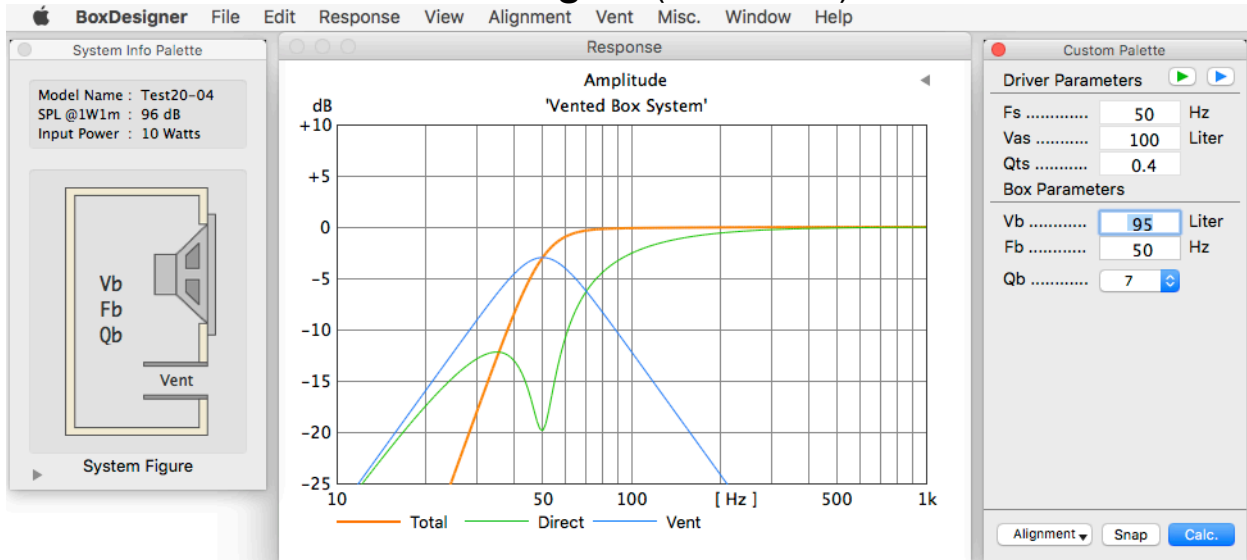


Sonic Design Labo Products Overview

Sonic Design Labo supports your loudspeaker enclosure design. Softwares would be offered simplicity, accurately and sophisticated interface.

BoxDesigner (Free ware)



Main window of BoxDesigner



BoxDesigner Icon



BoxDesigner File Icon

BoxDesigner, 8 kinds of High Pass System and 8 kinds of Band Pass System

different box system can be designed.

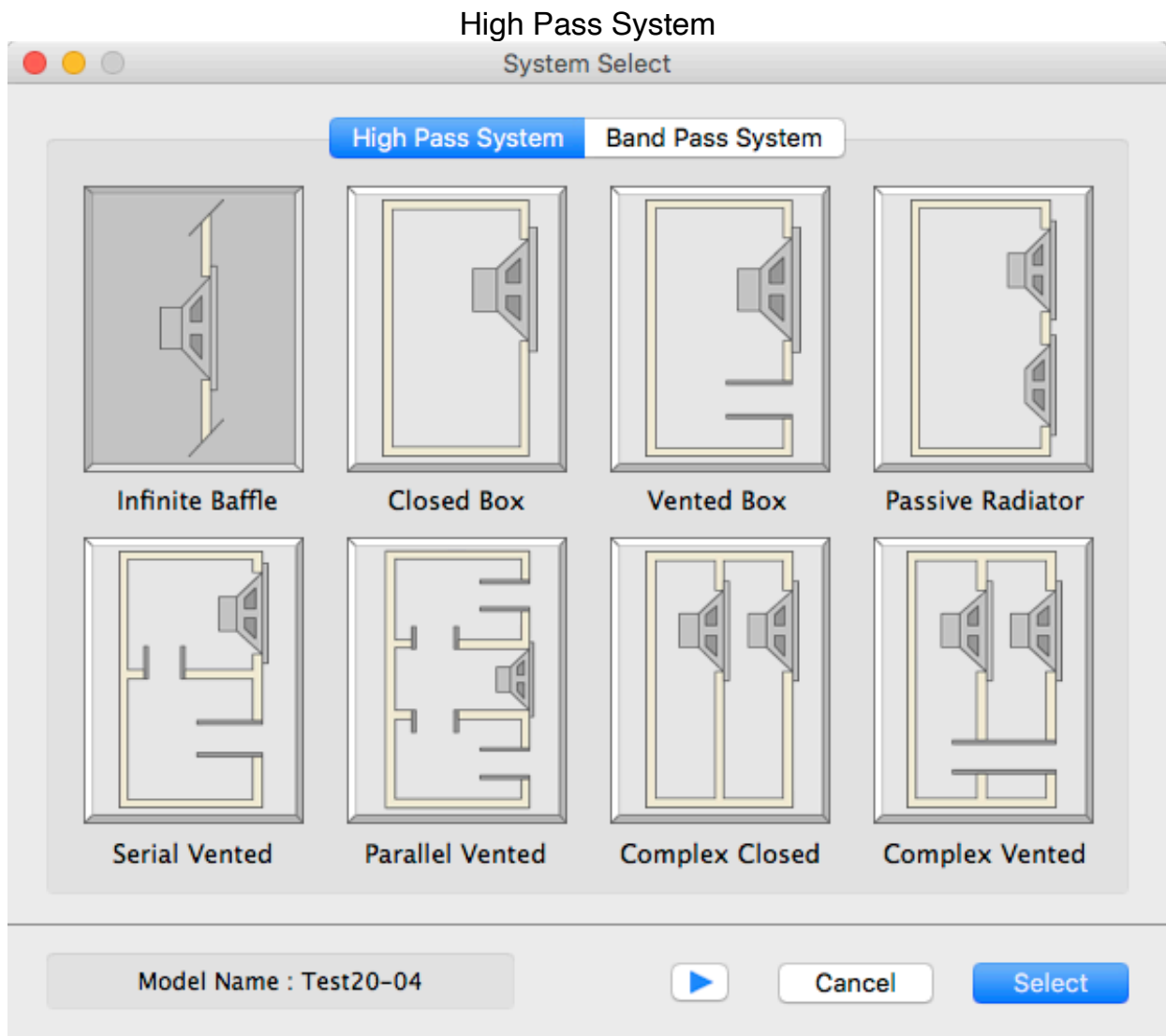
Optimum flat characteristics does default adaptation of sixteen kinds of each system.

The eleven characteristics and vent (port or duct) can be designed.

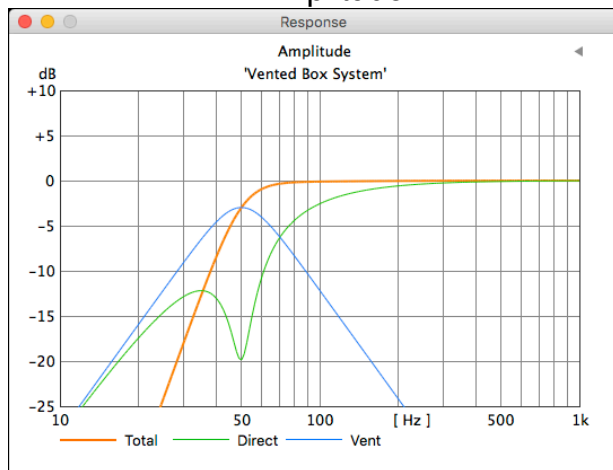
BoxDesigner is designed based on theory of A. N. Thiele, R. H. Small and others.

To use, "BoxDesignerDB" database software (Free ware) need.

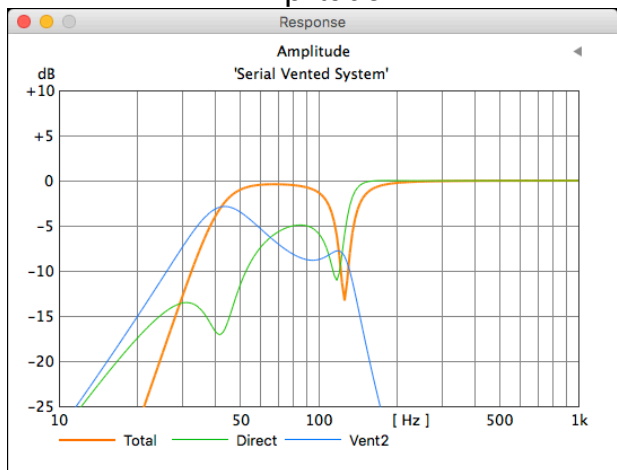
In a design of Passive Radiator System, "PassiveRadiatorDB" database software (free ware) need .

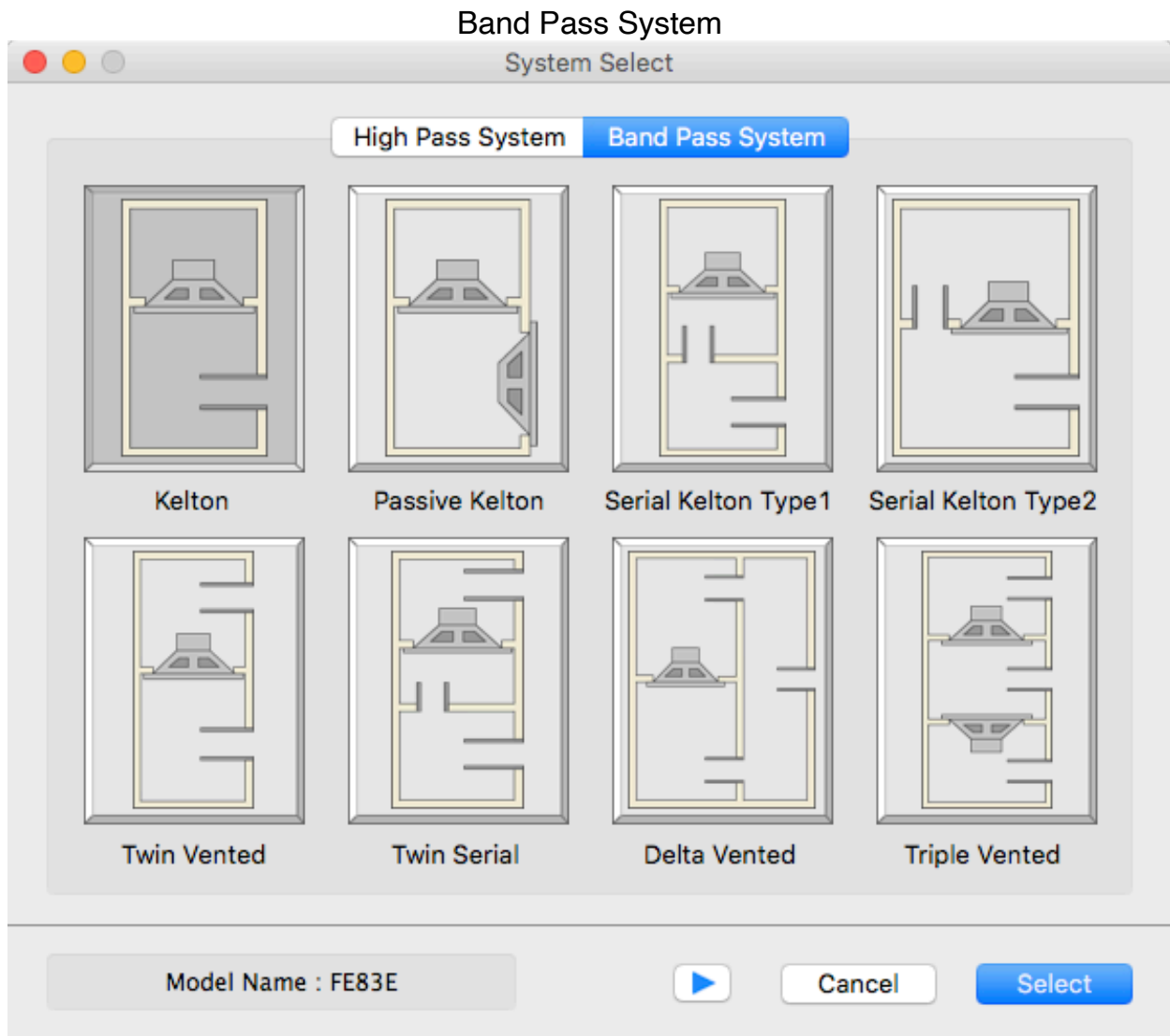


Example of Vented Box System
Amplitude

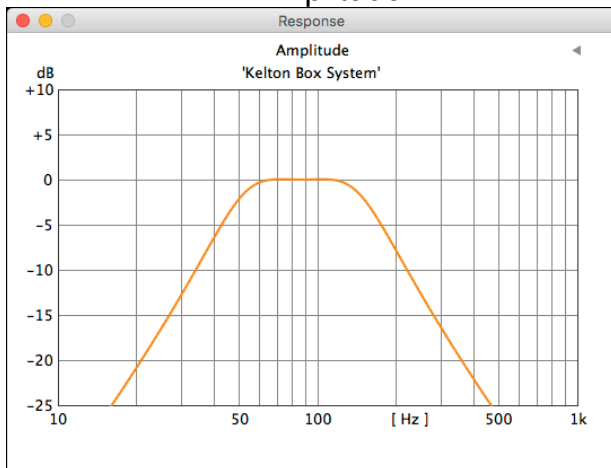


Example of Serial Vented System
Amplitude

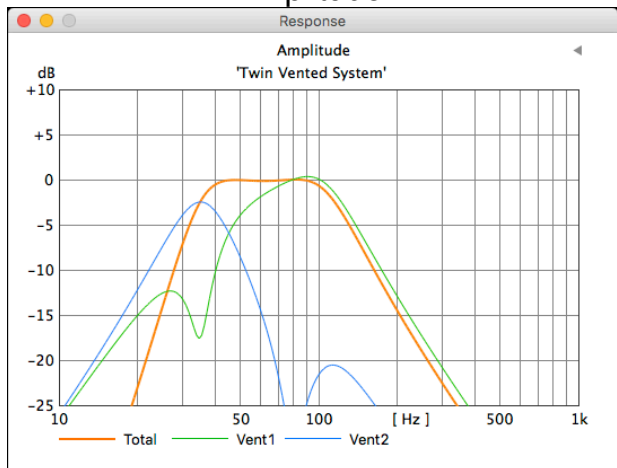




Example of Kelton Box System
Amplitude



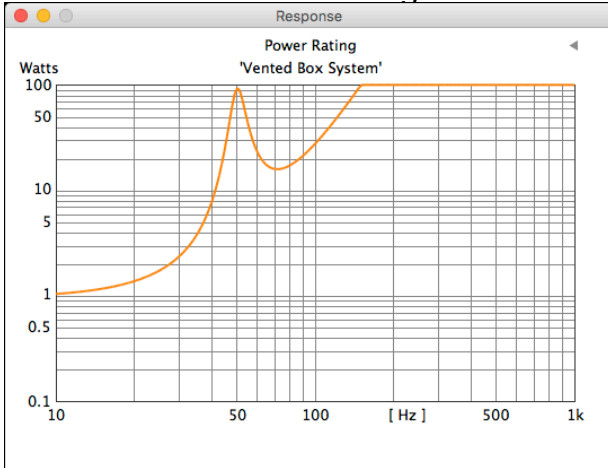
Example of Twin Vented System
Amplitude



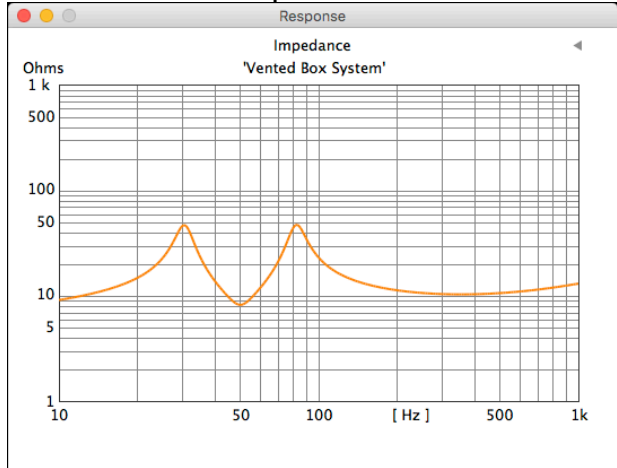
Because Band Pass System utilizes radiation from a vent, and a high pass ingredient of output is cut. It isn't necessary to put a low pass filter in an amplifier circuit, and a low region system can be built.

The following characteristics which becomes help of system design in addition to Amplitude can be indicated.

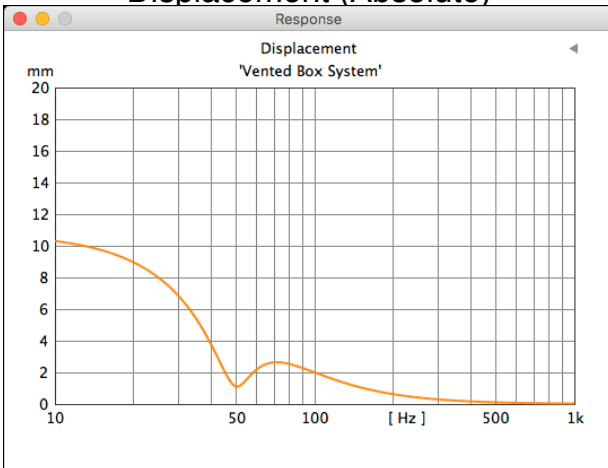
Power Rating



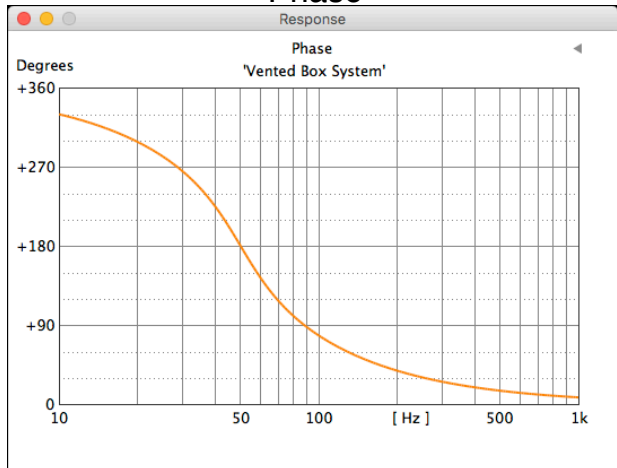
Impedance



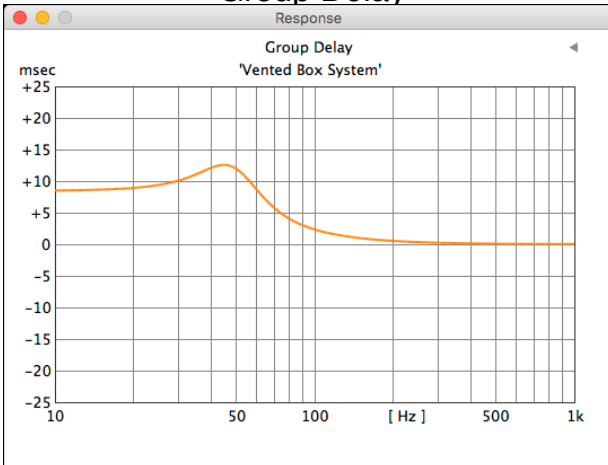
Displacement (Absolute)



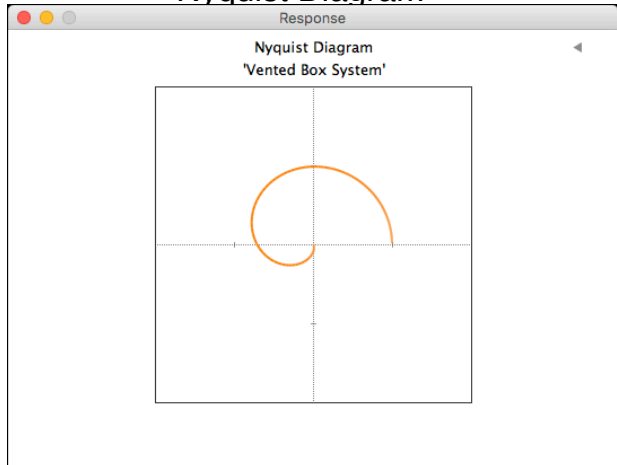
Phase



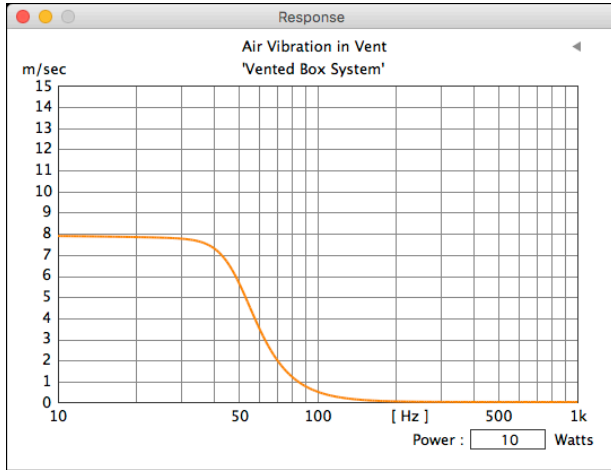
Group Delay



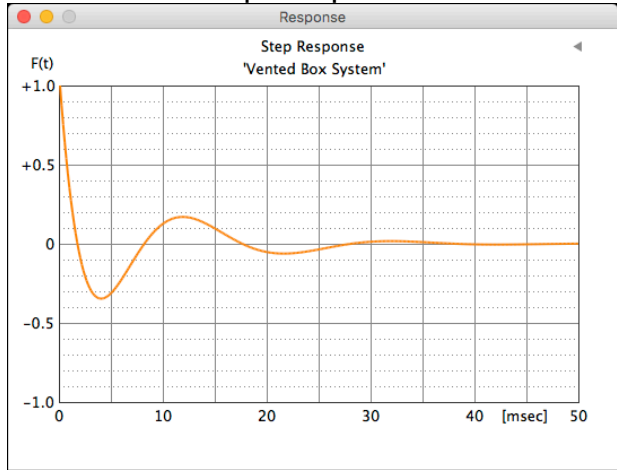
Nyquist Diagram



Air Vibration in Vent



Step Response



Vent Information

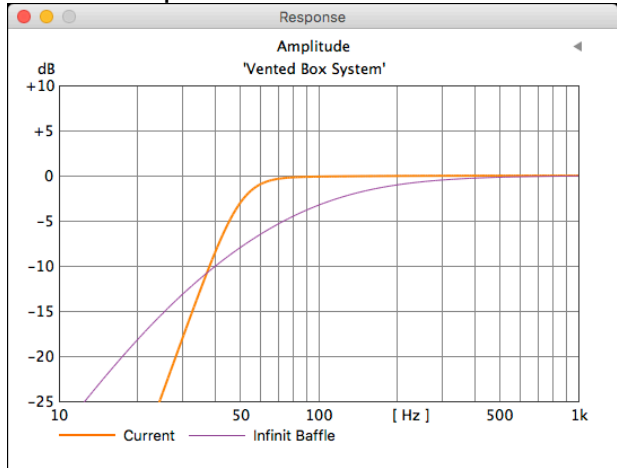
Vent Information
'Vented Box System'

Vent Parameters

Vent is	Ported
Vb(Box Volume)	95 Liter
Fb(Box Tuning Frequency)	50 Hz
Dv(Diameter of Each Vent)	104.46 mm
Lv(Thickness of Baffle)	20 mm
Sv(Total Vent Area)	85.7 cm ²
Number of Vents	1

Vent Figure

Comparison with Infinit Baffle



System Profile

System Profile
'Vented Box System'

Thiele/Small (Driver) Parameters

Model Name	Test20-04
Usable Frequency Range	N/A
Dia(Nominal Diameter)	20 cm
Fs(Free Air Resonance)	50 Hz
Vas(Acoustic Volume)	100 Liter
Qts(Total Q)	0.4
Qes(Electrical Q)	0.435
Qms(Mechanical Q)	5
Effi(Efficiency)	2.501 %
SPL(Sound Pressure Level 1W1m)	96 dB
Re(D.C.Resistance)	6 Ohms
Pemax(Thermal Limit Power)	100 Watts
Sd(Effective Area)	200 cm ²
Xmax (Peak Liner Displacement)	5 mm
Vd(Displacement Volume)	100 cm ³
Le(Voice Coile Inductance)	1 mH

Box Parameters

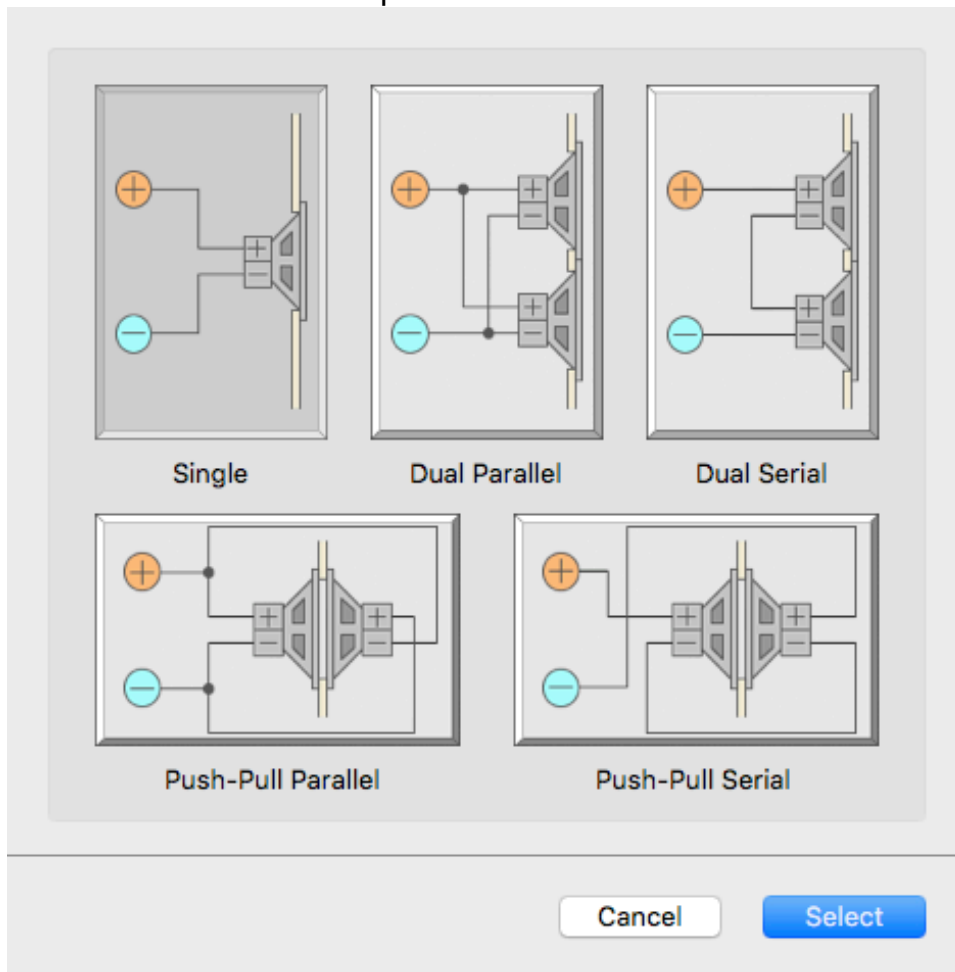
Vb(Box Volume)	95 Liter
Fb(Box Tuning Frequency)	50 Hz
Qb(Box Loss Factor Q)	7

System Figure

Speaker Connection

The various characteristics can be captured and preserved by the PNG format.

Five kinds of loudspeaker connection can be select.



Input Power of loudspeaker and thickness of baffle can change.

The vent can be optimized.

The image shows a dialog box with the following text and input fields:

- Enter Electrical Input Power: Watts
- Pemax Ref. Watts
- Enter Thickness of Port cut in Baffle: mm

At the bottom of the dialog box, there are two buttons: a white 'Cancel' button and a blue 'OK' button.

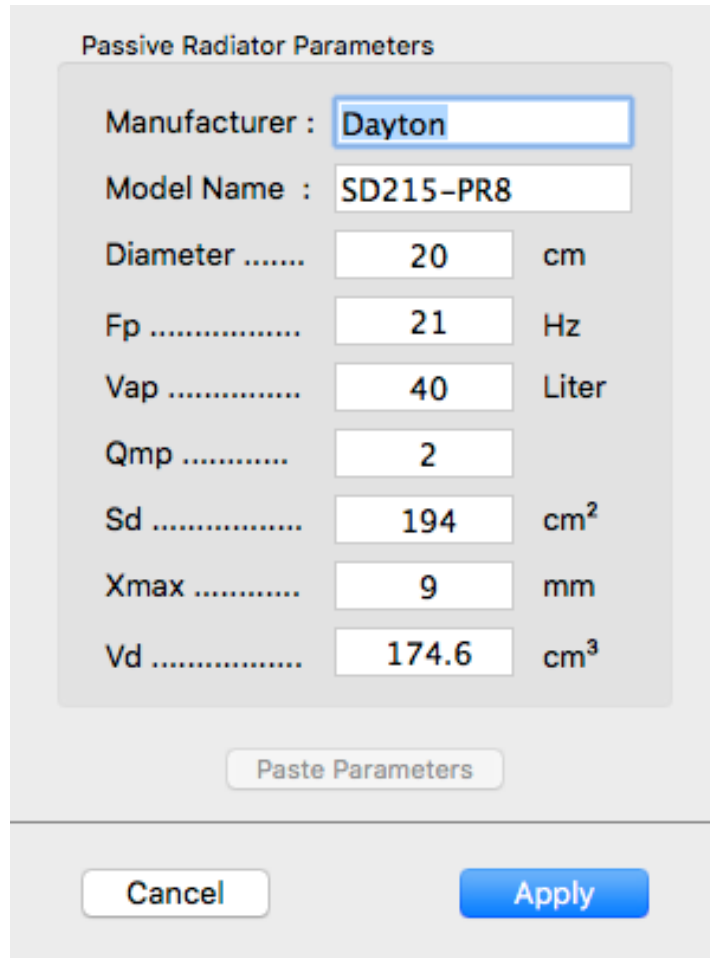
The optimized vent size can be designed.

Parameter	Value	Unit
Vent is	Ducted	
Vb (Box Volume)	95	Liter
Fb (Box Tuning Frequency)	50	Hz
Dv (Diameter of Each Vent)	120	mm
Dvmini (Minimum Diameter)	109.92	mm
Lv (Vent Length)	55.74	mm
Sv (Total Vent Area)	113.1	cm ²
Svmini (Mini. Total Vent Area)	94.89	cm ²
Number of Vents	1	

Chooses Circular by Tab and chooses Ducted, and enter vent diameter, the necessary vent length is calculated.

Parameter	Value	Unit
Vent is	Ducted	
Vb (Box Volume)	95	Liter
Fb (Box Tuning Frequency)	50	Hz
Wv (Vent Width)	100	mm
Hv (Vent Height)	100	mm
Lv (Vent Length)	44.35	mm
Sv (Total Vent Area)	100	cm ²
Svmini (Mini. Total Vent Area)	94.89	cm ²
Number of Vents	1	

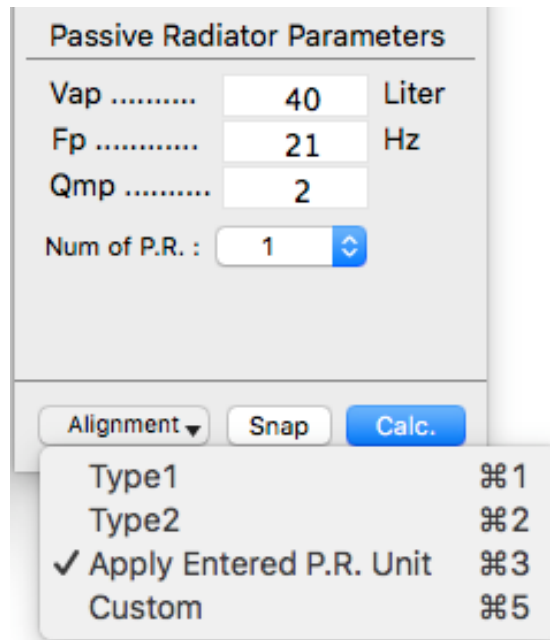
Chooses Rectangular by Tab and chooses Ducted, and enter the width of the vent and height, the necessary vent length is calculated.
It can enter data of Passive Radiator and be reflected to the characteristics.



The image shows a software dialog box titled "Passive Radiator Parameters". It contains several input fields for different parameters, each with a numerical value and a unit. The parameters and their values are: Manufacturer (Dayton), Model Name (SD215-PR8), Diameter (20 cm), Fp (21 Hz), Vap (40 Liter), Qmp (2), Sd (194 cm²), Xmax (9 mm), and Vd (174.6 cm³). Below the input fields is a "Paste Parameters" button. At the bottom of the dialog are "Cancel" and "Apply" buttons.

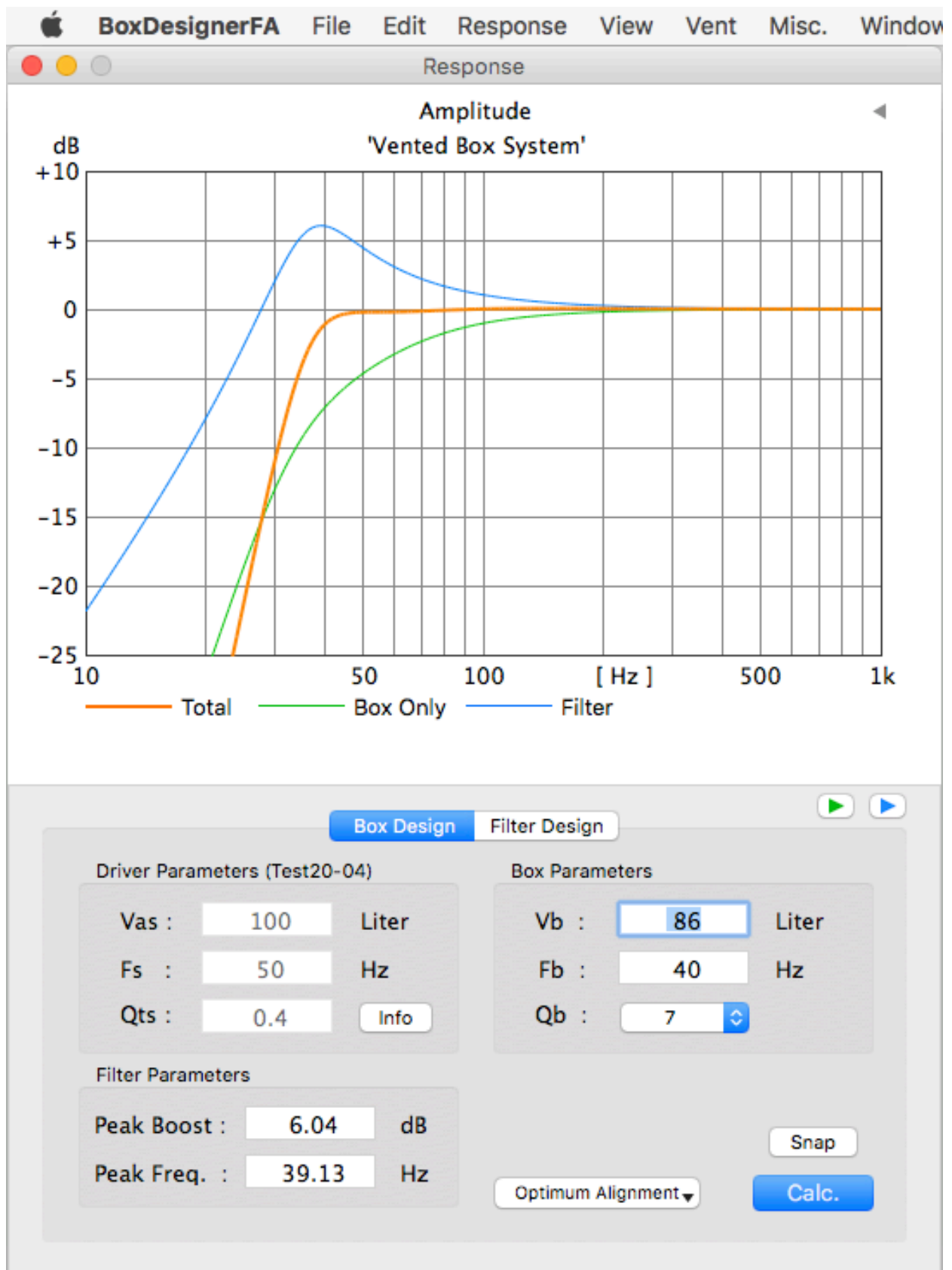
Parameter	Value	Unit
Manufacturer	Dayton	
Model Name	SD215-PR8	
Diameter	20	cm
Fp	21	Hz
Vap	40	Liter
Qmp	2	
Sd	194	cm ²
Xmax	9	mm
Vd	174.6	cm ³

It's taken by "Apply" button in application.



Data is reflected to Alignment.

BoxDesignerFA (Free ware)



Amplitude

BoxDesignerFA File Edit Response View Vent Misc. Window

Response

Filter Circuit 'Vented Box System'

Filter Peak Boost Level	6.04	dB
Filter Peak Frequency	39.13	Hz
C1 : Capacitor Value	0.47	uF
R1 : Resistor Value	2400	Ohm
R2 : Resistor Value	36000	Ohm

Box Design Filter Design

Filter Circuit

Value of Device

C1 Ref. :	0.47uF	
C1 :	0.47	uF
R1 :	2400	Ohm
R2 :	36000	Ohm

Snap

Calc.

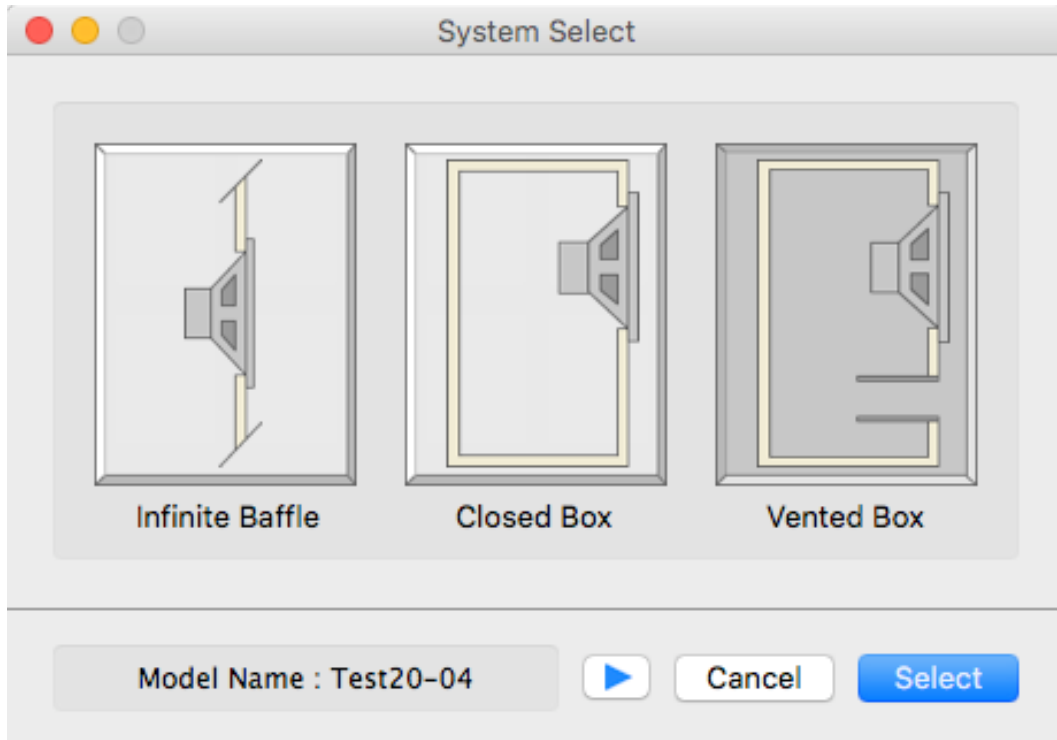
Filter Circuit



BoxDesignerFA Icon



BoxDesignerFA File Icon



System Select

BoxDesignerFA is the application which uses the second order line level low boost filter and designs the system to get better low-frequency performance by a little box volume.

BoxDesignerFA is made based on the theory by D. B. Keele, Jr. , W. Marshall Leach, Jr. and others.

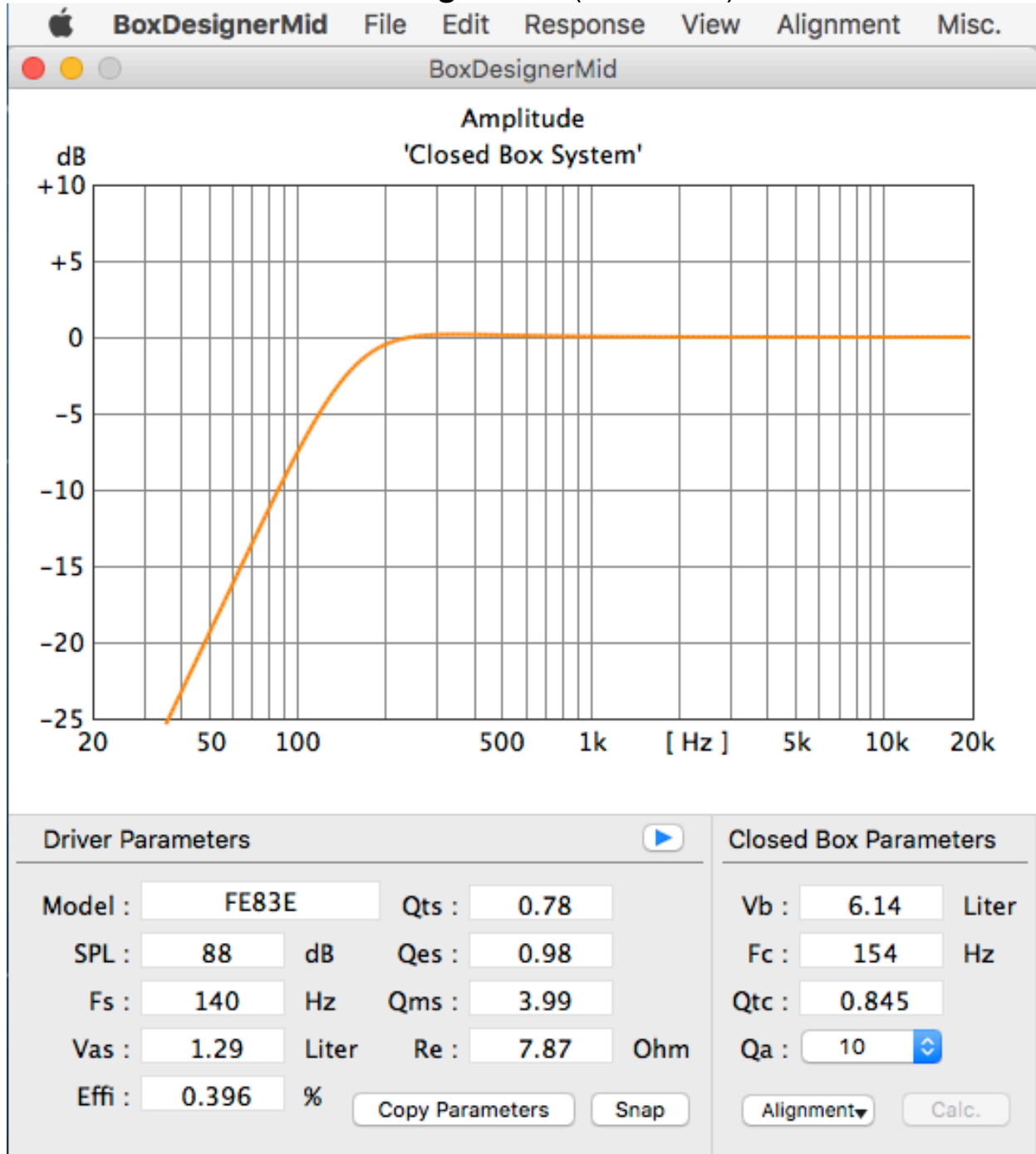
It corresponds to Infnit Baffle System, Closed Box System and Vented Box System.

A boost of +3dB or +6dB can be designed, and a boost circuit by an operation amplifier can be designed at the same time.

All kinds' characteristics which can be indicated are same as BoxDesigner.

It's need "BoxDesignerDB" database software (free ware) to use.

BoxDesignerMid (Free ware)



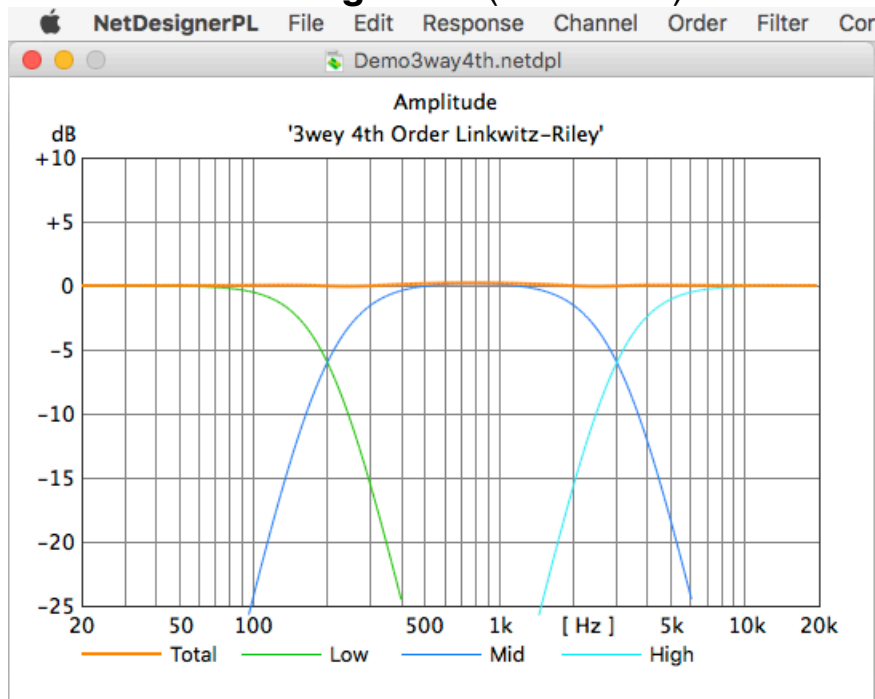
Application for loudspeaker characteristics confirmation for high and medium range.



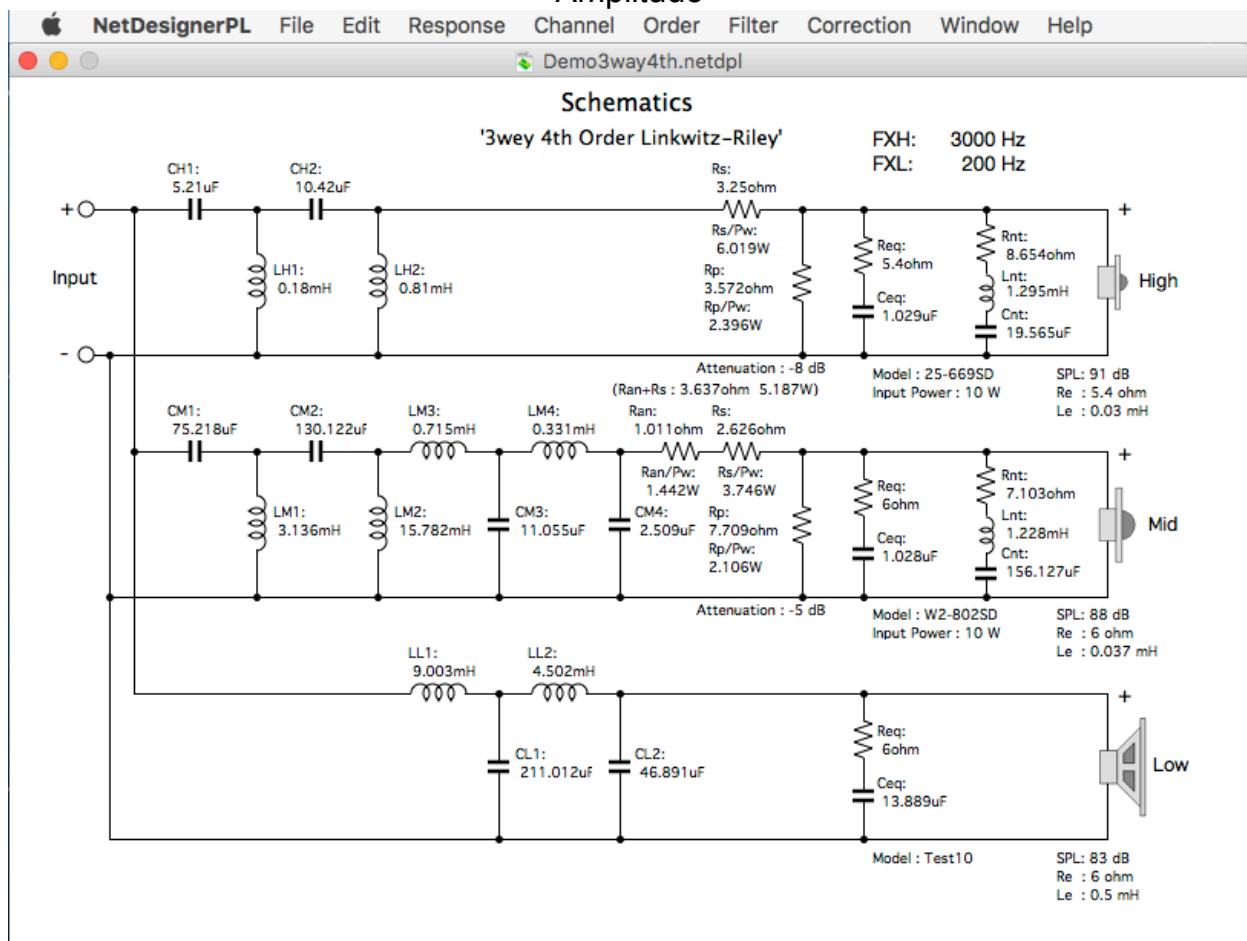
BoxDesignerMid Icon

The closed box volume of the cone speaker for Mid Range can be designed. "Copy Parameters" button is pushed, it's possible to hand data to NetDesignerPL.

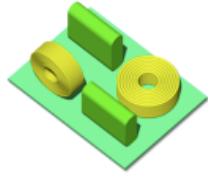
NetDesignerPL (Free ware)



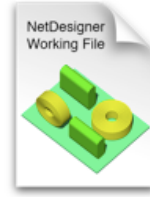
Amplitude



Schematics



NetDesignerPL Icon



NetDesignerPL File Icon

NetDesignerPL is loudspeaker network design application.

NetDesignerPL is a pilot version free ware.

First, Second, 3rd and 4th order network of 2Way and 3Way can be designed.

The shoulder characteristics of Linkwitz - Riley, Butterworth, Butterworth - Asymmetry, Bessel and Chebychev can be chosen.

Various impedance correction and level matching are calculated automatically.

NetDesignerPL is made based on the papers by Siegfried H. Linkwitz , Robert M. Bullock III. and others.

Careful points

Element values of capacitor and inductor can't be customized.

Because the direct current resistance value of inductor isn't being considered, An error of the level by the band of the network made actually forms.

But when taking attention to the points above mentioned, it can be said sufficiently practical application.

Addition

Use of PAD_Corrector.app of an accessory can revise a band level error.

Rich BoxDesigner relating utility Applications.

BoxDesignerDB (Free ware)

The screenshot shows the BoxDesignerDB application window with a menu bar (File, Edit, Sort, Calculate, Misc., Window, Help) and a title bar (_Test Parameters.spdata). The interface includes a 'No.' field (1/14), a 'Selected Model' field (Test20-02), a 'Freq. Range' dropdown (Thiele/Small Parameters), and buttons for 'Add New Model' and 'Select'. Below is a table of speaker parameters:

No	Model Name	Range	Dia (cm)	Fs (Hz)	Vas (Liter)	Qts	Qes	Qms	Effi (%)	Re (Ohms)	Pemax (Watts)	Sd (cm ²)	Xmax (mm)	Vd (cm ³)	Le (mH)
1	Test20-02	N/A	20.0	50.0	100	0.200	0.208	5.000	6.283	6.000	100	200.0	5.00	100.00	1.000
2	Test20-03	N/A	20.0	50.0	100	0.300	0.319	5.000	3.964	6.000	100	200.0	5.00	100.00	1.000
3	Test20-04	N/A	20.0	50.0	100	0.400	0.435	5.000	2.501	6.000	100	200.0	5.00	100.00	1.000
4	Test20-05	N/A	20.0	50.0	100	0.500	0.556	5.000	1.987	6.000	100	200.0	5.00	100.00	1.000
5	Test20-06	N/A	20.0	50.0	100	0.600	0.682	5.000	1.771	6.000	100	200.0	5.00	100.00	1.000
6	Test20-07	N/A	20.0	50.0	100	0.700	0.814	5.000	1.578	6.000	100	200.0	5.00	100.00	1.000
7	Test20-08	N/A	20.0	50.0	100	0.800	0.952	5.000	1.254	6.000	100	200.0	5.00	100.00	1.000
8	Test20-09	N/A	20.0	50.0	100	0.900	1.098	5.000	1.117	6.000	100	200.0	5.00	100.00	1.000
9	Test20-10	N/A	20.0	50.0	100	1.000	1.250	5.000	0.996	6.000	100	200.0	5.00	100.00	1.000
10	Test20-11	N/A	20.0	50.0	100	1.100	1.410	5.000	0.791	6.000	100	200.0	5.00	100.00	1.000
11	Test20-12	N/A	20.0	50.0	100	1.200	1.579	5.000	0.628	6.000	100	200.0	5.00	100.00	1.000
12	Test20-13	N/A	20.0	50.0	100	1.300	1.757	5.000	0.560	6.000	100	200.0	5.00	100.00	1.000
13	Test20-14	N/A	20.0	50.0	100	1.400	1.944	5.000	0.499	6.000	100	200.0	5.00	100.00	1.000
14	Test20-15	N/A	20.0	50.0	100	1.500	2.143	5.000	0.445	6.000	100	200.0	5.00	100.00	1.000

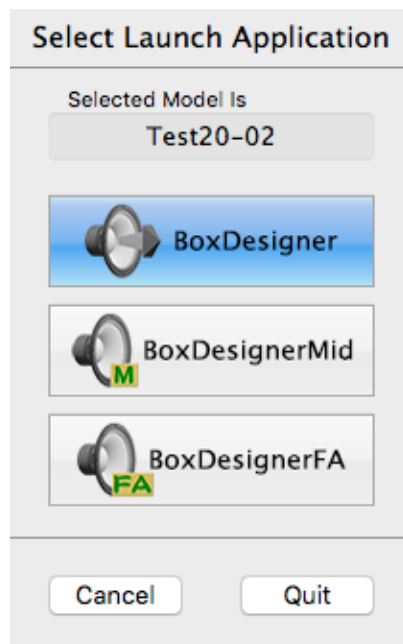
Loudspeaker data base application.



BoxDesignerDB Icon



BoxDesigner File Icon



The model who uses is chosen, a Launch application button is clicked, and "System Select" of launched application is indicated.

Currently, data files of 60 manufacturers are attached.

PassiveRadiatorDB (Free ware)

No	Manufacturer	Model Name	Dia (cm)	Fp (Hz)	Vap (Liter)	Qmp	Sd (cm ²)	Xmax (mm)	Vd (cm ³)	Mms (grams)
1	Dayton	DSA90-PR	7.5	43.7	3.5	5.720	31.2	4.00	12.48	5.0
2	Dayton	DSA115-PR	10.0	30.9	9.4	3.480	54.1	6.00	32.46	11.7
3	Dayton	DSA135-PR	12.5	27.9	12.2	3.700	75.4	8.00	60.32	21.5
4	Dayton	DSA175-PR	16.2	26.8	27.1	4.300	128.7	8.00	103.00	30.7
5	Dayton	DSA175-PR+75g	16.2	14.5	27.1	7.970	128.7	8.00	103.00	105.7
6	Dayton	DSA175-PR+150g	16.2	11.1	27.1	10.420	128.7	8.00	103.00	180.7
7	Dayton	DSA215-PR	20.0	25.6	36.7	7.660	211.2	11.00	232.32	67.0
8	Dayton	DSA215-PR+75g	20.0	17.6	36.7	11.140	211.2	11.00	232.32	142.0
9	Dayton	DSA215-PR+150g	20.0	14.2	36.7	13.775	211.2	11.00	232.32	217.0
10	Dayton	DSA215-PR+225g	20.0	12.3	36.7	15.980	211.2	11.00	232.32	292.0
11	Dayton	DSA215-PR+300g	20.0	11.0	36.7	17.910	211.2	11.00	232.32	367.0
12	Dayton	DSA270-PR	25.0	21.9	105.8	5.260	353.0	11.00	388.30	88.4
13	Dayton	DSA270-PR+75g	25.0	16.2	105.8	7.130	353.0	11.00	388.30	163.4
14	Dayton	DSA270-PR+150g	25.0	13.4	105.8	8.620	353.0	11.00	388.30	238.4
15	Dayton	DSA270-PR+225g	25.0	11.7	105.8	9.880	353.0	11.00	388.30	313.4

Passive radiator data base application.



PassiveRadiatorDB Icon



PassiveRadiatorDB File Icon

In the state BoxDesigner has launched, "Send" button Crick, "Passive Radiator Enter" in BoxDesigner is shown and copies automatically, it's entered by a "Apply" button.

Currently, data files of 12 manufacturers are attached.

ResonanceCalc (Free ware)

Box Resonance Calculator

Vent Figure

Known Box Volume

Vent Figure Select

Ported Circular

Ducted Rectangular

Both Ends Free Duct

Box Parameters

Box Volume : 30 Liter

Subtract Duct Volume

Vent Parameters

Dv : 50 mm

Lv : 100 mm

Vent Number : 2

Other Box & Vent Parameters

Fibrous Material Filling in Box : Volume Increase =100%

Thickness of Duct : 5 mm

Solutions

Effective Box Volume (Vb) : 30 Liter

Resonance Frequency (Fb) : 53.78 Hz

Vent (Duct) Volume (Vv) : 0 Liter 50%

Vent Air Column Resonance (F0) : 1264.03 Hz (Half of Wave)

Effective Vent Length (Lv') : 136.47 mm (Corrected)

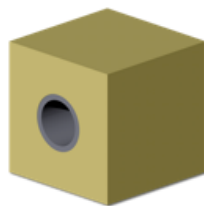
Total Vent Area (Sv) : 39.27 cm²

Q of Vent per One at Fb (Qv) : 74.85

Snap Calc.

Application for the design with the detailed box volume and vent size.

Filling of fabric material to a box,
the influence of the volume of the duct can be confirmed.



ResonanceCalc Icon

BoxSizeCalculator (Free ware)

Box Volume : Liter

Box Internal Size

From Two Size From Size Ratio

Zero is enter to unknown value.

Box Width : mm

Box Height : mm

Box Depth : mm

Solutions (Box Internal Size)

Box Width : mm

Box Height : mm

Box Depth : mm

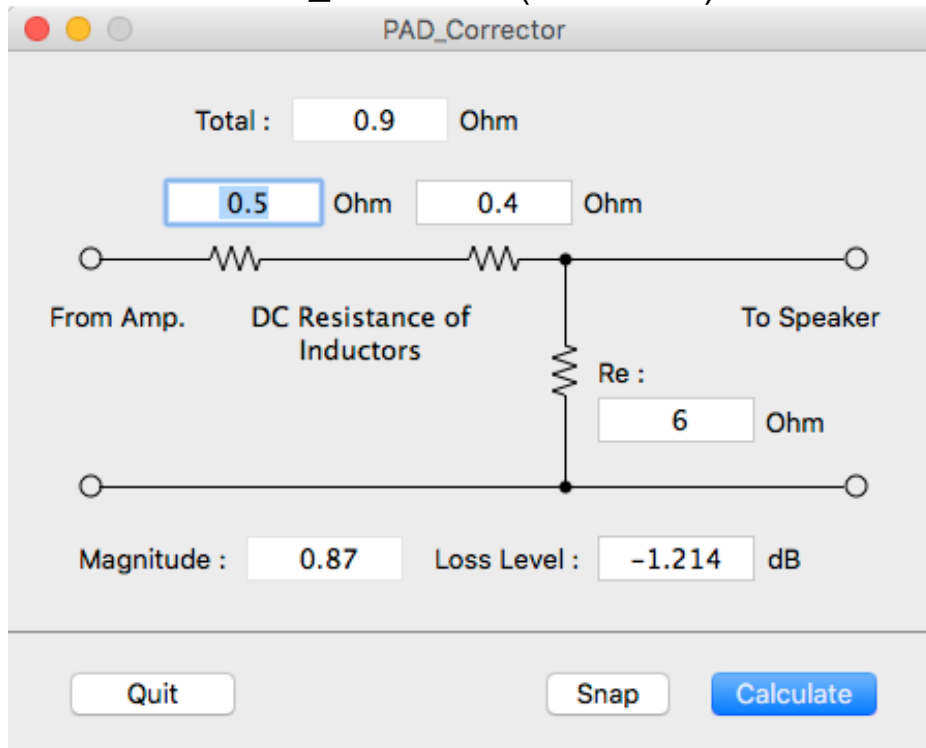
Application which calculates the size of the box.



BoxSizeCalculator Icon

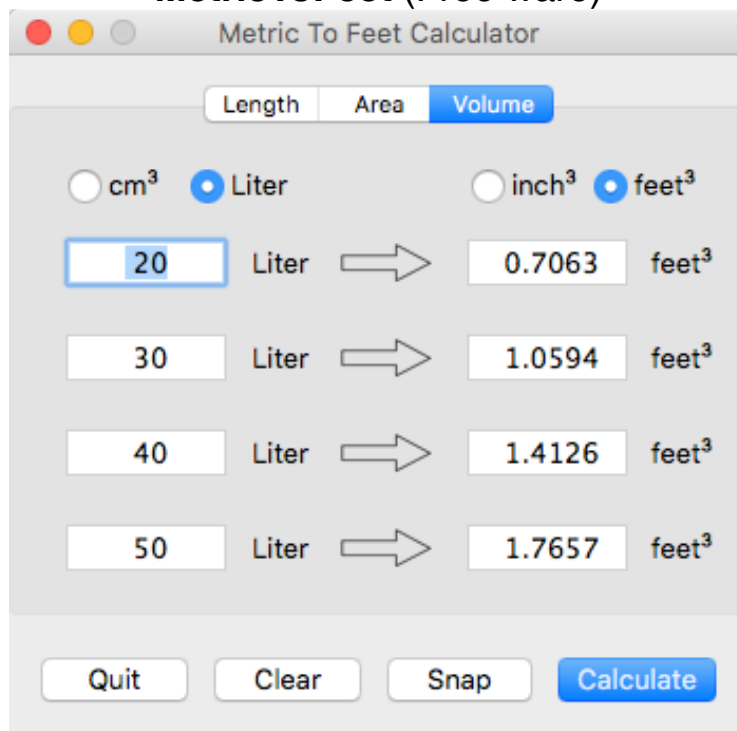
The box size is calculated from two sizes of the box or the ratio of the size.

PAD_Corrector (Free ware)



This is a mini app for mid and high level correction for NetDesignerPL.

MetricToFeet (Free ware)



This is mini app for the metric units is changed to the feet units.

Special note.

The above applications opens only one file at present.