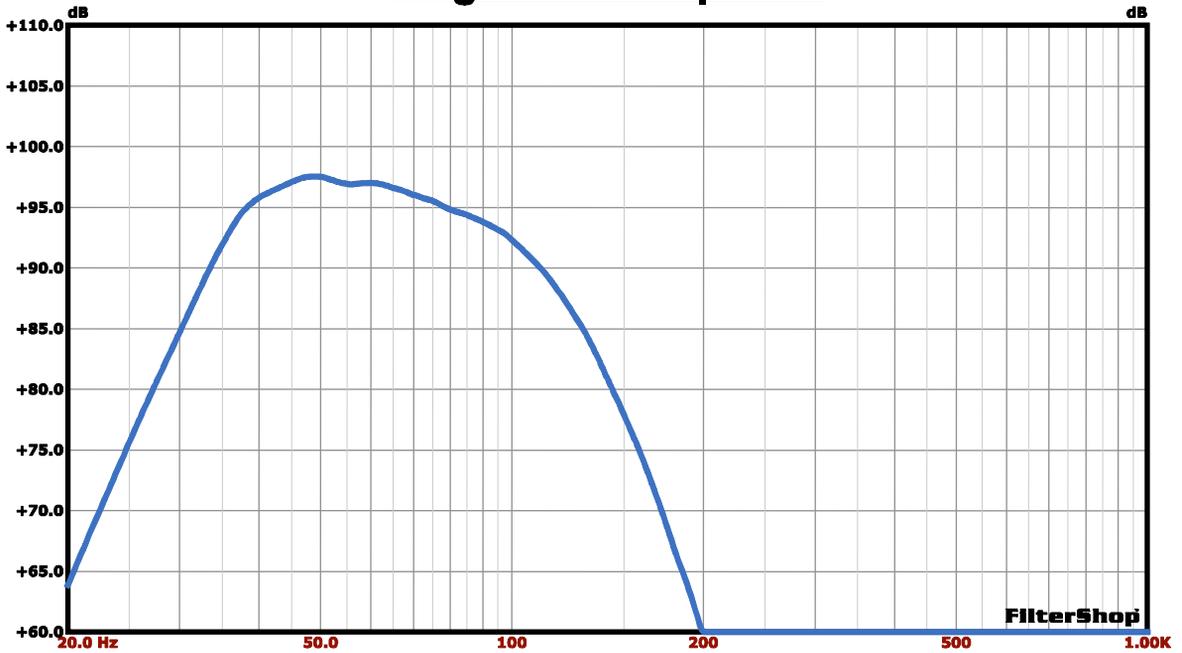
Required Amplifier for proper driving, approx.: 1500W @ 8 Ohm, with Gain = 32dB

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

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## Frequency response

### Magnitude Response



### Magnitude Response

