

5. Verifying the Measurements in REW

By David Das

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Overview

In the previous article you learned how to import the FIR Filters from Aconate into ROON's Convolution Engine.

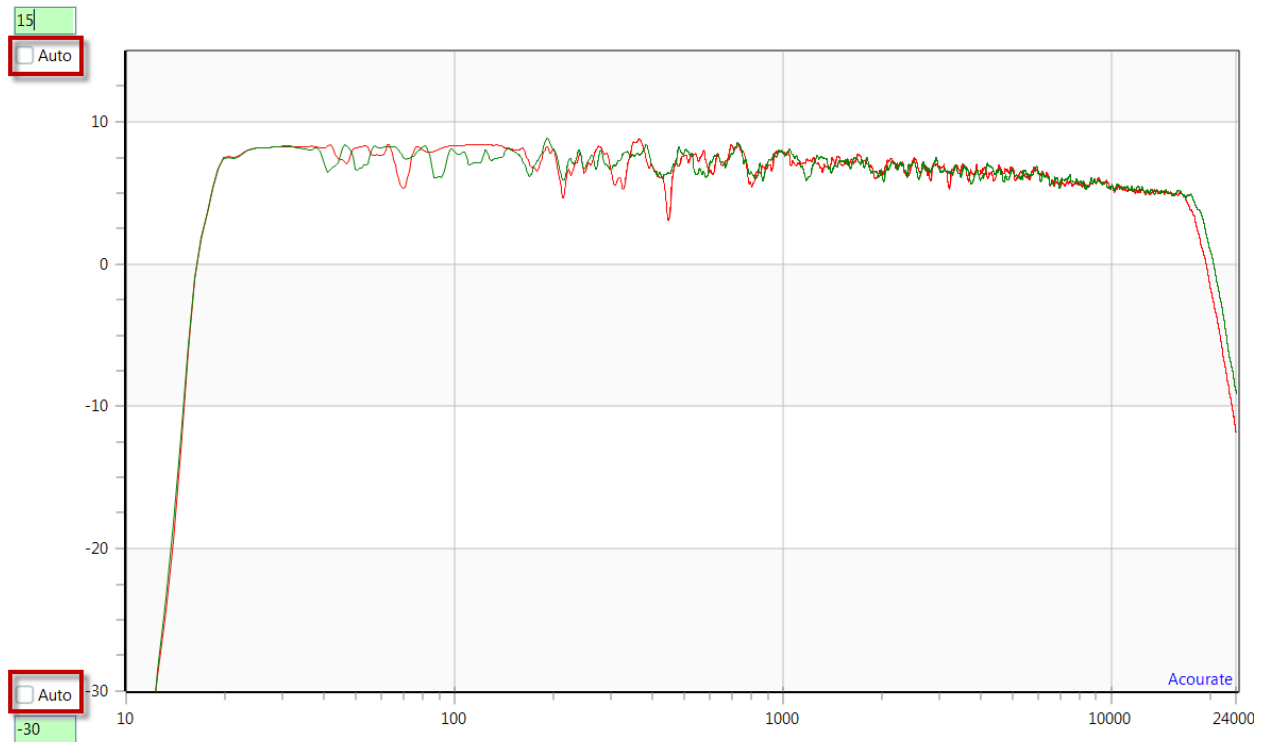
You imported these two Filters:

Moab-P1.zip

Moab-P2.zip

Let's focus on **Moab-P1.zip**

Here are the **Predicted** Impulse Response Curves of the Left and Right Channels as computed by Aconate.



Your objective is to verify the Predicted results with actual measurements taken with REW.

To do so, you would create LogSweeps for the Left and Right channels in REW and add them to your ROON Music Library.

Next, you will have ROON playback those LogSweeps with the Moab-P1 Preset engaged and measure the responses in REW. They will reflect the measurements after applying Digital Correction.

This will allow you to compare the Before Measurements with the After Measurements in REW.

In the next article I will share my closing thoughts along with a few references.

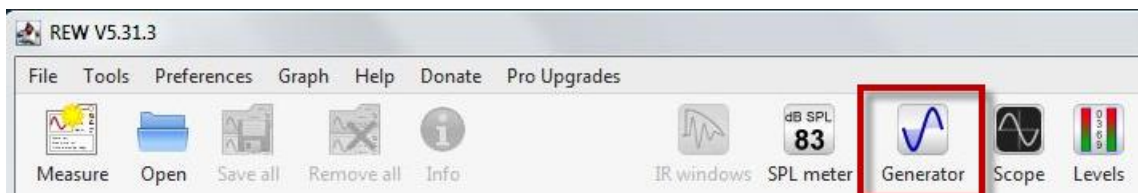
Let's begin!

Create a Test Tone for the Left Channel

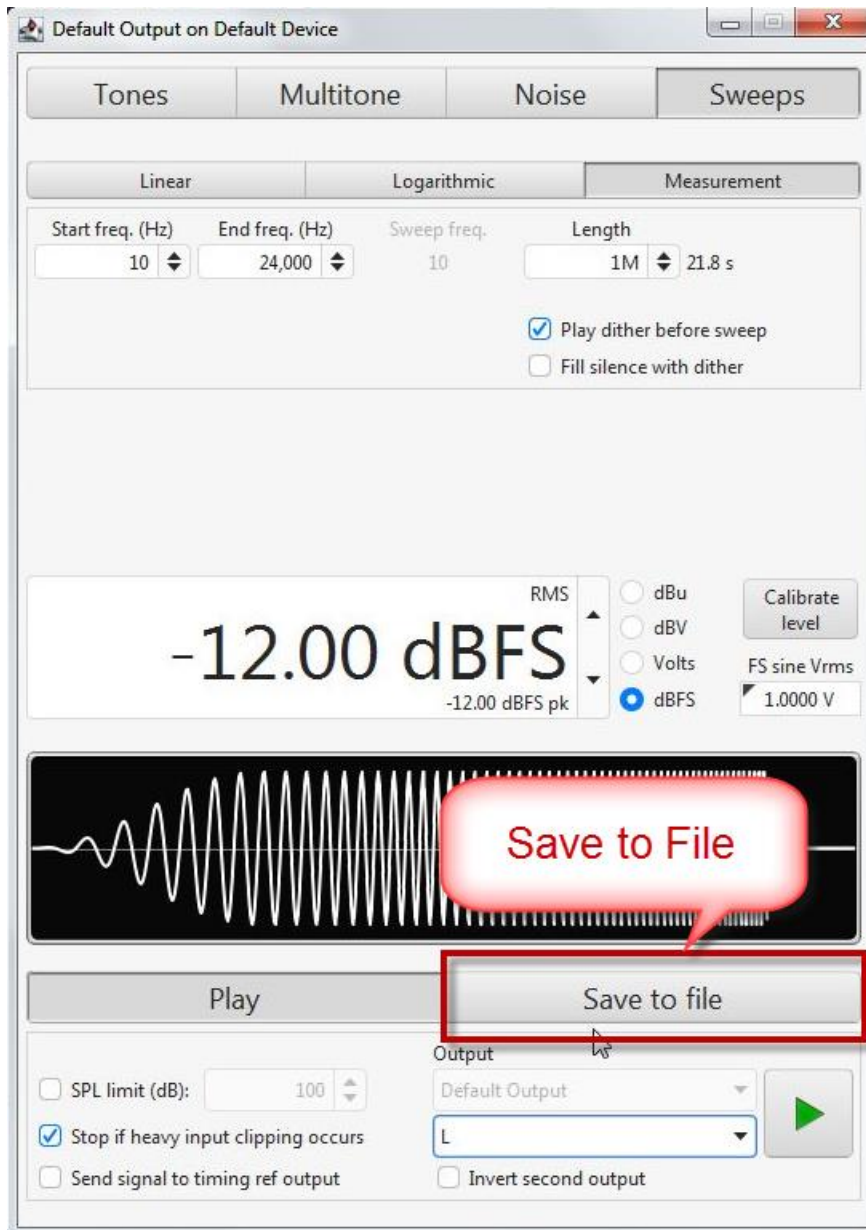
Launch REW



Open the **Signal Generator** Tool.



Open the **Save to File** Tab

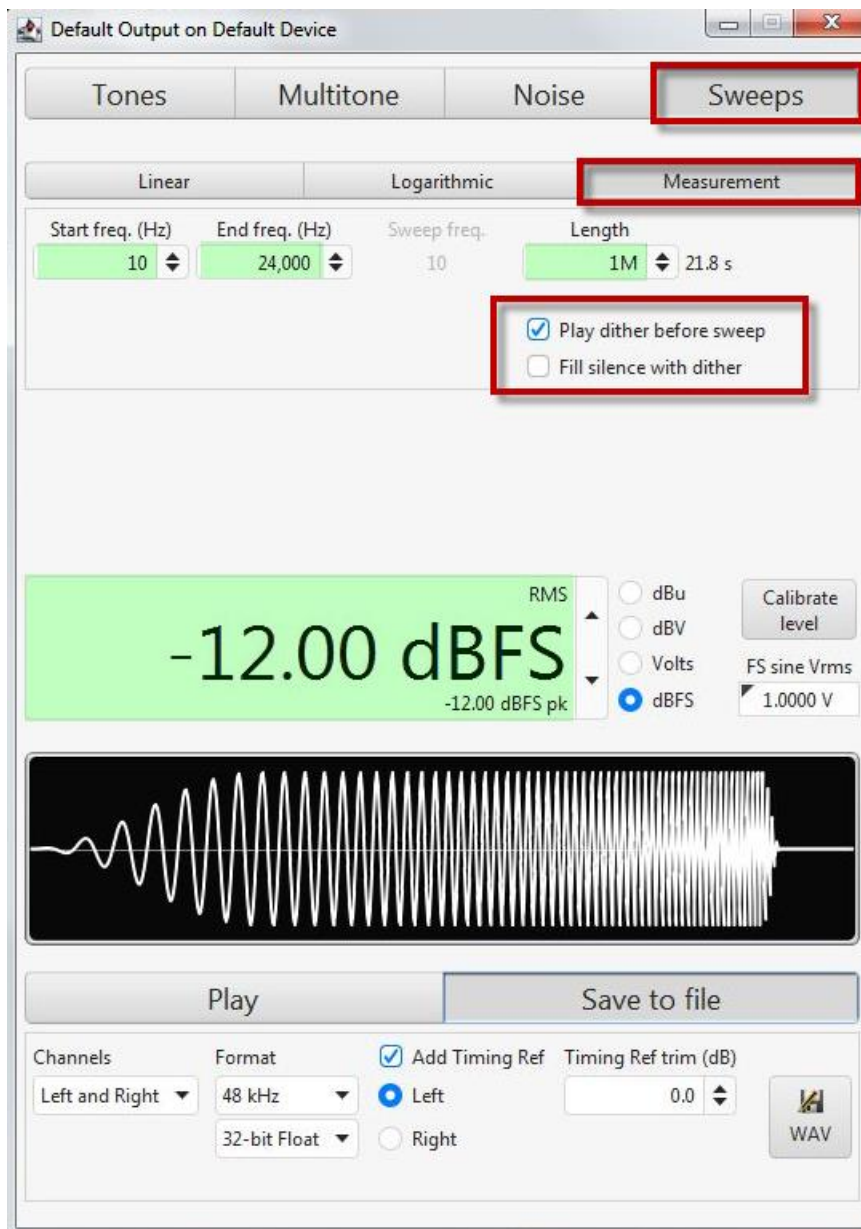


Open the **Sweeps** Tab
Open the **Measurement** Tab

Start Freq = 10Hz
End Freq = 24,000Hz

Length = 1M (1 million samples. This will play for 21.8 seconds)
Check Play dither before sweep

Level = -12dBFS

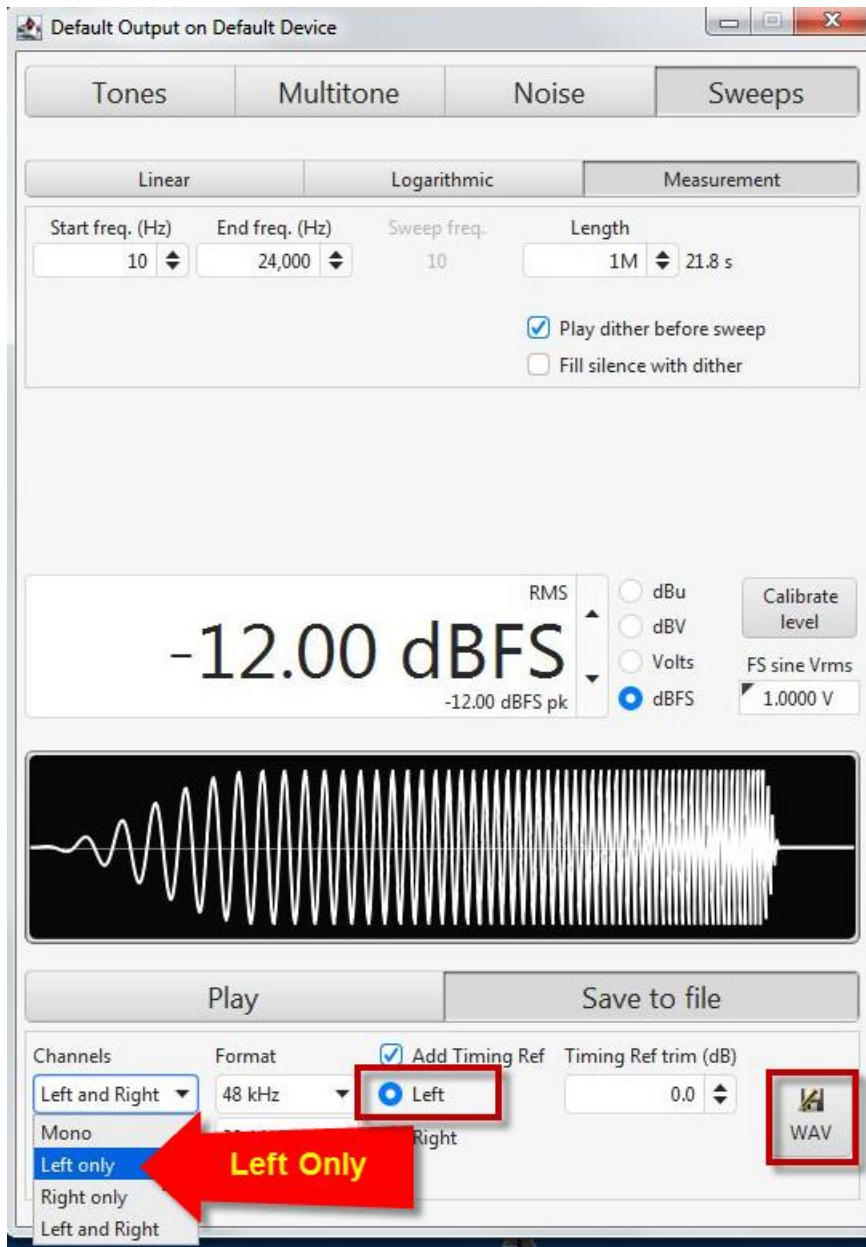


Channels:

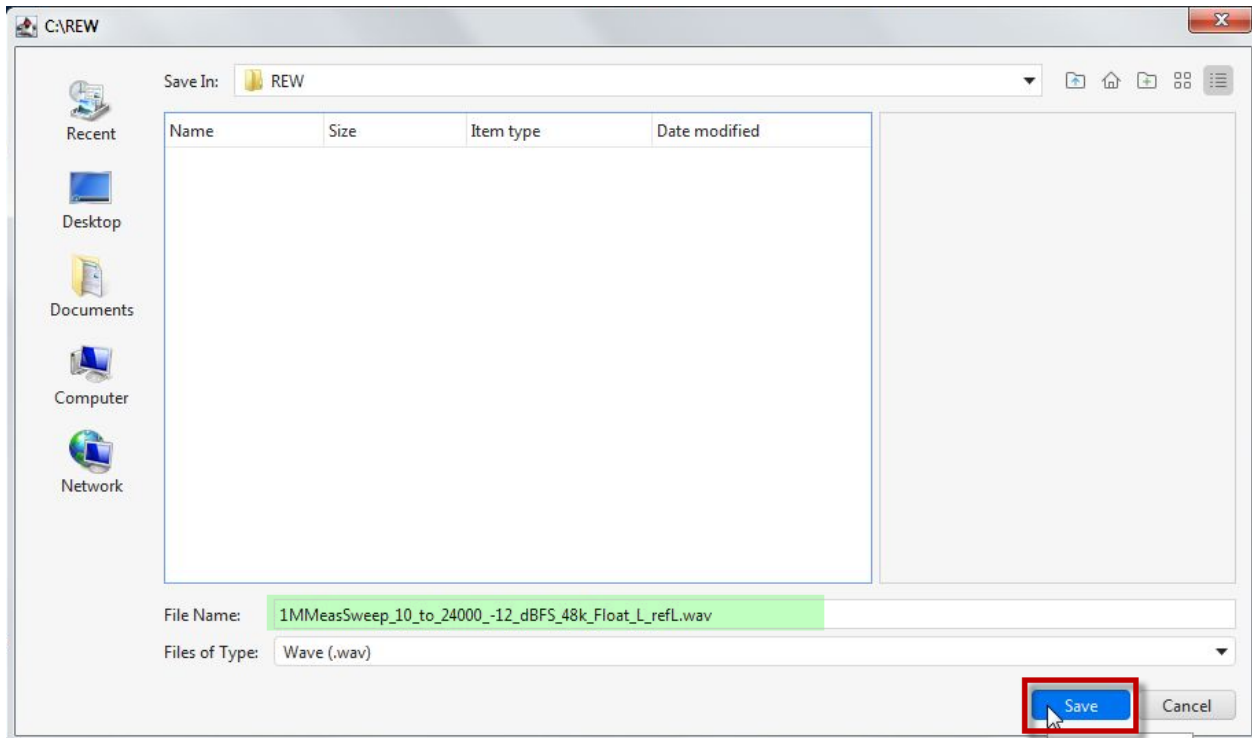
Select **Left Only**

Check **Add Timing Reference**

Select the Left Channel as your Timing Reference

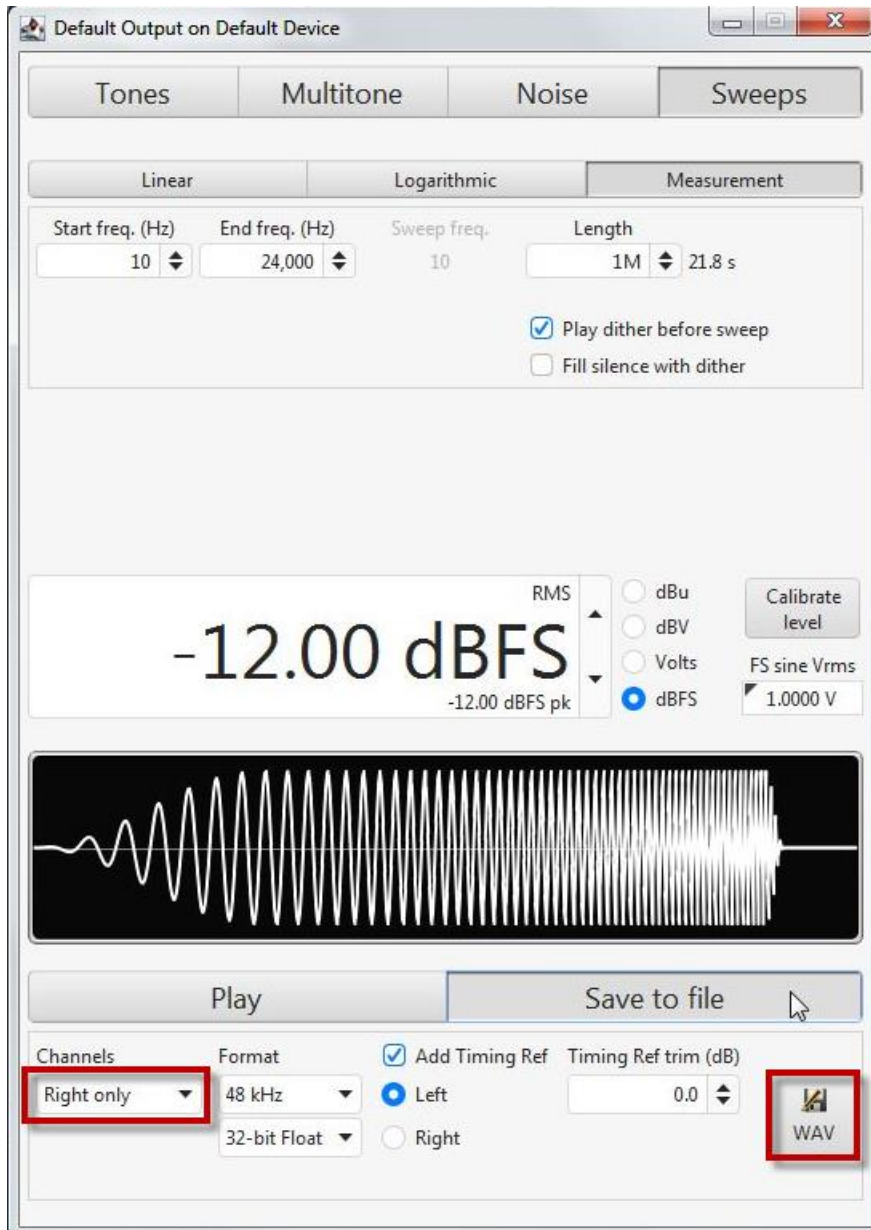


Click on the **WAV** button to save the Sweep to a WAV File.



Save this file to C:\REW

Create a Test Tone for the Right Channel

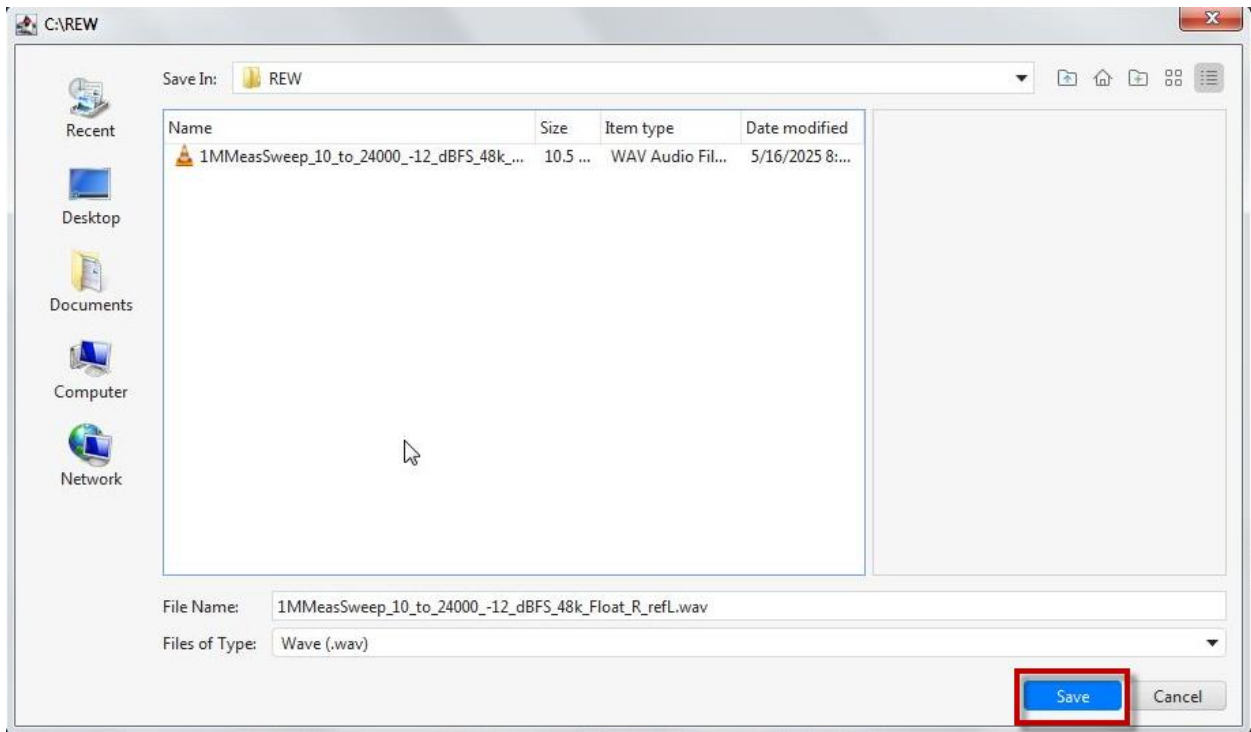


Select Channels = **Right Only**

Keep the same Timing Reference Channel = Left

Press the **WAV** button to save the file.

Save the File to C:\REW



Save

C:\REW

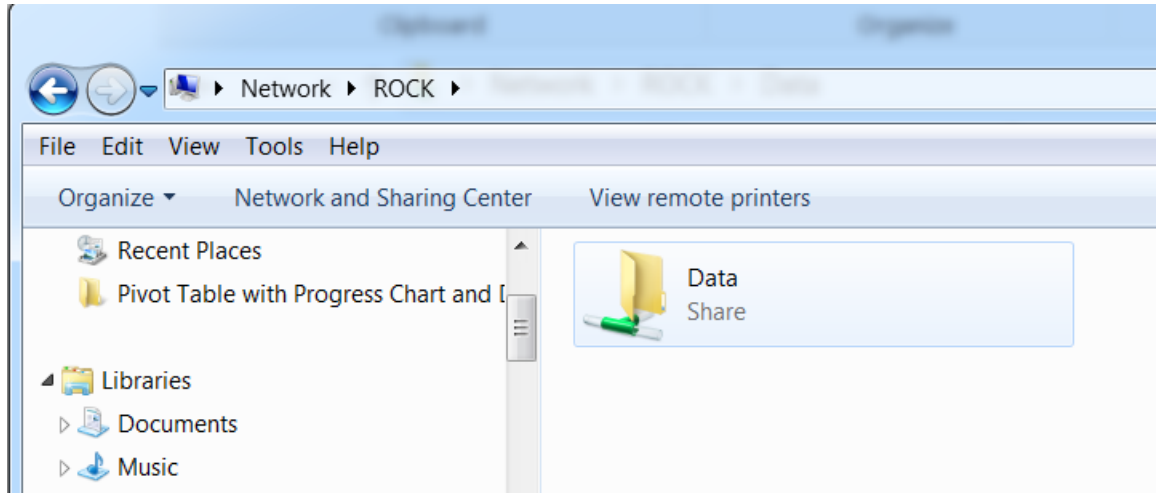
1MMeasSweep_10_to_24000_-12_dBFS_48k_Float_L_refL.wav	WAV Audio File (VLC)	10,753 KB
1MMeasSweep_10_to_24000_-12_dBFS_48k_Float_R_refL.wav	WAV Audio File (VLC)	10,753 KB
Moab Before.mdat	REW Measurement	1,300 KB

You have one sweep for the Left Channel and one sweep for the Right Channel. Both Sweeps are using the Left Channel as a Timing Reference.

Add the Test Tones to your ROON Music Library

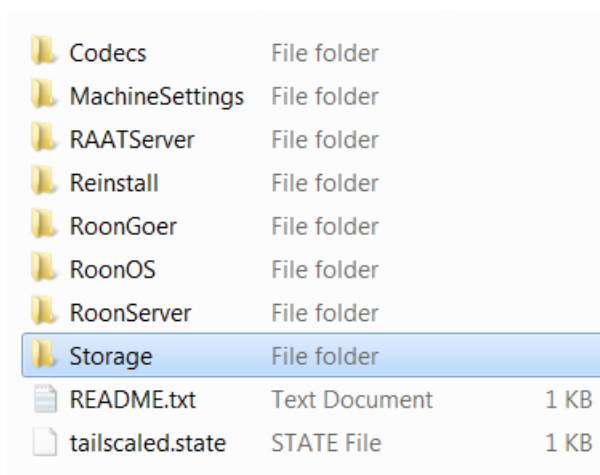
Open Windows Explorer.

Enter Network Address = <\\ROCK>



Open the **Data** folder.

<\\ROCK\Data>



Open the **Storage** folder.

<\\ROCK\Data\Storage>

MUSIC_Generic_STORAGE_DEVICE_3361-6533-p1 File folder

Open this folder.

\\ROCK\Data\Storage\MUSIC_Generic_STORAGE_DEVICE_3361-6533-p1

Create a new folder named **REW Test Tones**

MusicLibrary	File folder
RoonBackups	File folder
REW Test Tones	File folder

Copy the REW Test Tones for the Left and Right Channels into this folder.

\\ROCK\Data\Storage\MUSIC_Generic_STORAGE_DEVICE_3361-6533-p1\REW Test Tones

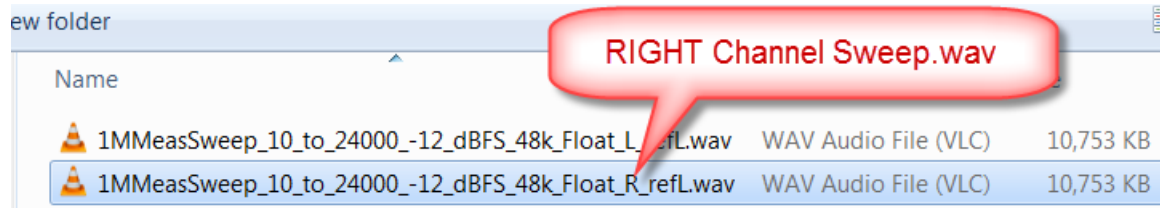
1MMeasSweep_10_to_24000_-12_dBFS_48k_Float_L_refL.wav	WAV Audio File (VLC)	10,753 KB
1MMeasSweep_10_to_24000_-12_dBFS_48k_Float_R_refL.wav	WAV Audio File (VLC)	10,753 KB

These filenames are rather long and they look too similar.

To avoid confusion rename them as follows:

Name	Type	Size
1MMeasSweep_10_to_24000_-12_dBFS_48k_Float_L_refL.wav	WAV Audio File (VLC)	10,753 KB
1MMeasSweep_10_to_24000_-12_dBFS_48k_Float_R_refL.wav	WAV Audio File (VLC)	10,753 KB

LEFT Channel Sweep.wav

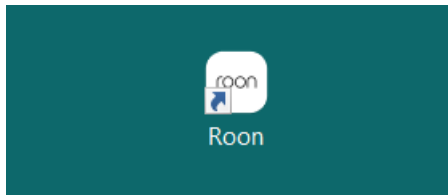


This will make it much easier to differentiate between the Left and Right Sweeps when you play them through ROON.

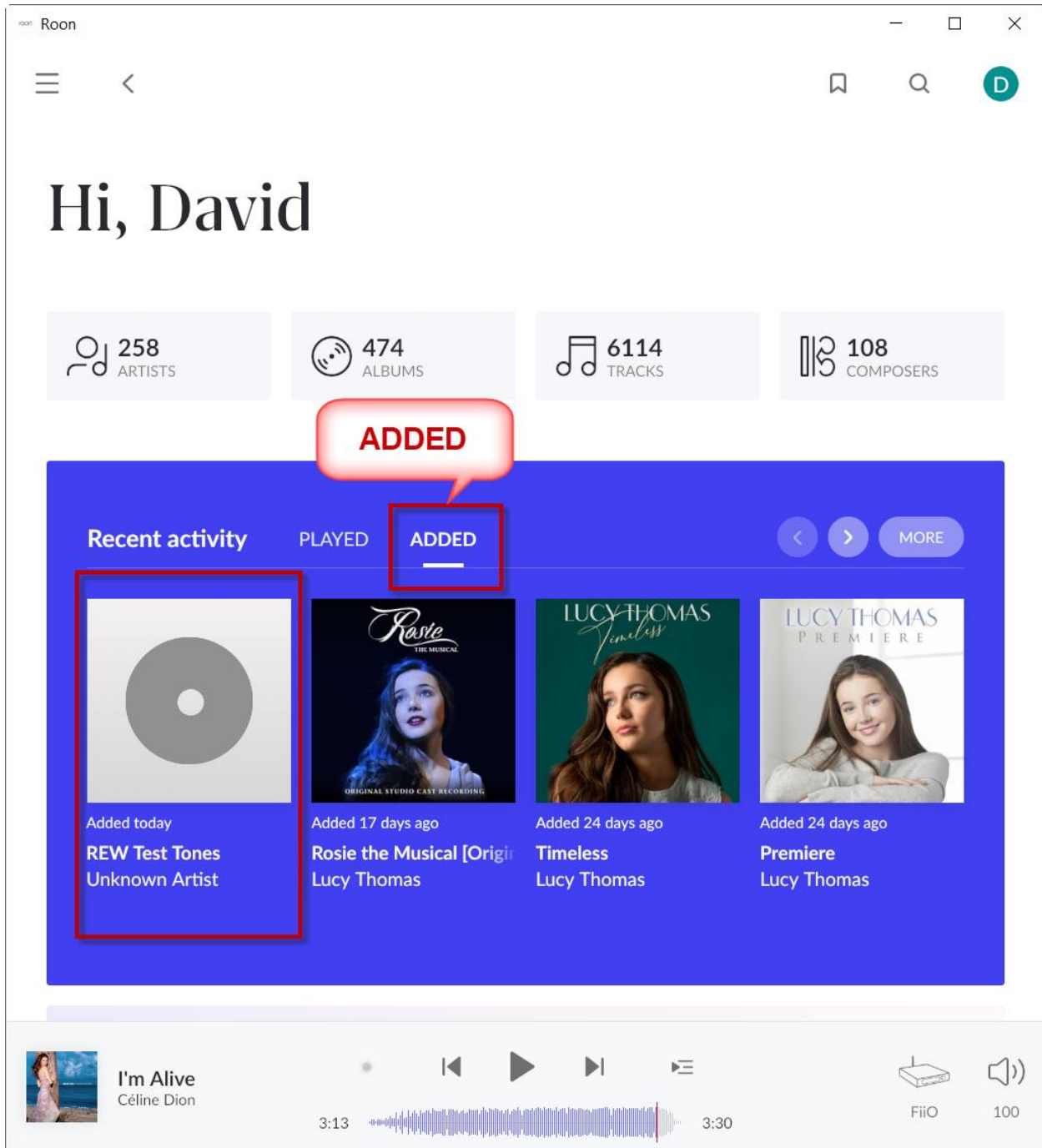
[\\ROCK\Data\Storage\MUSIC_Generic_STORAGE_DEVICE_3361-6533-p1\REW_Test_Tones\](\\ROCK\Data\Storage\MUSIC_Generic_STORAGE_DEVICE_3361-6533-p1\REW_Test_Tones)



Launch ROON



You will find the **REW Test Tones** folder under the **ADDED** Tab.



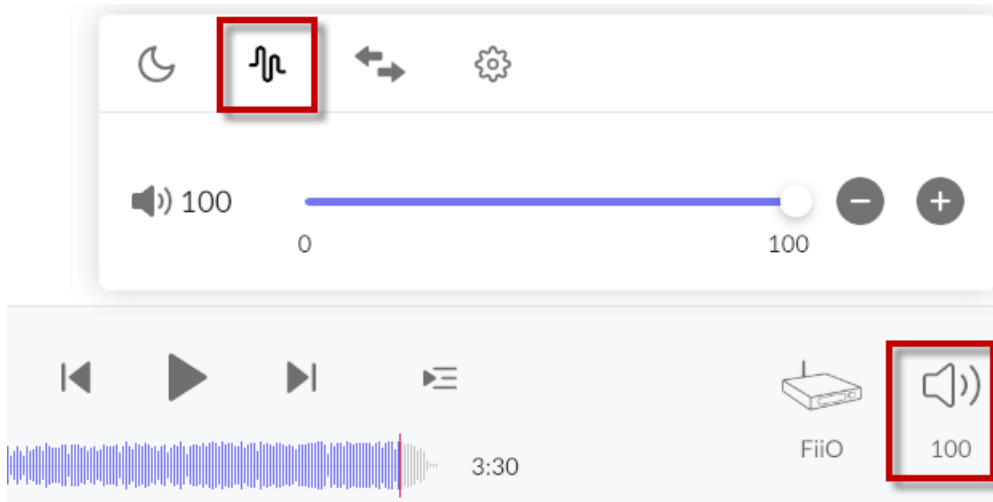
These are the two Test Tones you have added to your ROON Music Library.

The screenshot shows the ROON Music Library interface. At the top, the 'Roon' logo is visible on the left, and window control icons (minimize, maximize, close) are on the right. Below the logo are navigation icons (hamburger menu, back arrow) and utility icons (bookmark, search, profile 'D'). The main content area features a large grey album cover with a white circle in the center. To the right of the cover, the album title 'REW Test Tones' is displayed in a large, bold font, followed by 'Unknown Artist' and 'Various Artists'. Below this is a 'Play now' button and three circular icons: a heart, a plus sign, and a three-dot menu. Underneath the album information, the following details are listed: 'Unidentified | 56 sec | ☆☆☆☆☆ | WAV 48kHz 32bit | ↗ 15 | Added 16 May 2025'. A section titled 'TRACKS' is centered below the album details. At the top of the tracks list, there is a '> Focus' button with a heart icon and a 'Filter' button with a search icon. The tracks list contains two entries, each with a play button icon, the track name, a heart icon, the duration, a play count, and a three-dot menu icon. The first track is 'LEFT Channel Sweep' with a duration of 0:28 and a play count of 24. The second track is 'RIGHT Channel Sweep' with a duration of 0:28 and a play count of 7. The entire tracks list is enclosed in a red rectangular border.

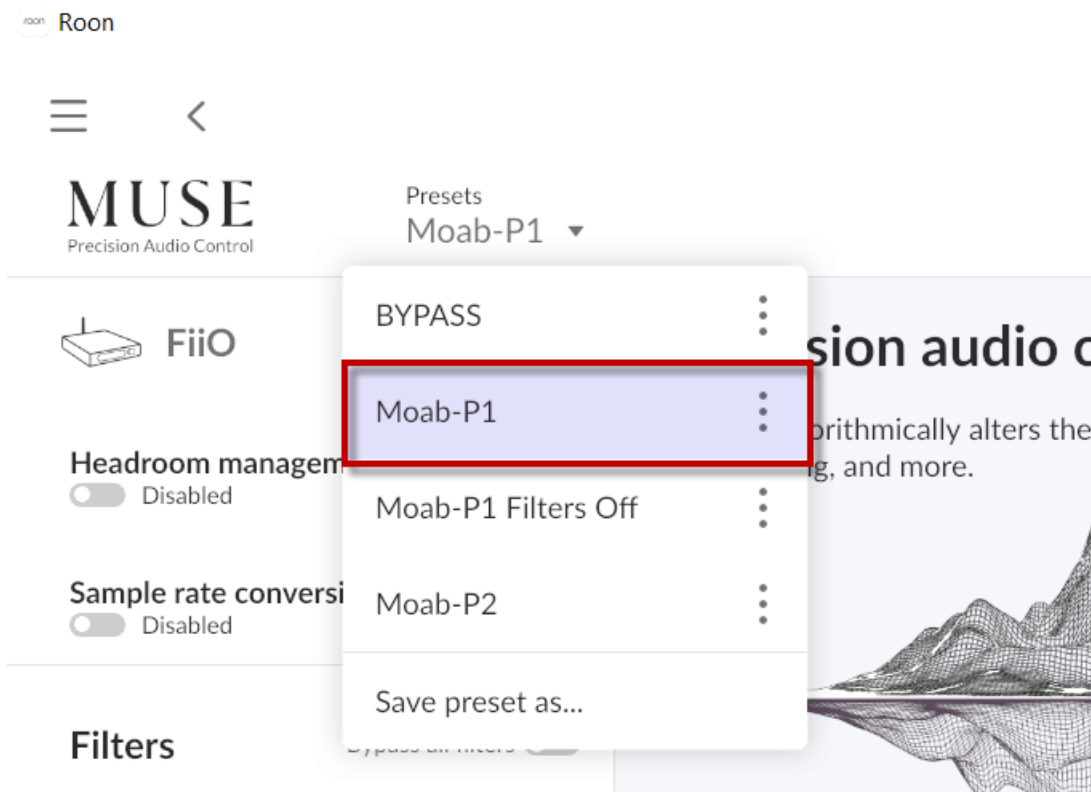
Track Name	Duration	Play Count
LEFT Channel Sweep	0:28	▶24
RIGHT Channel Sweep	0:28	▶7

Select Preset = Moab-P1

Click on the Volume Icon and open the **MUSE** Controls.



Select Preset = **Moab-P1**



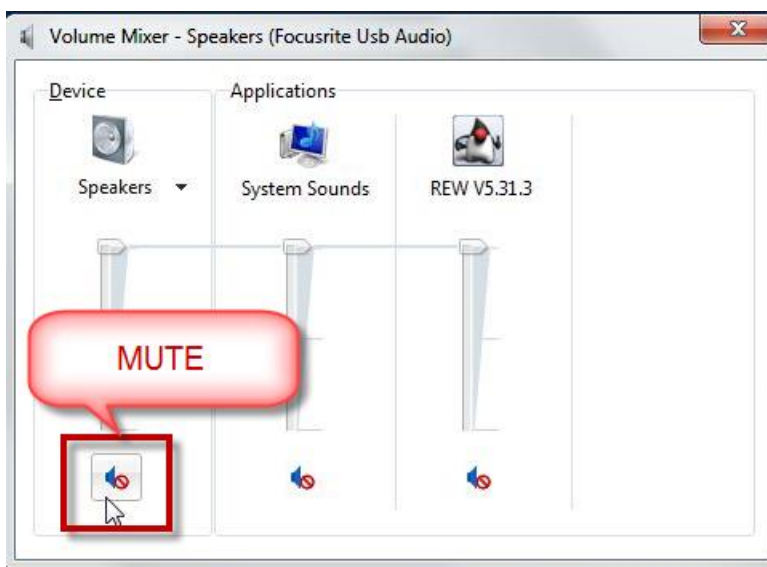
Launch REW



Open your PC Volume Mixer.

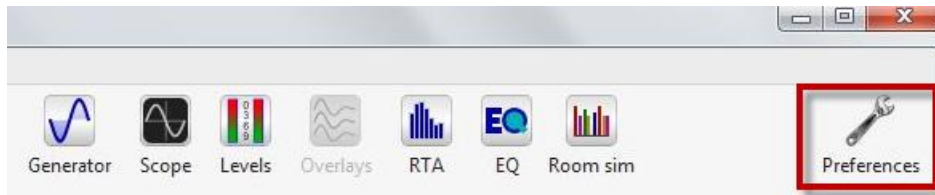


Mute your speakers.

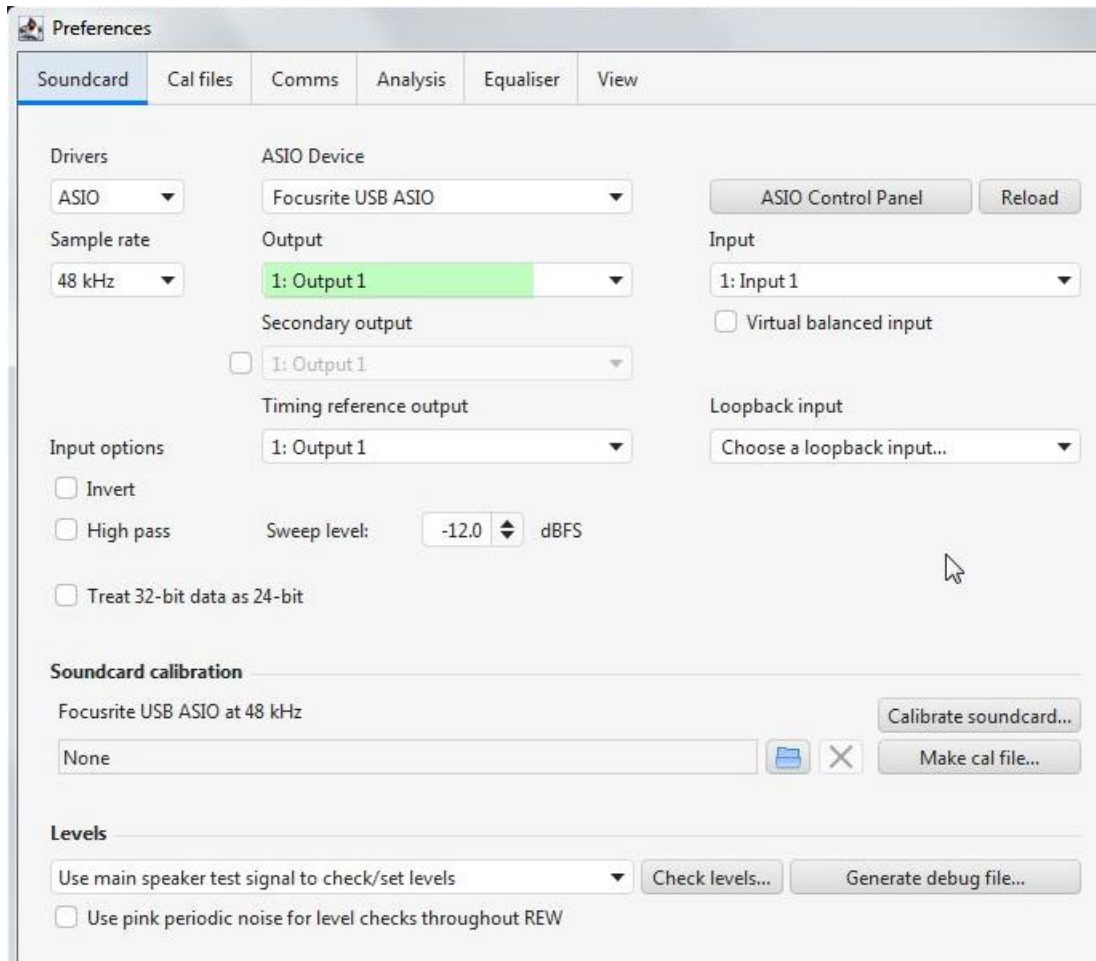


Measure the Left Channel after corrections

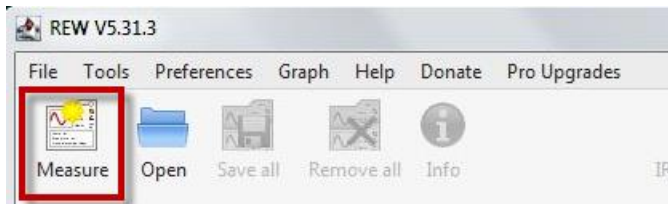
Show Preferences



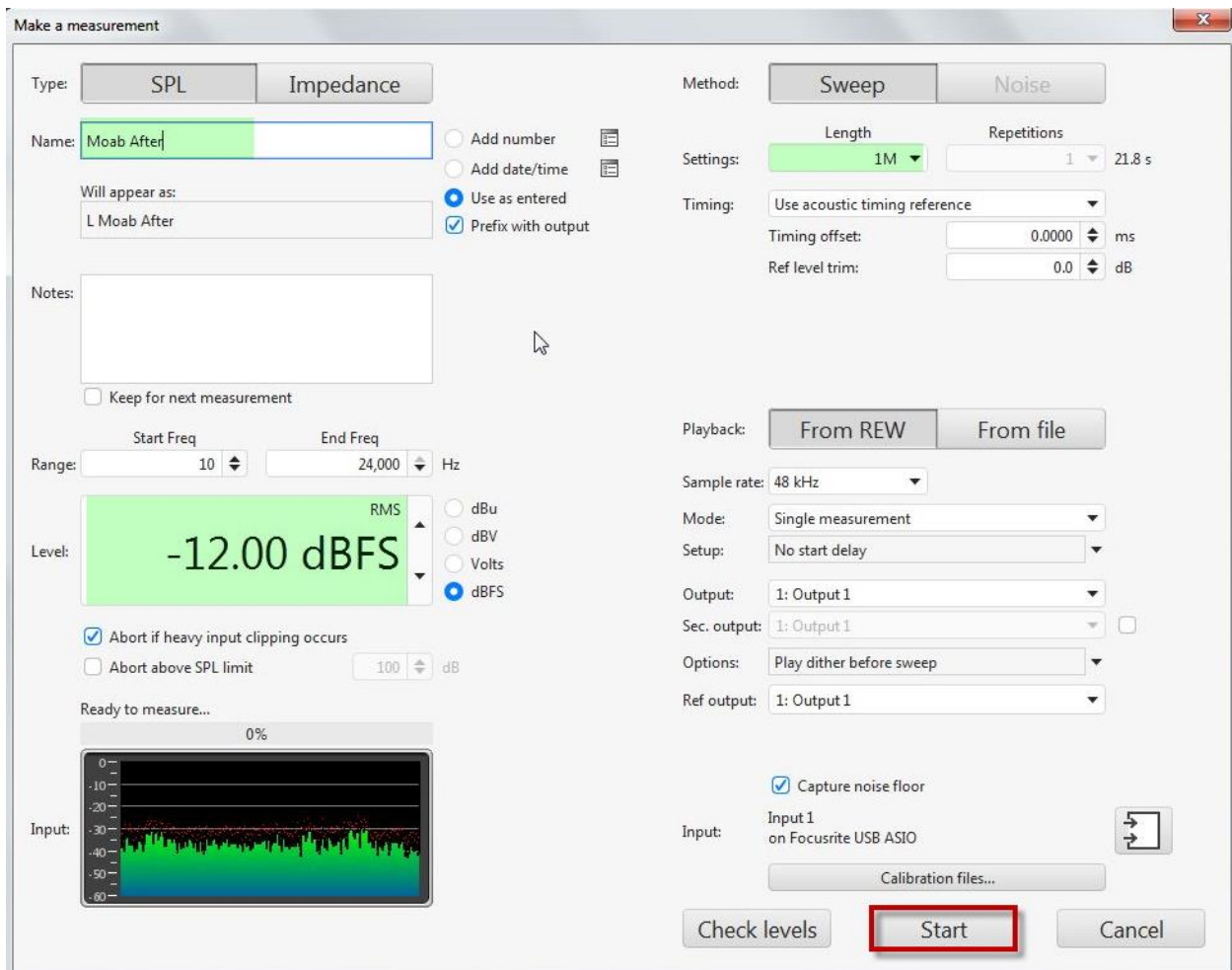
Output = **Output 1** (This is your Left Channel)



Open the **Measure** Tool



Name = Moab After



Press **Start**

No sound will come from your Laptop since you have muted the PC Volume Mixer. Instead, you are going to play back the Sweep of the Left Channel through ROON.

Play the Left Channel Sweep from ROON.

The screenshot shows the ROON music application interface. At the top, the album 'REW Test Tones' by 'Unknown Artist' is displayed. Below the album art, there are controls for 'Play now', a heart icon, a share icon, and a more options icon. The track 'LEFT Channel Sweep' is selected in the 'TRACKS' list, and a context menu is open over it, highlighting the 'Play now' option. The playback progress bar at the bottom shows the track is at 0:15 of a 0:28 duration.

Roon

REW Test Tones

Unknown Artist
Various Artists

Play now

Unidentified | 56 sec | ☆☆☆☆☆ | WAV 48kHz 32bit | 15 | Added 16 May 2025

TRACKS

> Focus

Filter

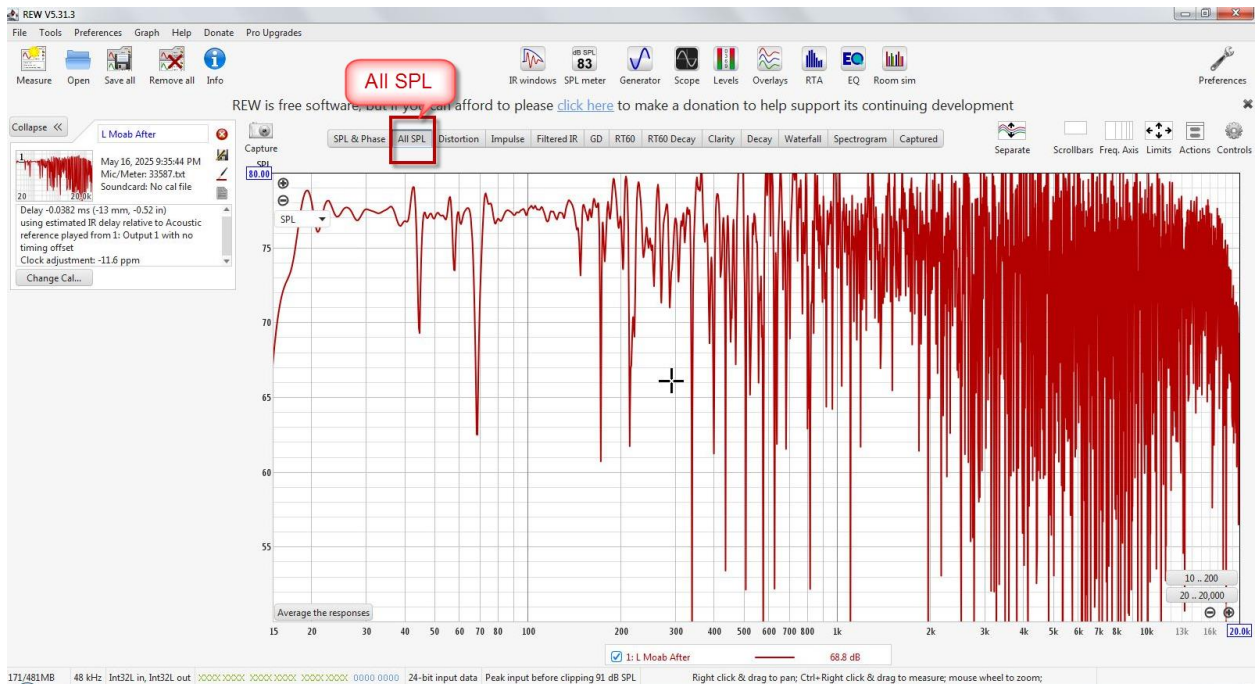
Track	Duration	Plays	Actions
LEFT Channel Sweep	0:28	24	Heart, More
LEFT Channel Sweep	0:28	7	Heart, More

LEFT Channel Sweep
Various Artists

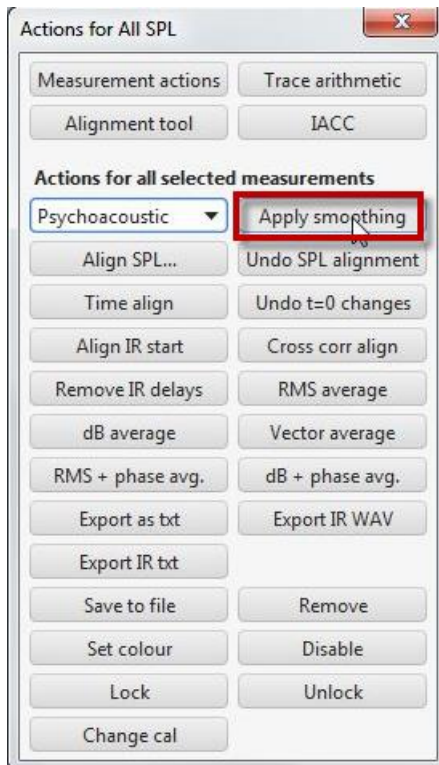
0:15 0:28

FiIO 100

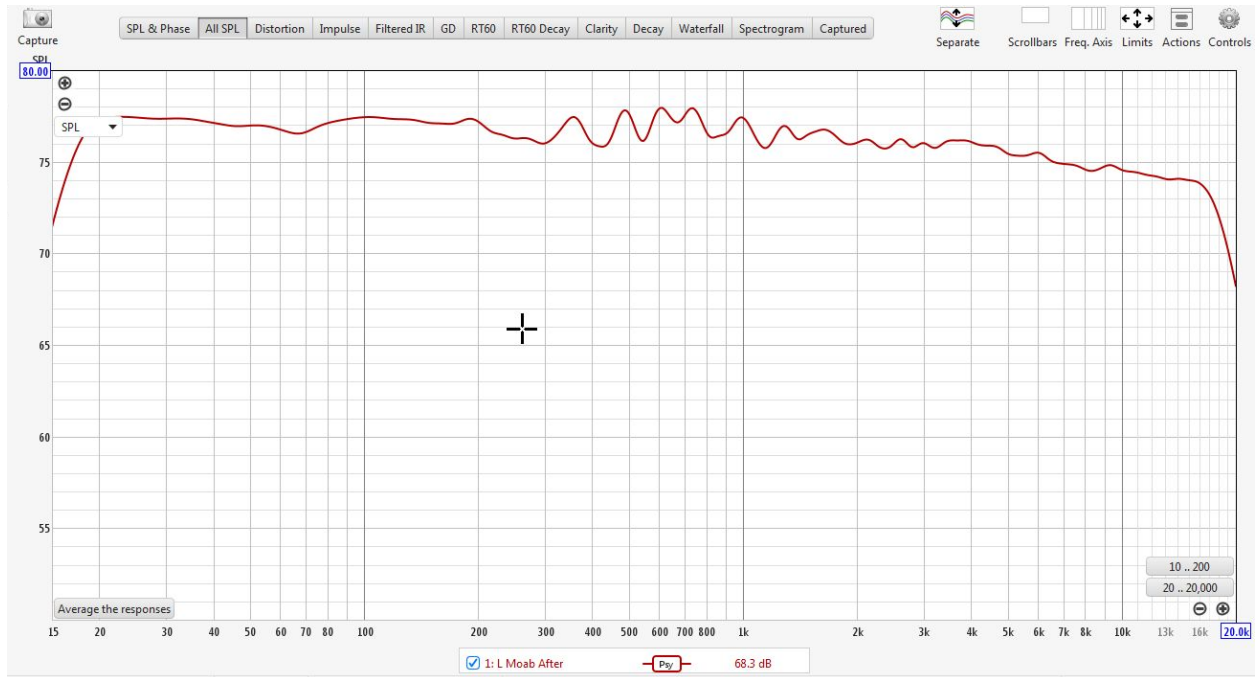
Open the ALL SPL Tab



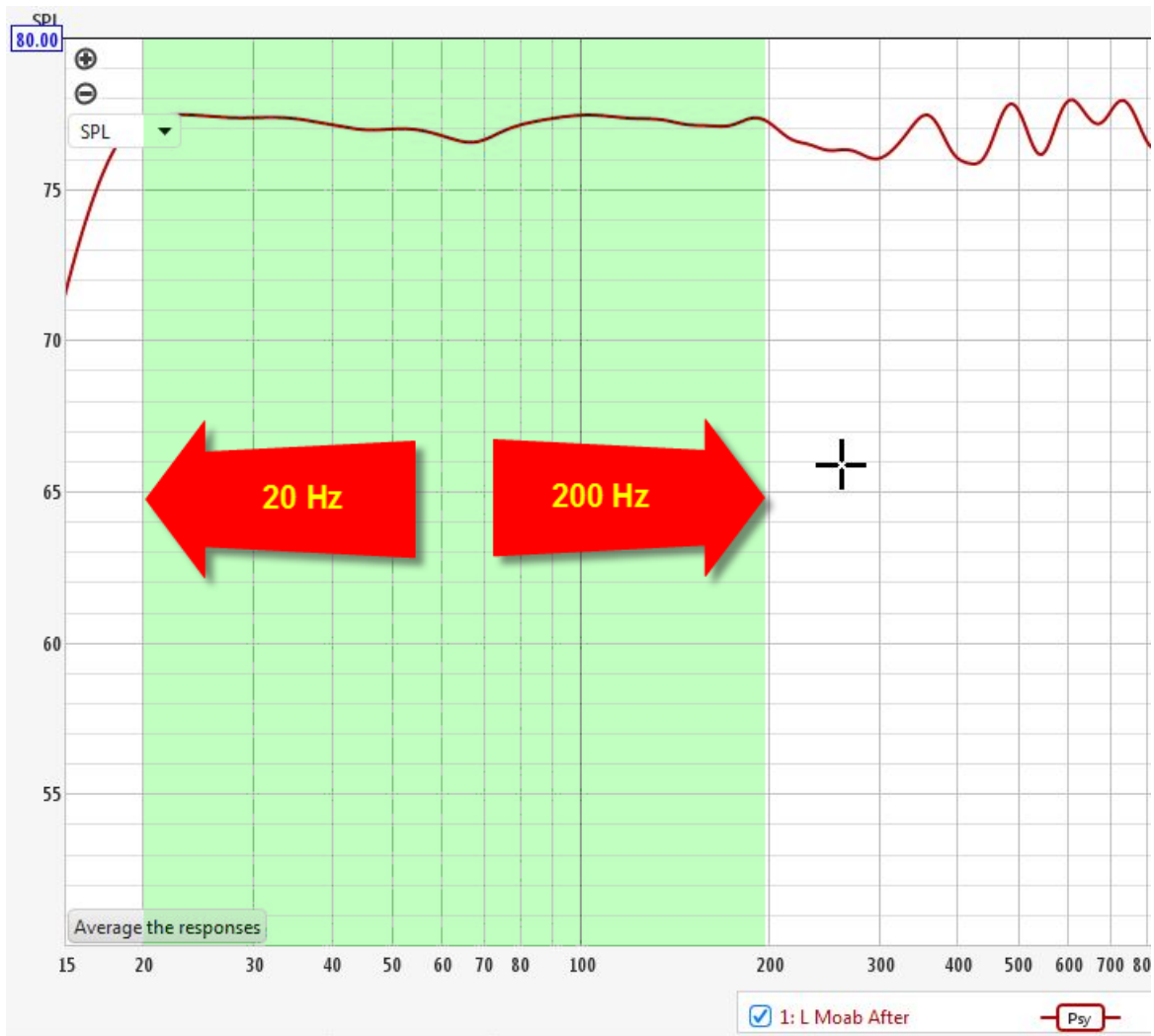
Apply a Psychoacoustic smoothing



This is the SPL curve of your Left Channel after engaging the Moab-P1 Preset.

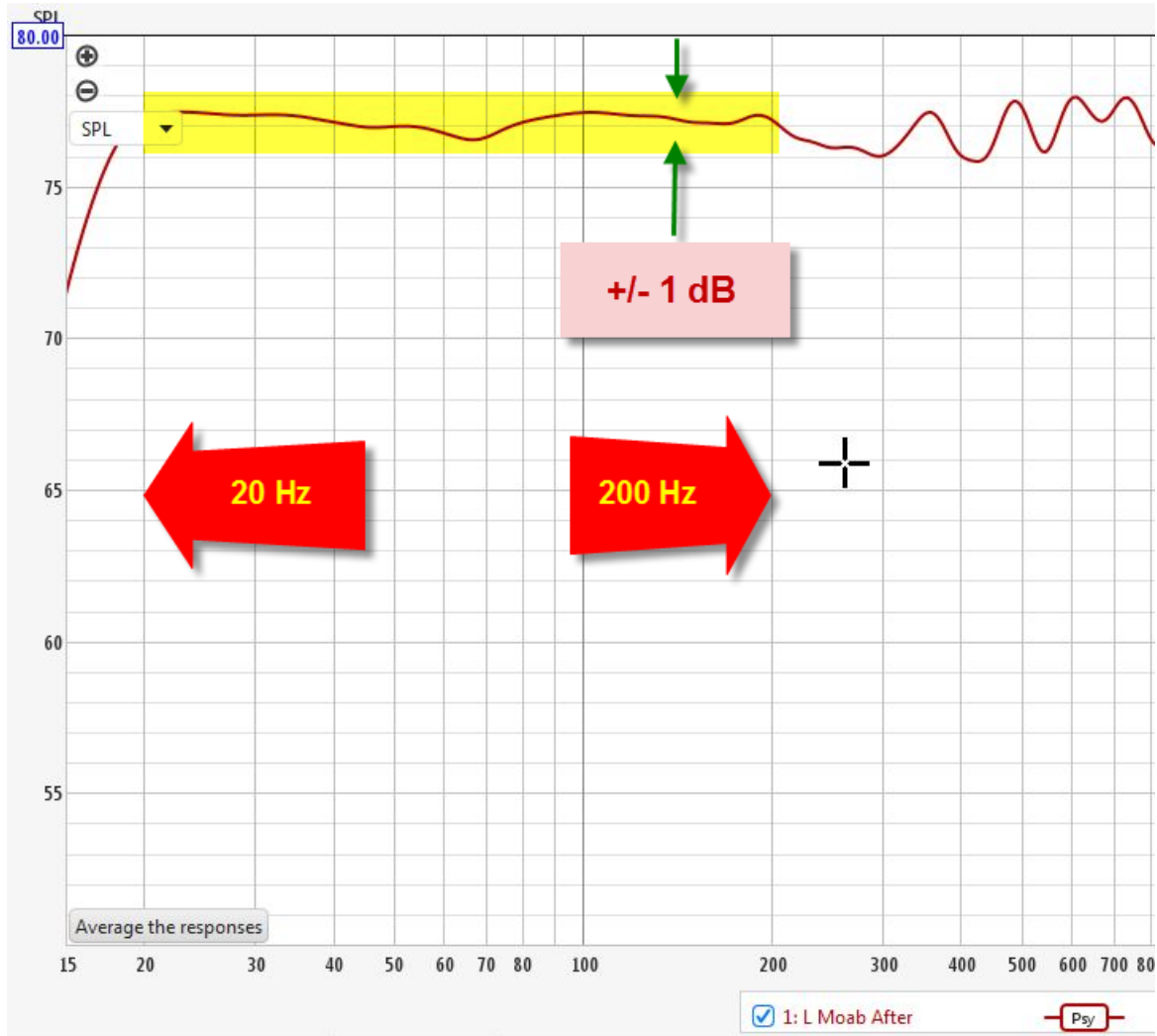


Examine the Region between 20 Hz and 200 Hz



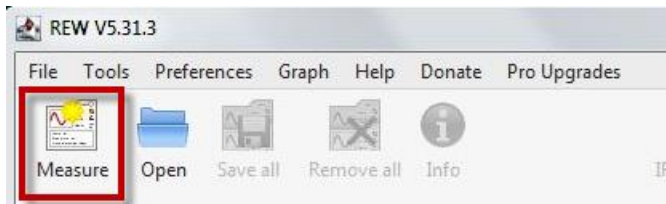
The bass response between 20Hz and 200Hz is smooth within a +/- 1dB window.

Accurate Digital Room Correction helped to even out the bass region.

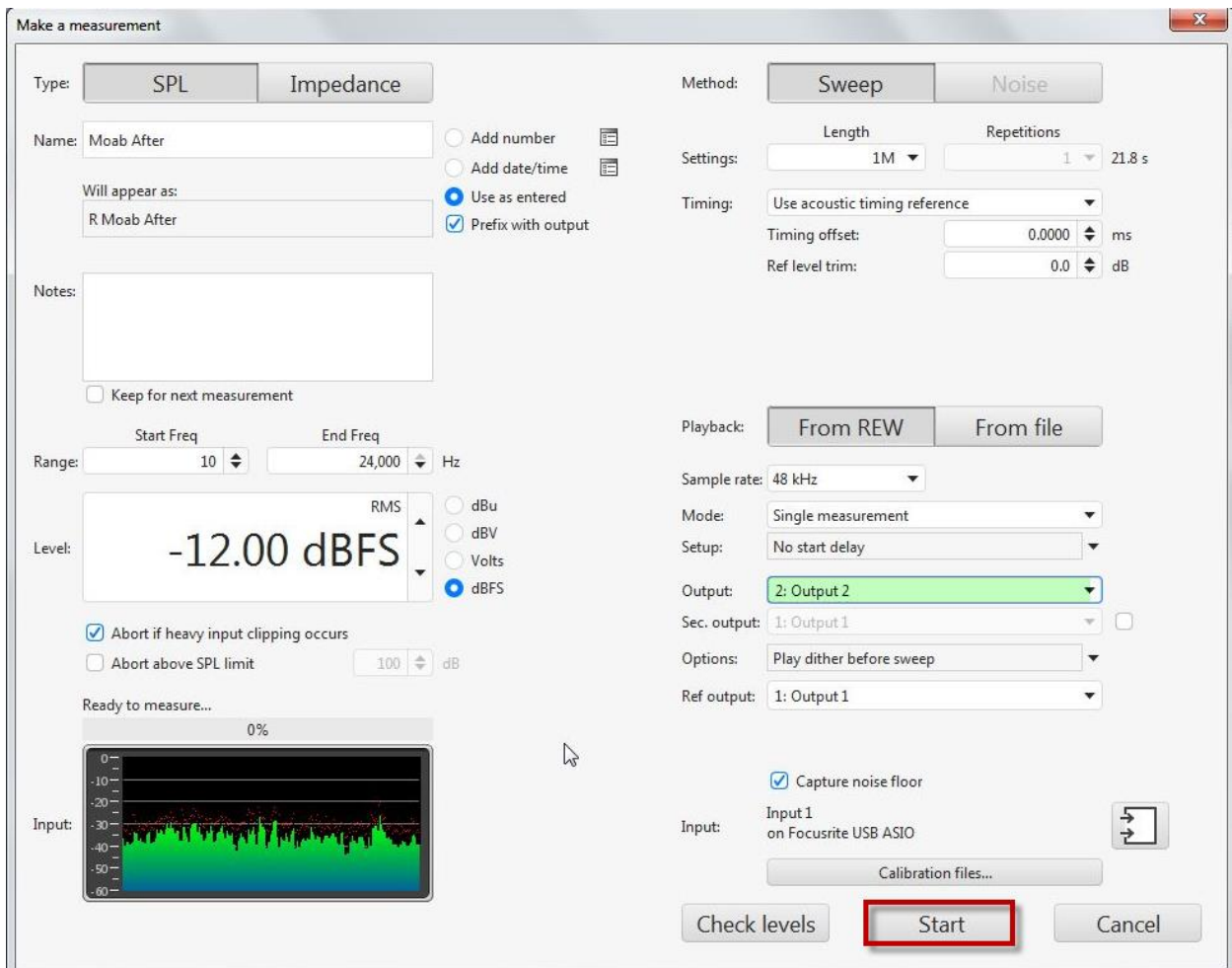


Measure the Right Channel after corrections

Open the **Measure** Tool



Change Output = **Output 2** (This is your Right Channel)



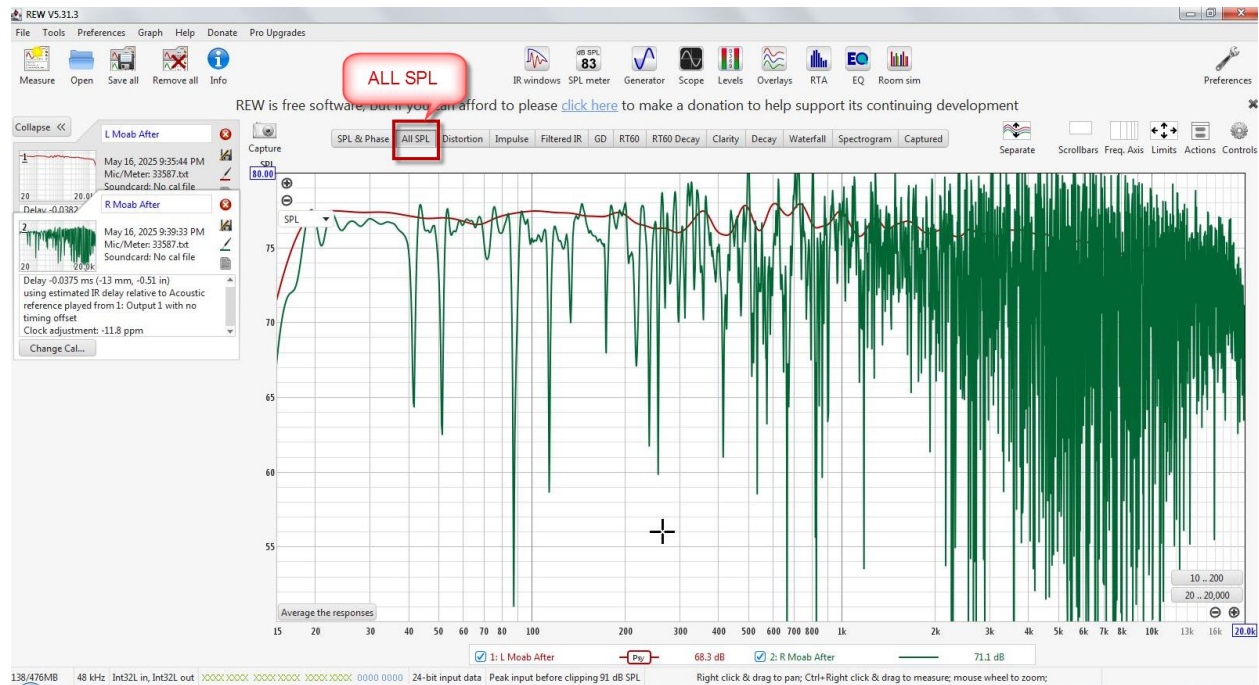
Press **Start**

No sound would come from your PC. You have muted the PC Volume Mixer. Instead, you are going to play back the Sweep of the Right Channel through ROON.

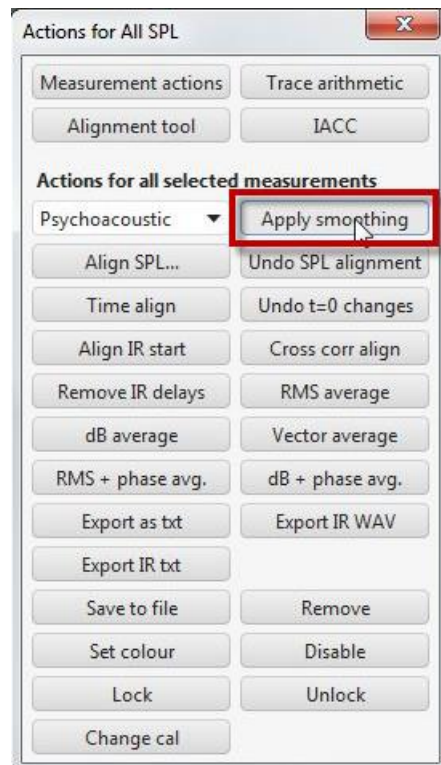
Play the Right Channel Sweep from ROON.

The screenshot shows the ROON music application interface. At the top, the 'roon' logo and window controls are visible. Below the navigation bar, the album 'REW Test Tones' by 'Unknown Artist' (Various Artists) is displayed. A context menu is open over the 'Play now' button, with the 'Play now' option highlighted in red. The track list below shows 'RIGHT Channel Sweep' as the current track, with a play button and a volume icon. The bottom player bar shows the track 'RIGHT Channel Sweep' by 'Various Artists' is playing, with a progress bar at 0:08 of 0:28 and a volume icon set to 100.

Open the ALL SPL Tab



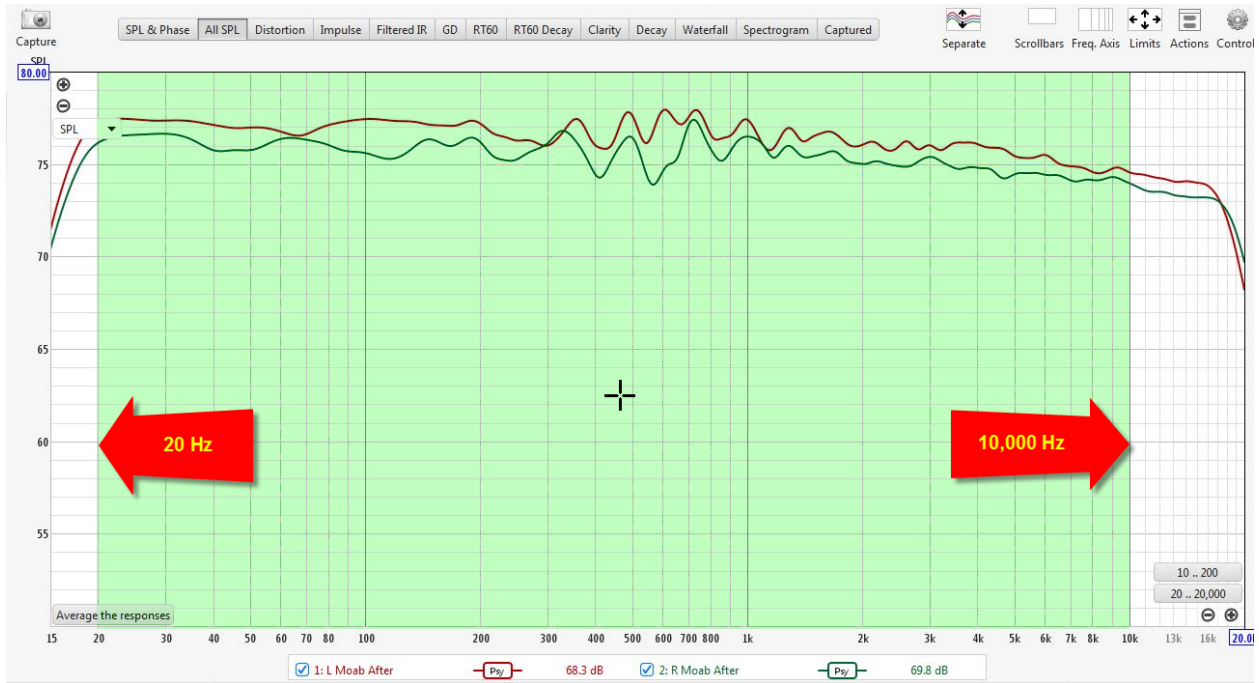
Apply a Psychoacoustic Smoothing



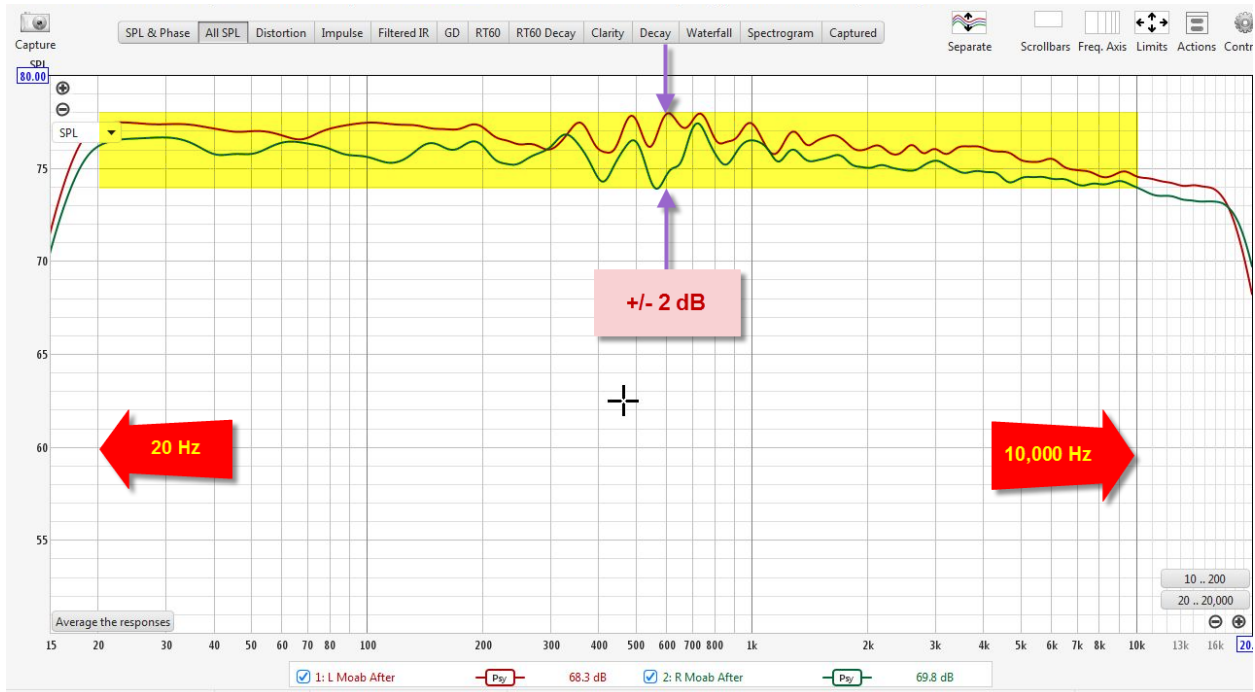
This is the SPL curve of your Right Channel after engaging the Moab-P1 Preset.



Examine the Frequency Response of both channels between 20Hz and 10,000Hz.



The Frequency Response of the Left and Right Channels are within a +/- 2dB window from 20Hz to 10,000Hz.

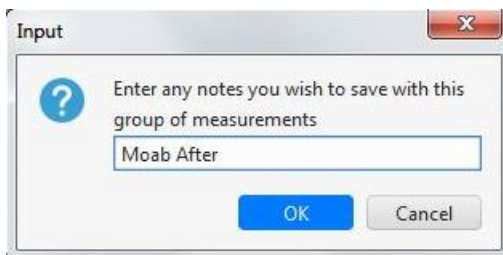
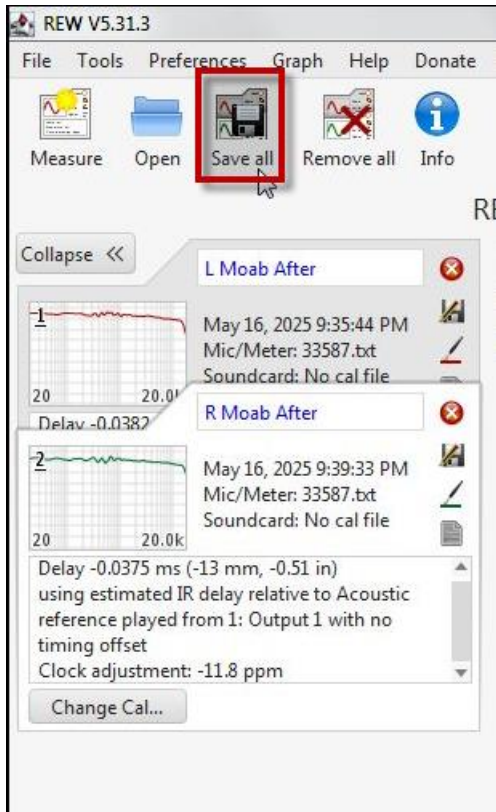


The Frequency Response of the Left and Right Channels are within a +/- 2.5dB window from 20Hz to 17,000Hz

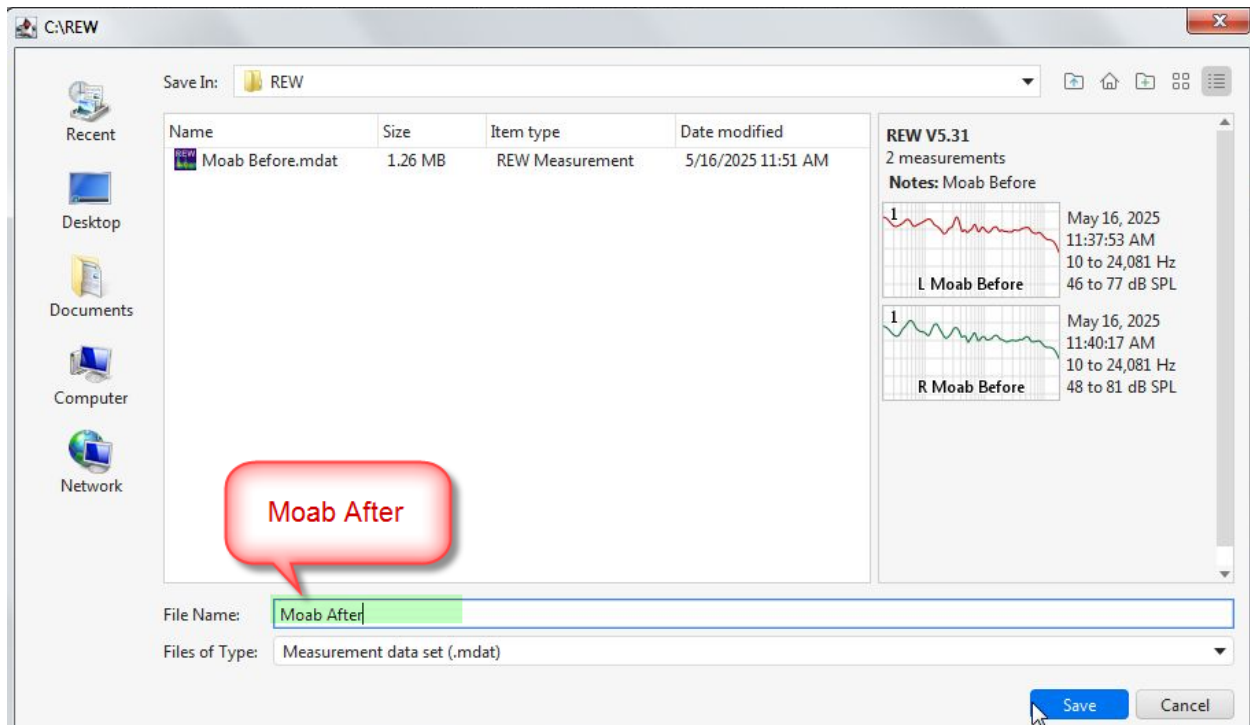


These results are good for your first iteration with Acourate.

Save the After Measurements



Name the File = Moab After



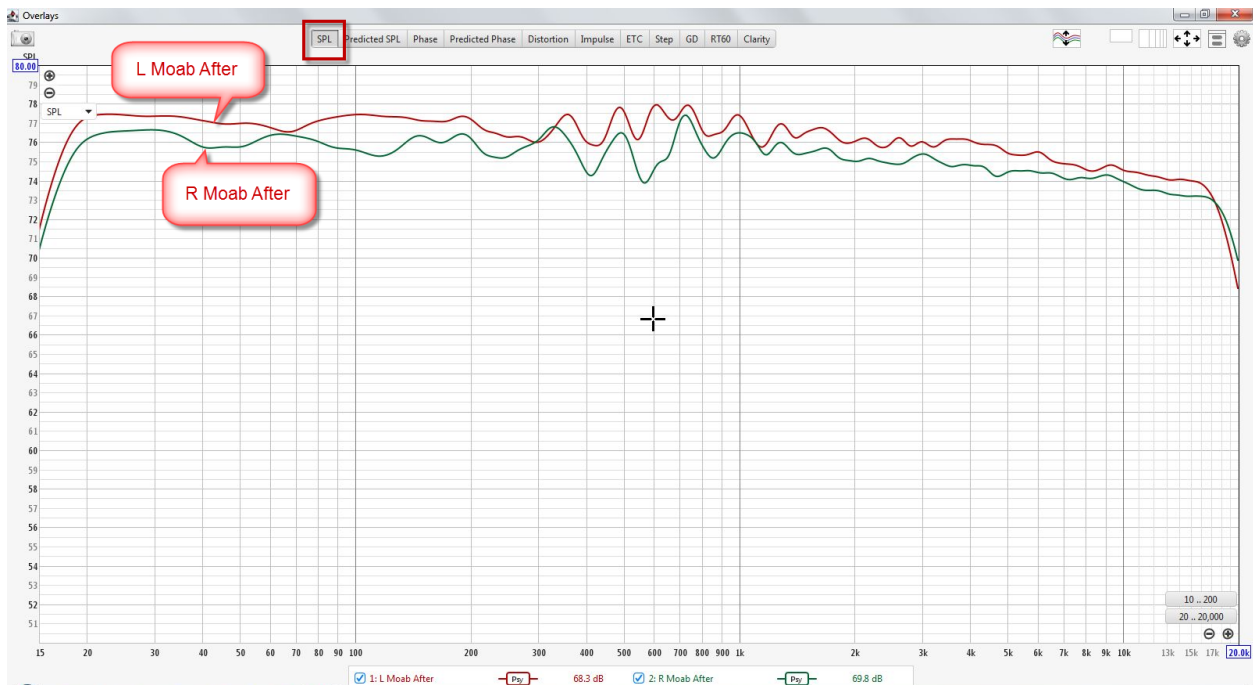
Save this file under:

C:\REW

Show Overlays



You can compare the SPL curves of the Left and Right Channels after corrections.

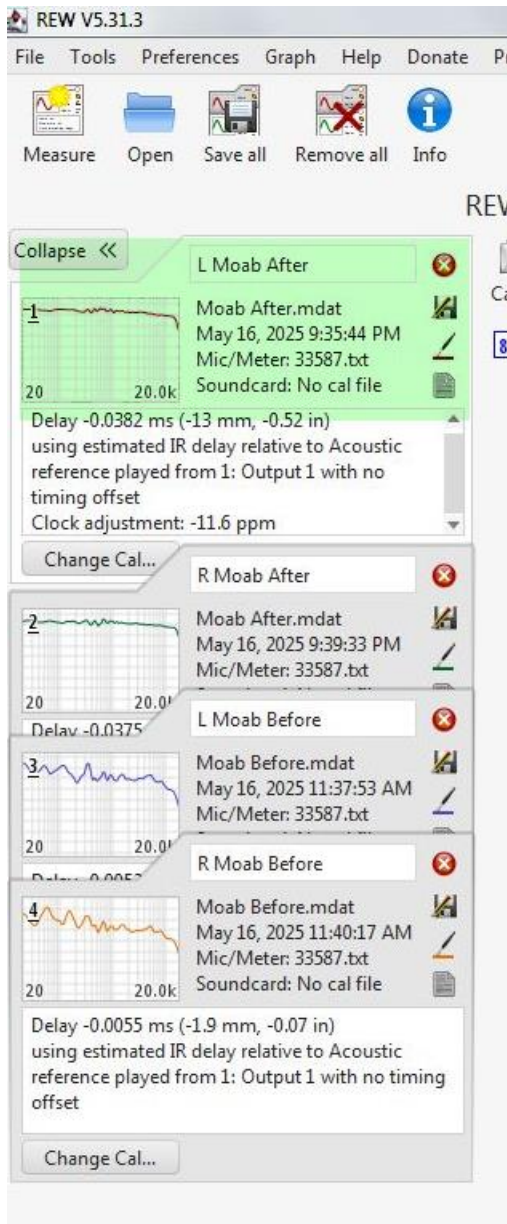


Open the **STEP** tab.

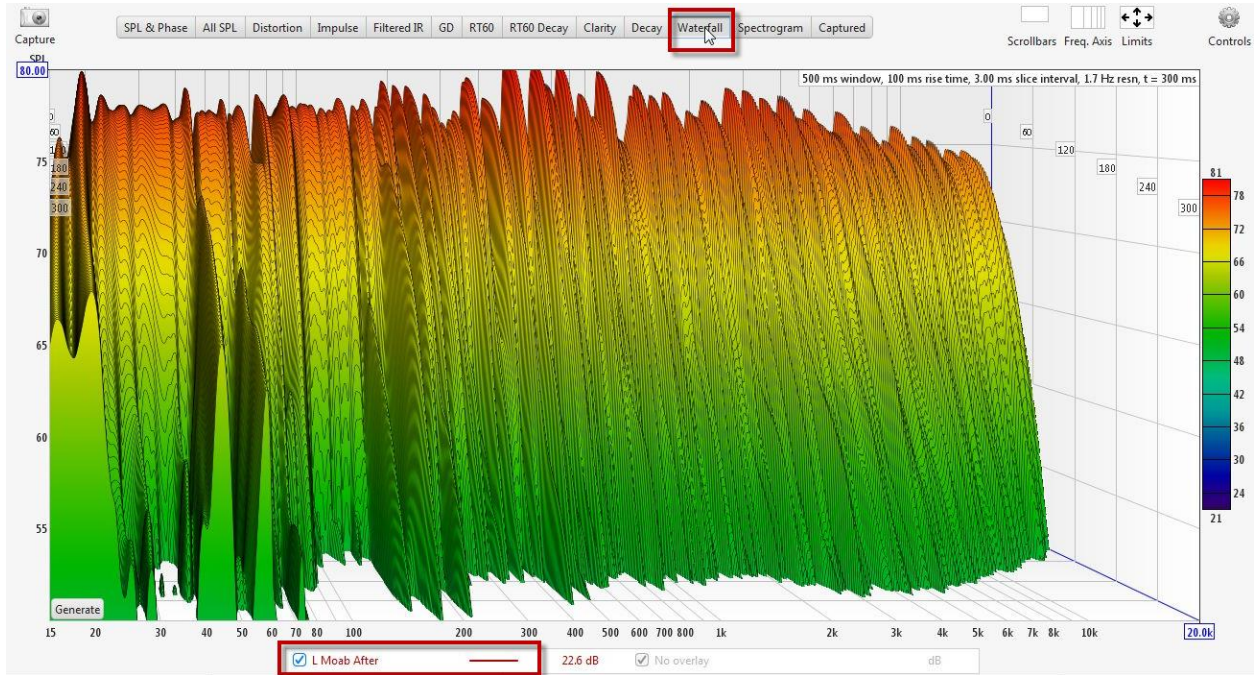
You can compare the Step Response of the Left and Right Channels.



Select the **L Moab After** Measurement.



View the Waterfall Plot for **L Moab After**

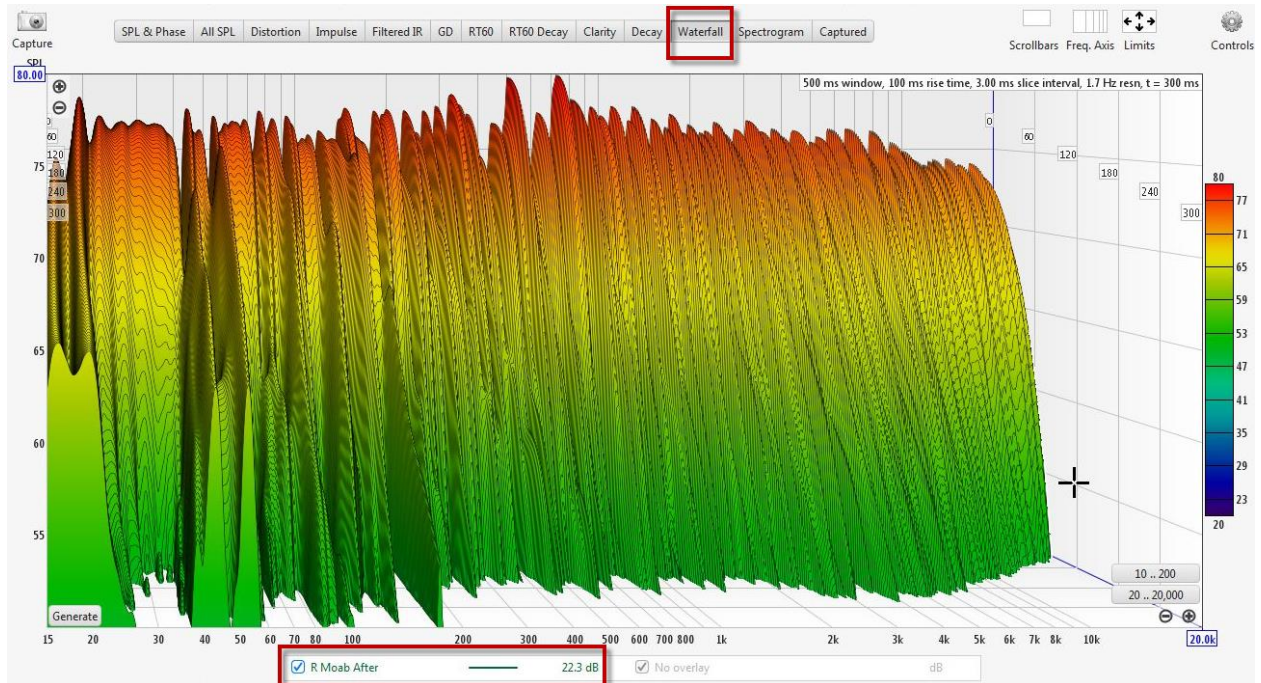


Select the **R Moab After** Measurement

The screenshot shows the REW V5.31.3 software interface. The menu bar includes File, Tools, Preferences, Graph, Help, Donate, and Proc. Below the menu bar are icons for Measure, Open, Save all, Remove all, and Info. The main window displays a list of measurements. The 'R Moab After' measurement is highlighted in green. The details for this measurement are as follows:

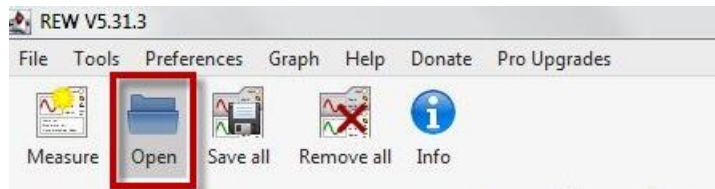
Measurement Name	File Name	Date/Time	Mic/Meter	Soundcard	Delay	Delay Description
L Moab After	Moab After.mdat	May 16, 2025 9:35:44 PM	Mic/Meter: 33587.txt		-0.0382	
R Moab After	Moab After.mdat	May 16, 2025 9:39:33 PM	Mic/Meter: 33587.txt	No cal file	-0.0375 ms (-13 mm, -0.51 in)	using estimated IR delay relative to Acoustic reference played from 1: Output 1 with no timing offset Clock adjustment: -11.8 ppm
L Moab Before	Moab Before.mdat	May 16, 2025 11:37:53 AM	Mic/Meter: 33587.txt		-0.0055	
R Moab Before	Moab Before.mdat	May 16, 2025 11:40:17 AM	Mic/Meter: 33587.txt	No cal file	-0.0055 ms (-1.9 mm, -0.07 in)	using estimated IR delay relative to Acoustic reference played from 1: Output 1 with no timing offset

View the Waterfall Plot for R Moab After

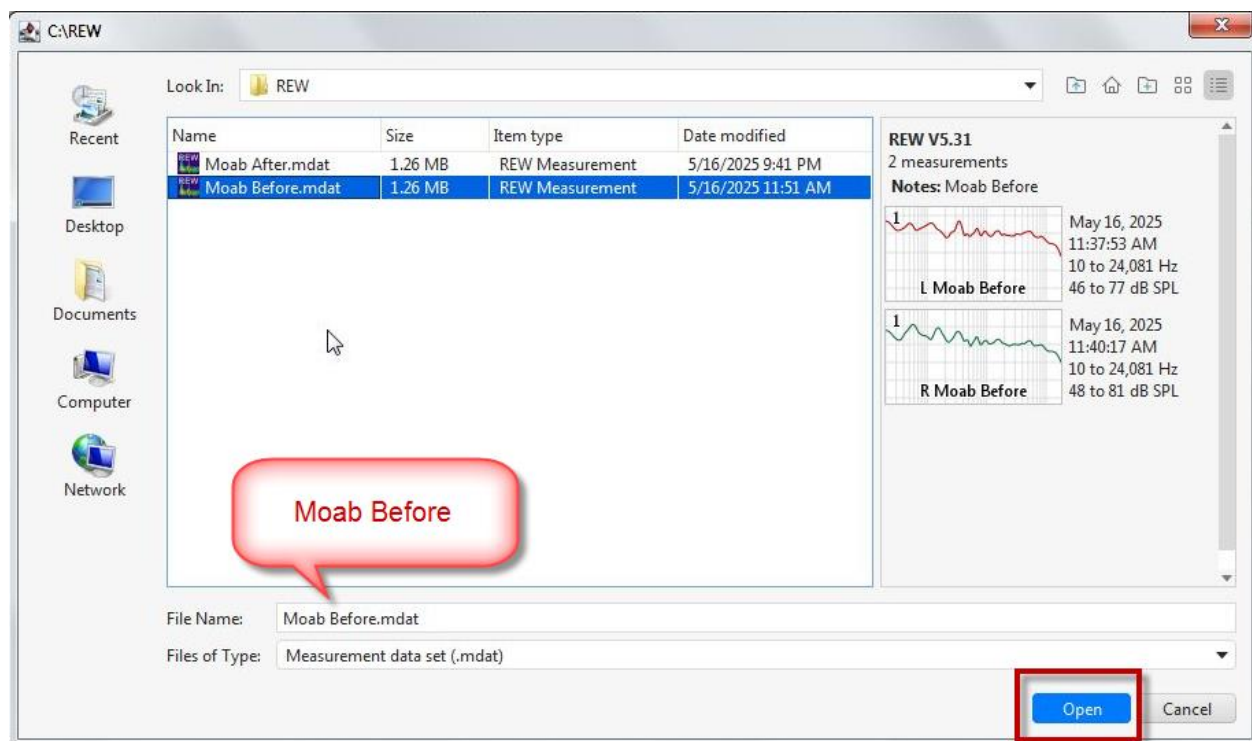


Compare the Before and After Response Curves

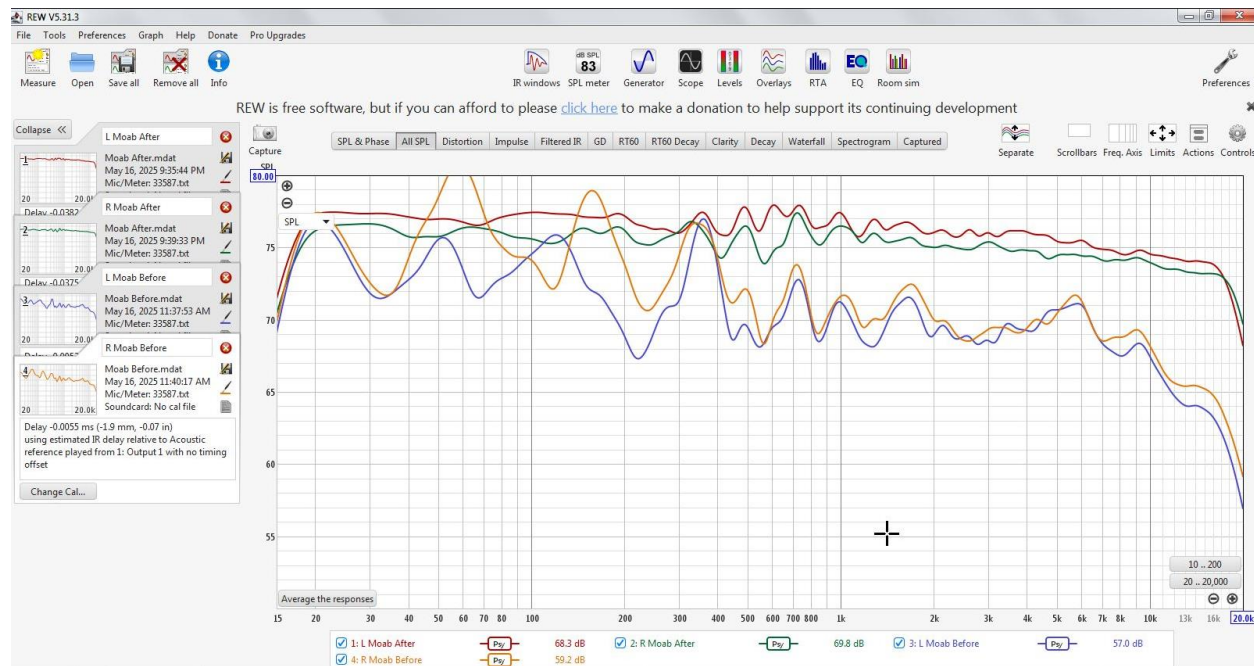
Click on the **File Open** Icon.



Open the File = **Moab Before.mdat**



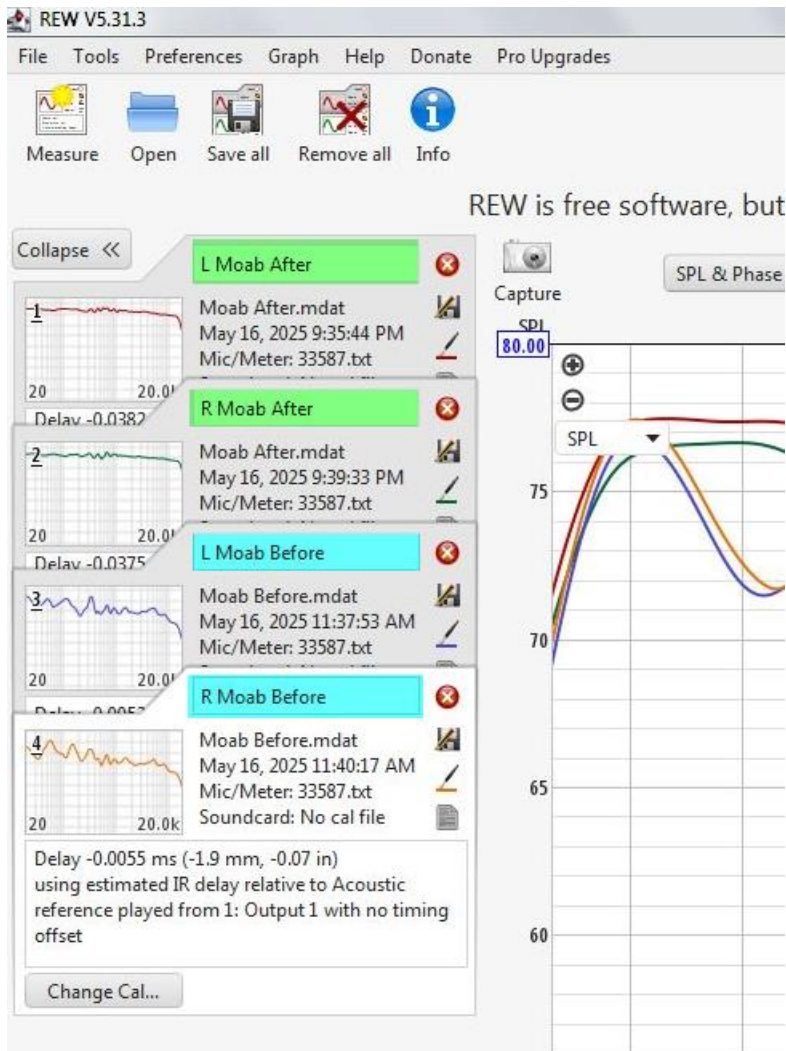
Now you can compare the Before and After Curves.



You have 4 curves:

L Moab After
R Moab After

L Moab Before
R Moab Before

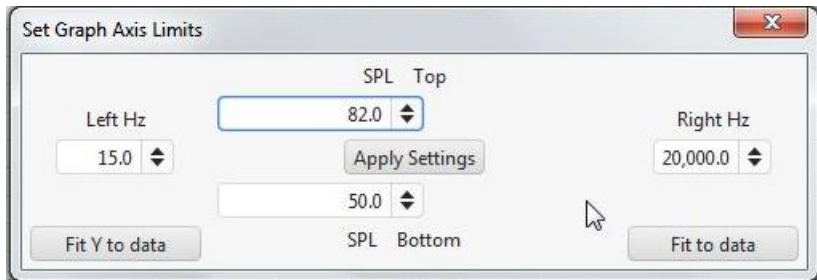


The Before Measurements show large swings in the bass region.

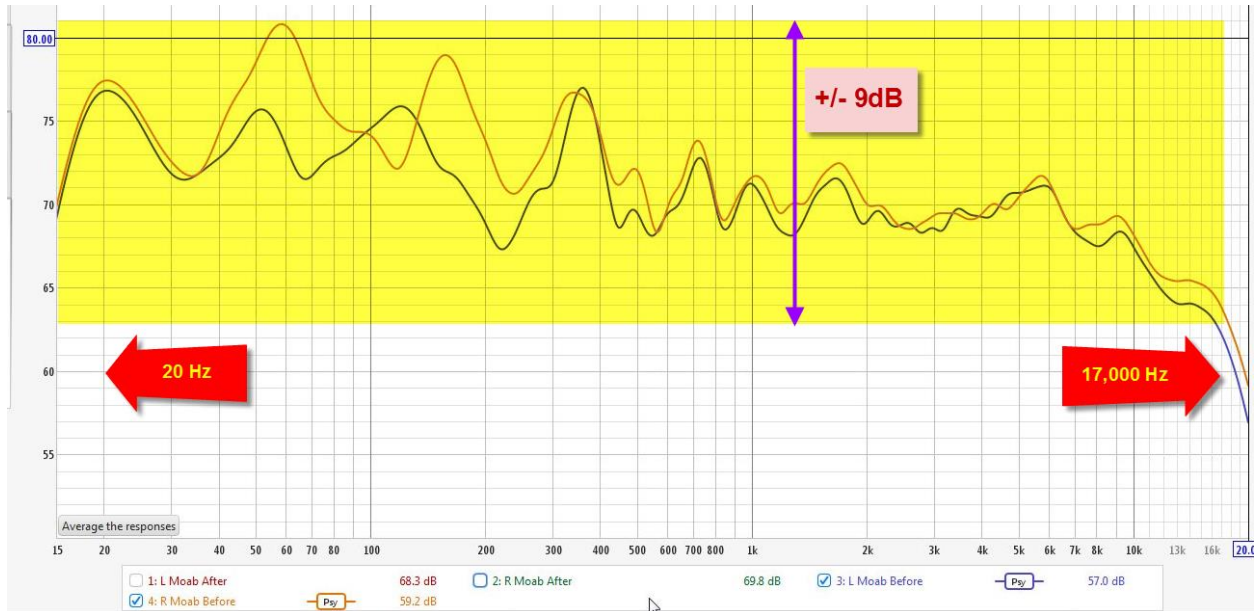


Modify the Y-axis Limits to view the full extent of the swing.

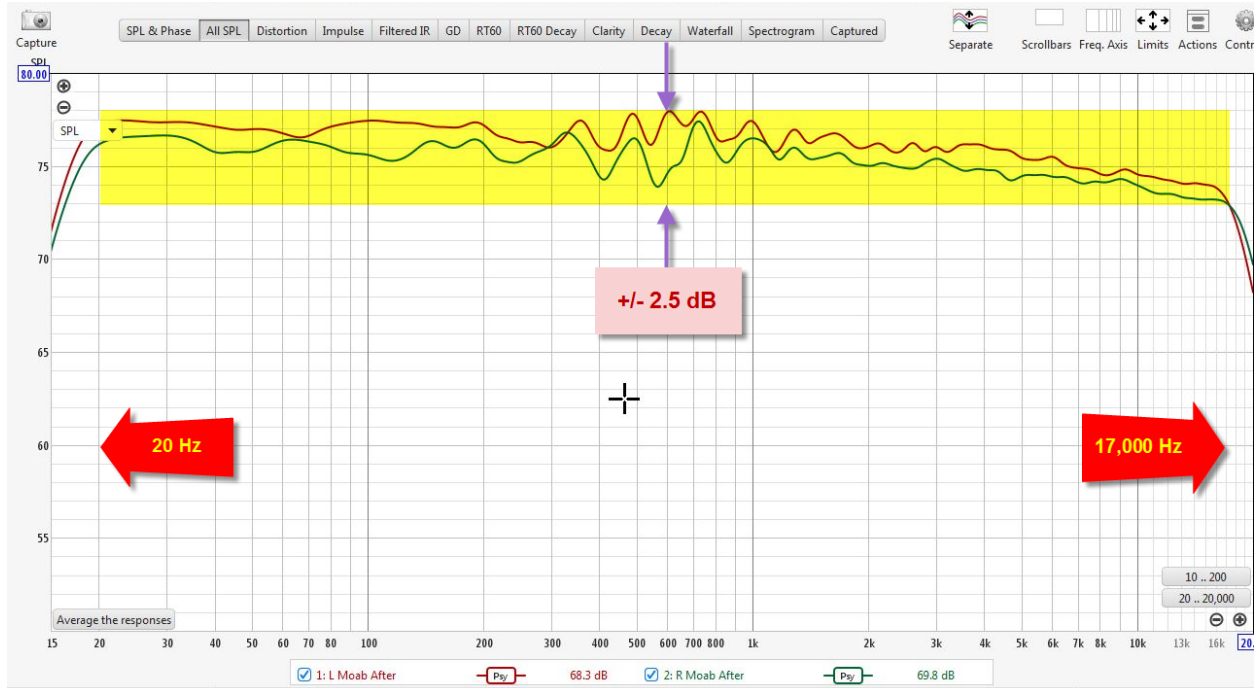
Top = 82 Hz



The Before Measurements show a swing of +/- 9 dB between 20Hz to 17,000Hz.



The After Measurements show a lessor swing of +/- 2.5 dB between 20Hz and 17,000Hz.



This is a significant improvement.

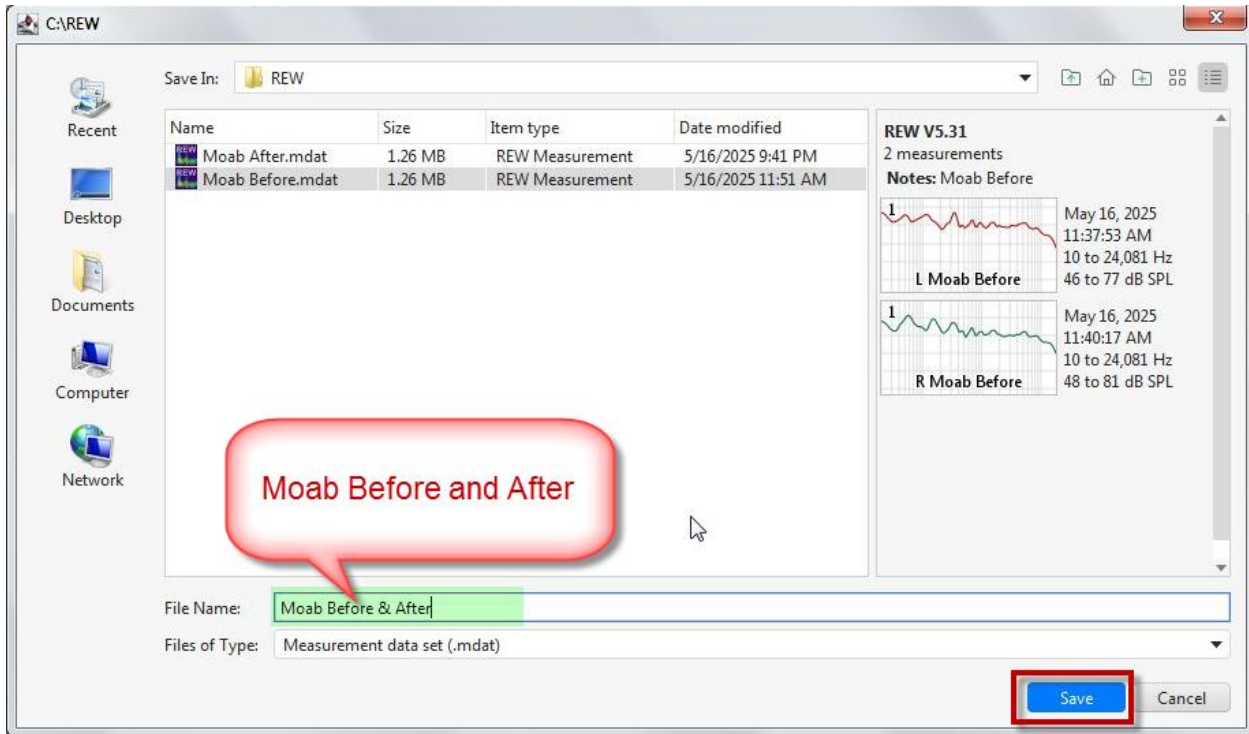
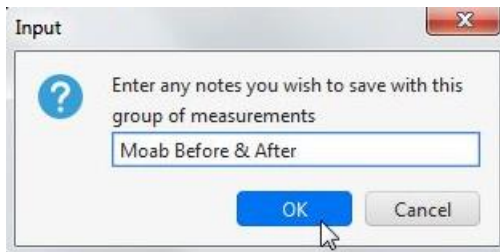
Save the Before and After Measurements

Click on the **Save All** button.

The screenshot shows the REW V5.31.3 software interface. The menu bar includes File, Tools, Preferences, Graph, Help, Donate, and Pro Upgrades. Below the menu bar are icons for Measure, Open, Save all (highlighted with a red box), Remove all, and Info. The main window displays a list of measurements with the following details:

- L Moab After**: Moab After.mdat, May 16, 2025 9:35:44 PM, Mic/Meter: 33587.txt, Delay -0.0382
- R Moab After**: Moab After.mdat, May 16, 2025 9:39:33 PM, Mic/Meter: 33587.txt, Soundcard: No cal file, Delay -0.0375 ms (-13 mm, -0.51 in) using estimated IR delay relative to Acoustic reference played from 1: Output 1 with no timing offset, Clock adjustment: -11.8 ppm
- L Moab Before**: Moab Before.mdat, May 16, 2025 11:37:53 AM, Mic/Meter: 33587.txt
- R Moab Before**: Moab Before.mdat, May 16, 2025 11:40:17 AM, Mic/Meter: 33587.txt, Soundcard: No cal file, Delay -0.0055 ms (-1.9 mm, -0.07 in) using estimated IR delay relative to Acoustic reference played from 1: Output 1 with no timing offset

On the right side, there is a graph showing SPL vs frequency. The y-axis is labeled 'SPL' and ranges from 55 to 80.00. The x-axis is labeled 'Average' and ranges from 20 to 20.0k. The graph shows several curves representing different measurements.



Name the file **Moab Before and After**

Save

View the contents of C:\REW

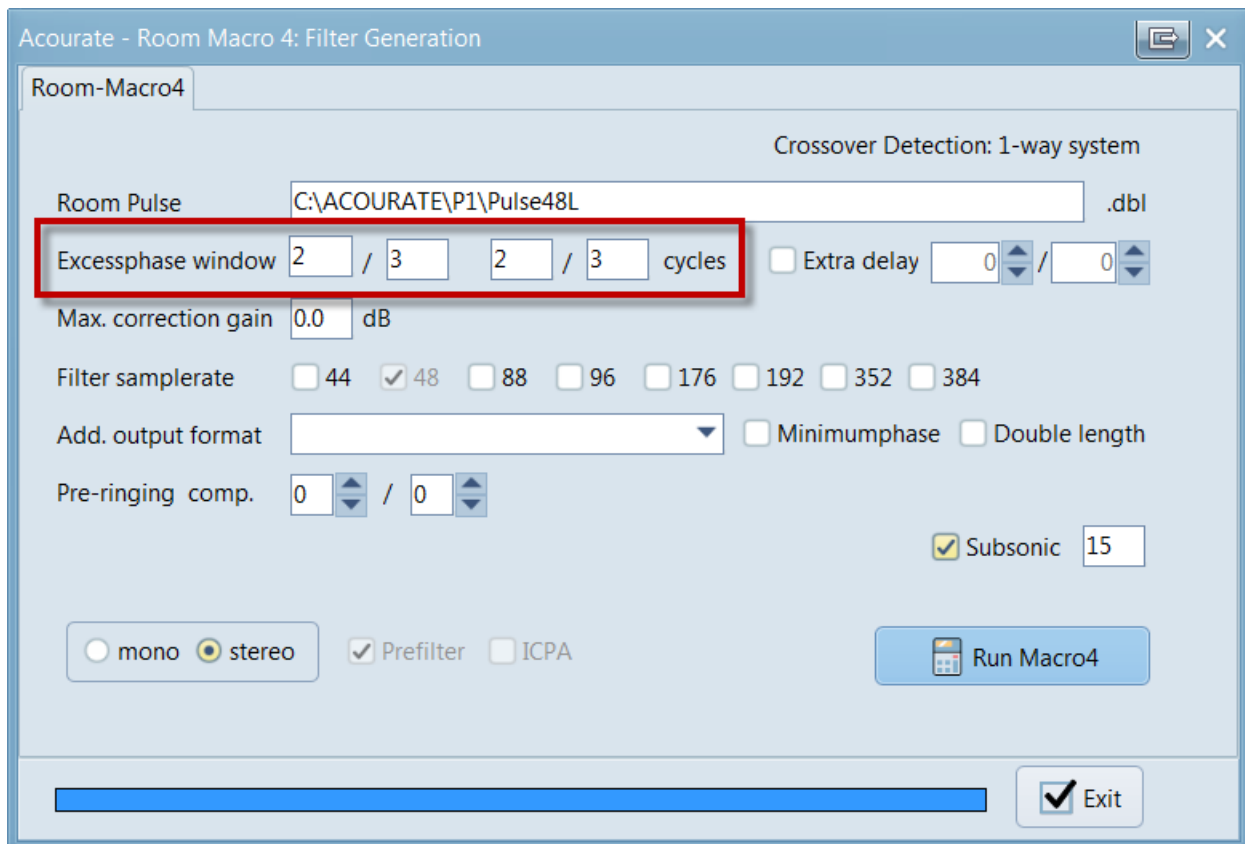
	1MMeasSweep_10_to_24000_-12_dBFS_48k_Float_L_refL.wav	WAV Audio File (VLC)	10,753 KB
	1MMeasSweep_10_to_24000_-12_dBFS_48k_Float_R_refL.wav	WAV Audio File (VLC)	10,753 KB
	Moab After.mdat	REW Measurement	1,300 KB
	Moab Before and After.mdat	REW Measurement	2,591 KB
	Moab Before.mdat	REW Measurement	1,300 KB

Subsequent Iterations

Now that you have gone through the entire workflow of taking measurements with Acurate, generating the FIR Filters, importing them in ROON and verifying the results with REW, you are free to run multiple iterations until you find the best Filter that suits your taste.

You can start by designing a different Target Curve experimenting with different slopes around the bass and treble regions. A perfectly flat frequency response curve does not always sound the best. A slight boost in the bass region with a gradual roll off in the treble may bring more life and excitement to your music.

You can try entering different values of the Excess Phase Window and evaluate which combination yields the best results.



Typically, it takes weeks of iteration to arrive at something that sounds perfect. With Acurate you have the tools to shape the Frequency Response of your 2-Channel setup to match your personal listening habits.

Total Cost for the Project

Here is a list of all the items you would need to digitally correct your 2-channel audio setup using ACOURATE and ROON.

1.

Mini PC to run your ROON Server

<https://www.amazon.com/Micro-Mini-PC-Computers-N5105/dp/B09Q8Z6VB7/>

\$143.99

2.

ROON Ready Lossless Music Streamer

<https://www.amazon.com/FiiO-SR11-Streamer-Receiver-Multiroom/dp/B0DFCQPZQY/>

\$99.99

3.

MicroSD Card to store your Local Music Library

<https://www.amazon.com/SanDisk-Extreme-microSDXC-Memory-Adapter/dp/B09X7C2GBC>

\$41.99

4.

USB Thumb Drive to install the ROON OS on your Mini PC

<https://www.amazon.com/Samsung-MUF-256AB-AM-Plus-256GB/dp/B07D7PDLXC>

\$14.99

5.

Dayton Audio EMM-8 Omnidirectional Condenser Microphone

<https://www.amazon.com/Dayton-Audio-EMM-6-Measurement-Microphone/dp/B002K18X40>

\$69.95

6.

Microphone Stand

https://www.bhphotovideo.com/c/product/1447612-REG/auray_ms_65hd_pro_hd_microphone_stand.html

\$69.99

7.

USB Audio Interface

<https://www.amazon.com/Focusrite-Scarlett-Interface-Bundle-Polishing/dp/B09WJFHJZY>

\$220

8.

Accurate Personal License

<https://www.audiovero.de/en/acourate.php>

\$520

Grand Total = **\$1,180.90**

Note-1: In addition you would need a Laptop computer running Windows 10 or higher.

Note-2: For taking more accurate measurements you should replace the Dayton Audio EMM-6 measurement mic with the iSEMcon EMX-7150 measurement mic.

https://www.isemcon.net/ashop/product_info.php?language=en&products_id=57

The screenshot shows the iSEMcon website interface. At the top left is the iSEMcon logo with the text 'ACOUSTICS & VIBRATION DIVISION'. To the right is a shopping cart icon with the text 'My Shopping Cart' and 'Your cart is empty'. Below the logo is a navigation bar with 'All Categories', 'Cart', 'Checkout', and 'Register' buttons, and a search bar. The main content area features a breadcrumb trail: 'Main page > Catalogue > Measurement microphones > Phantom > EMX-7150 Measurement microphone Kit'. The product title is 'EMX-7150 Measurement microphone Kit' with a 'Not rated yet' star rating. The price is '298,10 EUR' with a note '19% VAT incl. excl. Shipping costs'. There is an 'Add to cart' button and a quantity selector set to '1'. On the left side, there is a 'Quick purchase' section with a text input for 'Article number' and a search icon. Below that is a 'Newsletter subscription' section. The manufacturer information section shows the iSEMcon logo and a 'More products' link.

You can purchase this from a US Dealer for \$318.50.

<https://www.rationalacoustics.com/products/isemcon-emx-7150>