Subject: Pi 3 subwoofer
Posted by 48h350 on Mon, 09 Jul 2012 11:37:25 GMT
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Hi Wayne, you sent me the plans for the Pi 3 sub.
Unfortunately the shipping to Australia is just about as expensive as the driver-Eminence Lab 12-itself, so i am looking for alternatives.
You did approve, in the past,the use of a car sub from JBL: GTO 1214 TD .
So I am thinking of using this driver to build the subs (2)
http://www.jbl.com/resources/Brands/jbl/Products/ProductRelatedDocuments/en-US/BoxesandParameters/GTO1214TD.pdf

I found this piece of software to work out dimensions,port length etc.
http://www.ajdesigner.com/fl_subwoofer/subwoofer.php
Is this software good enough to design the enclosure or would you use something else?
What alignment would you recommend?
Would you build a sub just as wide as the Pi 4 and use it as a stand?
Thanks for your work.

Massimo

Subject: Re: Pi 3 subwoofer
Posted by Wayne Parham on Mon, 09 Jul 2012 13:08:27 GMT
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Subs are pretty easy to design, really. They don't have to run midrange frequencies, so there are no standing waves inside because the box is acoustically small. So you can expect the box modeling software to be accurate.

I like to use an alignment that is slightly overdamped so it doesn't become peaky when the voice coil gets hot.

Subject: Re: Pi 3 subwoofer
Posted by 48h350 on Thu, 12 Jul 2012 23:30:36 GMT
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Hi Wayne I am following the road of using Pialign to model the enclosure of the above mentioned driver jbl gto1214.
(Thiele and Small parameters attached in original post)
after a while I "think" I understand how to use it. Can I confirm with you that, to get QD for your program, you do: Qd= 1/Qm + 1/Qe ?

where Qm is Mechanical Q of the driver and Qe is the electrical Q.
I obtained a Qd of 2.133

I attach the results, can you be so kind to see if they make sense?

For the dimensions, am I right to assume that volume HAS to be reached with the suggested dimension in relation with the port diameter and length ? In other words if I wanted a square faced SW, is there any way to "lead" the program to do so ?

Thanks Wayne

massimo

File Attachments

1) JBL GTO1.PID, downloaded 466 times

Subject: Re: Pi 3 subwoofer
Posted by Wayne Parham on Fri, 13 Jul 2012 01:09:29 GMT
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Your results look good, and you could expect a nice little subwoofer from that 1ft3 box. It isn't very large and yet has 35Hz f3 and 22Hz f10. Port area is 12in2, so you can make it 3.5" square and 5" long.

That woofer is suitable in tiny little boxes from 0.5ft3 up to about 3ft3. Helmholtz frequency should be 20-25Hz.

I'd probably put it in a box between 1ft3 and 2ft3 with Helmholtz frequency of 22Hz. It will work well in cabinets that size range.

Subject: Re: Pi 3 subwoofer
Posted by 48h350 on Fri, 13 Jul 2012 02:37:12 GMT
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Great Wayne, thanks for that.
How can I get your software to work with a different volume?
Am I right to assume the pialign will only give a pi aligned result and one only?
So if I chose to build a box say 15"x 15" x 15" can I still use the
12sq. inches port and 5" long?
Thanks for your patience

massimo

Subject: Helmholtz formula
Posted by Wayne Parham on Fri, 13 Jul 2012 03:11:47 GMT
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15" x 15" x 15" would be a nice box size for that woofer.

But PiAlign won't calculate a port for that box. It was designed to recommend a cabinet size, used mostly for mains cabinets really. It's literally a 1970s program. Not that electro-mechanical alignment software is or even needs to be more modern than that, but still, my point is that is a single-purpose design tool.

You could calculate the port using standard Helmholtz formula. That will be plenty for a sub, no need to do any more analysis.

Subtract the volume displaced by the driver and wood thickness. Without offset, a 15" x 15" a 15" box is 3375in3. If you use 3/4" wood, that will reduce it by about 9003 to ~2450in3. Estimate the volume offset by the woofer at 250in3. That leaves volume at ~2200in3. So calculate Helmholtz frequency using that volume, using the formula below:

Here's a little BASIC program that will calculate the formulas for you:

```
10 INPUT"Enclosure Volume";VE
20 INPUT"Diameter of Port";PD
30 INPUT"Length of Port";PL
40 VB=VE*1728:PI=3.1415926535:AP=PI*((PD/2)^2):LC=PL+((8*PD)/(3*PI))
50 FR=(13548/(2*PI))*(AP/(VB*LC))^.5
60 PRINT"Fr =";FR;"Hz."
70 GOTO 10
```

You can verify the Helmholtz frequency if you wish. Measure impedance and look for the minimum between the peaks to find the Helmholtz frequency.

Subject: Re: Helmholtz formula
Posted by 48h350 on Fri, 13 Jul 2012 04:17:27 GMT
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Great.

I get 8.4 inches long port with a diameter of 4 inches in a 15"x15"x15" box with a Helmholtz frequency of 22.87 Hz in a box of 1.27 cu ft. of volume.
Thanks for the help Wayne.

massimo