DEQX®

Speaker Calibration Guide

LS200

High Definition Digital Integrated Amplifier

Pre-4

Pre-8

High Definition Preamp Processor

Version 0.1
May 17, 2026

IMPORTANT INFORMATION

DISCLAIMER AND LIMITATION OF LIABILITY

DEQX Pty. Ltd. ('DEQX') assumes no responsibility for loss or damage resulting from the use of any of its products.

Specifications are subject to change without notice.

Contact DEQX Support at http://deqx.com/support.php for installation and operational support. We highly recommend using the DEQXpert™ on-line installation and/or training service.

The exclamation point within a triangle is intended to alert the user to the presence of important operating and maintenance instructions in the literature accompanying the product.

The lightning with arrowhead symbol within a triangle is intended to alert the user to the presence of un-insulated "dangerous voltage" within the products' enclosure that may be of sufficient magnitude to constitute a risk of electrical shock to person.

CONTENTS

Contents

1. OVERVIEW

Welcome to the DEQX Calibration Guide.

This guide describes how to calibrate a pair of passive fullrange speakers with the DEQX Gen4 processors.

Even if your intent is to implement a more complex calibration, by adding subwoofers or implementing an active speaker crossover, we strongly recommend that you work through this guide with a pair of passive speakers first. Once you are familiar with the concepts used in DEQX Gen4, you will be equipped to perform more complex calibrations.

This guide applies to the following DEQX processors:

- Pre-8
- Pre-4
- LS200

This manual is part of the DEQX documentation suite:

- DEQX Gen4 User Manual
- DEQX Speaker Calibration Guide
- DEQX Subwoofer Integration Guide
- DEQX HD-Active Calibration Guide

If you haven't already, refer to the DEQX Gen4 User Manual to get started with your DEQX prior to using this Calibration Guide.

DEQX Gen4 supports the Google Chrome web browser only. If you do not have Google Chrome installed on your computer, you can download it from:

https://www.google.com/chrome/

2. SPEAKER MEASUREMENT

One of the vexing issues in speaker measurement is the presence of the room – it is difficult to measure *only* the properties of a speaker, because reflections from any other object (including furniture, floor, ceiling and walls) conspire to corrupt the measurement.

On the other hand, we also need to measure the speaker from the listening position when performing final EQ, especially in the bass region.

With DEQX Gen4, there is a clear distinction between the different types of measurement. The first type of measurement, called *pseudo-anechoic measurement*, aims to measure the response of the speaker only, excluding the effects of the room. You can measure one speaker only, and use it to correct both speaker; or for ultimate accuracy, you can measure both speakers and give each their own correction filter.

The second type of measurement, *in-room measurement*, is performed after the response of the speaker itself is corrected. This measurement is done for each speaker.

To obtain accurate speaker measurements, the measurement microphone **must** be pointed directly at the speaker. While it is essentially omnidirectional at lower frequencies, it becomes more directional at higher frequencies and is calibrated for a flat response at high frequencies *only* when pointed directly at the speaker. If the microphone is pointed vertically at the ceiling or floor, or anywhere but *directly at the speaker*, your measurement (and thus calibration) will not be accurate at high frequencies.

2.1 SPEAKER AND MICROPHONE POSITIONING FOR PSEUDO-ANECHOIC MEASUREMENT

Figure 1 illustrates a typical indoor speaker measurement setup. A microphone stand with a boom arm is recommended for placement flexibility.

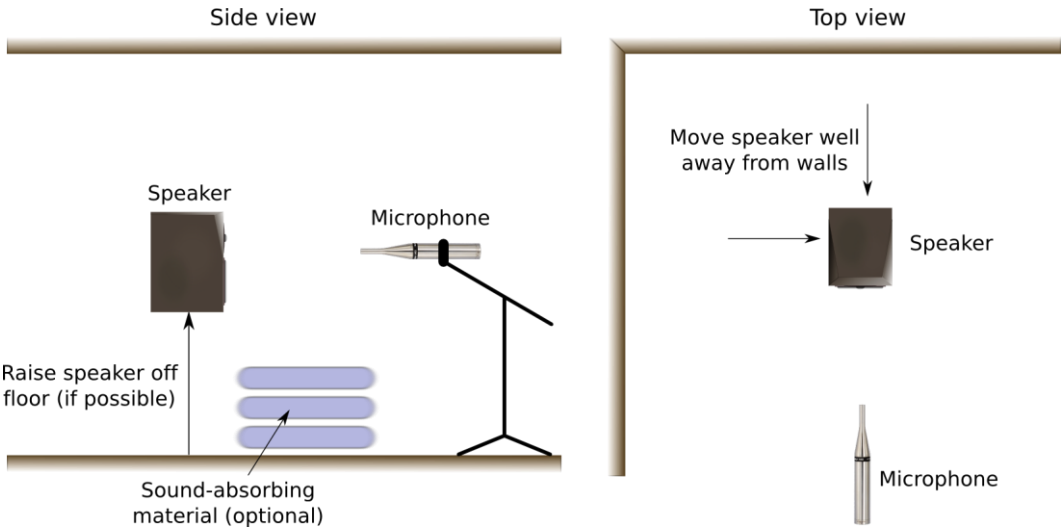


Figure 1. Speaker measurement setup

- Move the speaker well away from the walls or other large objects such as furniture. (They should be at least as far from the walls as the tweeter is from the floor, otherwise those reflections will reduce the reflection-free time window.)
- If possible, raise the speaker so the tweeter is about halfway between the floor and ceiling. This ensures that reflections from the floor and ceiling are as delayed as possible.
- If it is not possible to obtain a sufficiently long reflection-free time window (see Chapter **Error! R eference source not found.**), place thick absorbing material (e.g. cushions and pillows) on the floor between the speaker and microphone to reduce the level of the floor reflection.
- Position the microphone 600 mm (two feet) away from the speaker. Larger speakers may need the microphone positioned further away so the drivers integrate properly for the measurement. (Moving the microphone further away will reduce the length of the reflection-free time window.)
- Position the microphone at a height midway between the centers of the midrange (or midwoofer) and tweeter drivers. In cases where the tweeter has limited vertical dispersion (some types of ribbon tweeters, for example), positioning the microphone at the same height as the tweeter center may be more accurate.
- While the microphone is typically positioned horizontally on the speaker's axis, in some cases a better measurement can be obtained if the microphone is slightly off the horizontal axis (such as inline with the edge of the speaker cabinet).

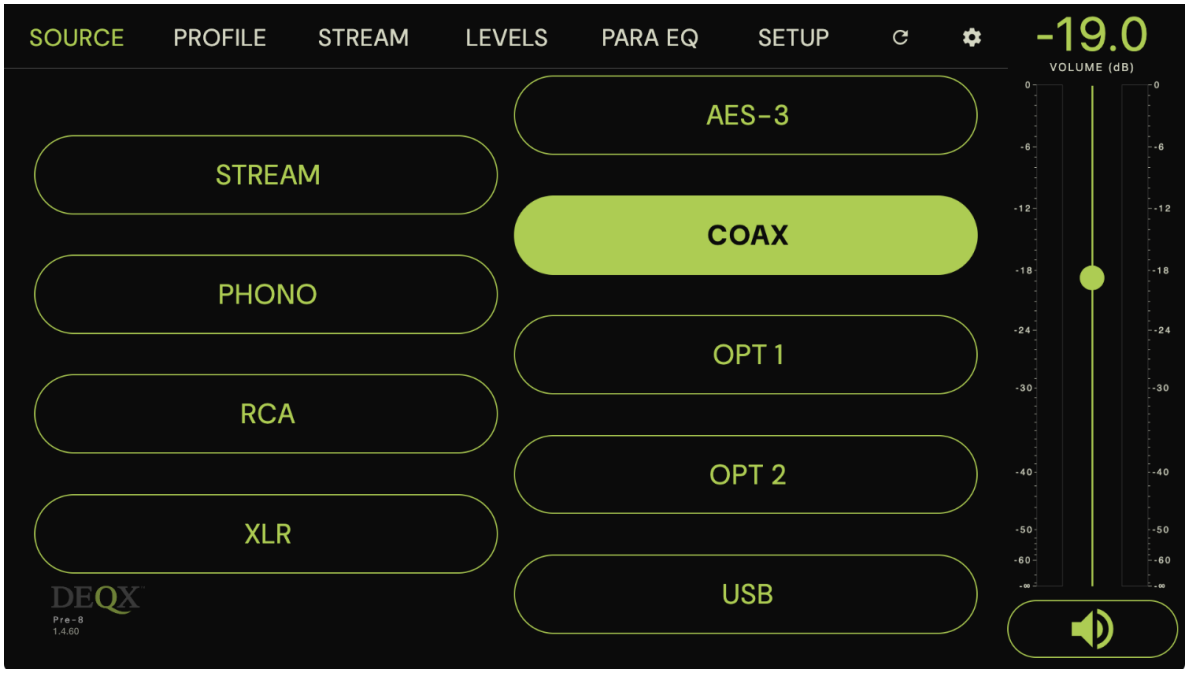
2.2 SPEAKER AND MICROPHONE POSITIONING FOR IN-ROOM MEASUREMENT

3. CONNECTING TO DEQX CONTROL

To access DEQX Control, ensure that your DEQX is powered on and connected to your network. Open Google Chrome and enter the address of your DEQX: deqxy3.local.

Browsers other than Google Chrome are not supported. You can download Google Chrome from https://www.google.com/chrome/.

The initial page displayed is the **Source** page. Each page in the UI is accessed via the menu row along the top. The bulk of this manual will focus on the **Setup** page, with some attention given to the **Para EQ** page.



To proceed, click on the **Setup** link in the menu. A new page will open with a security check, then you will be redirected to the **Setup** page. If you have not already, you will need to create a DEQX Cloud account and log in before proceeding.

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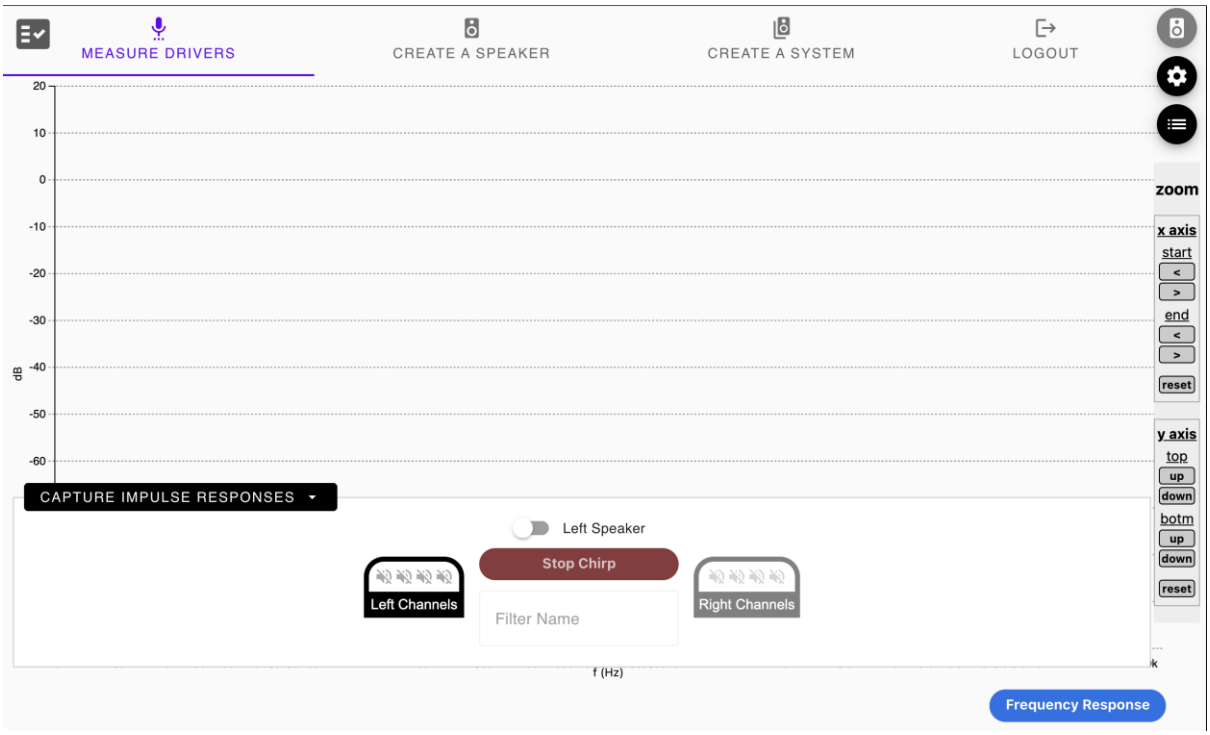
4. THE MEASURE DRIVERS TAB

After logging in, the initial tab presented is the **Measure Drivers** tab. This is where you will measure the speakers.

This is how the tab looks when first opening it:

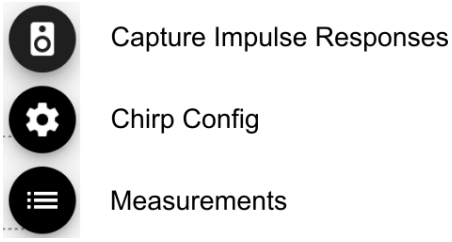


4.1 POSITION THE SPEAKER AND MICROPHONE

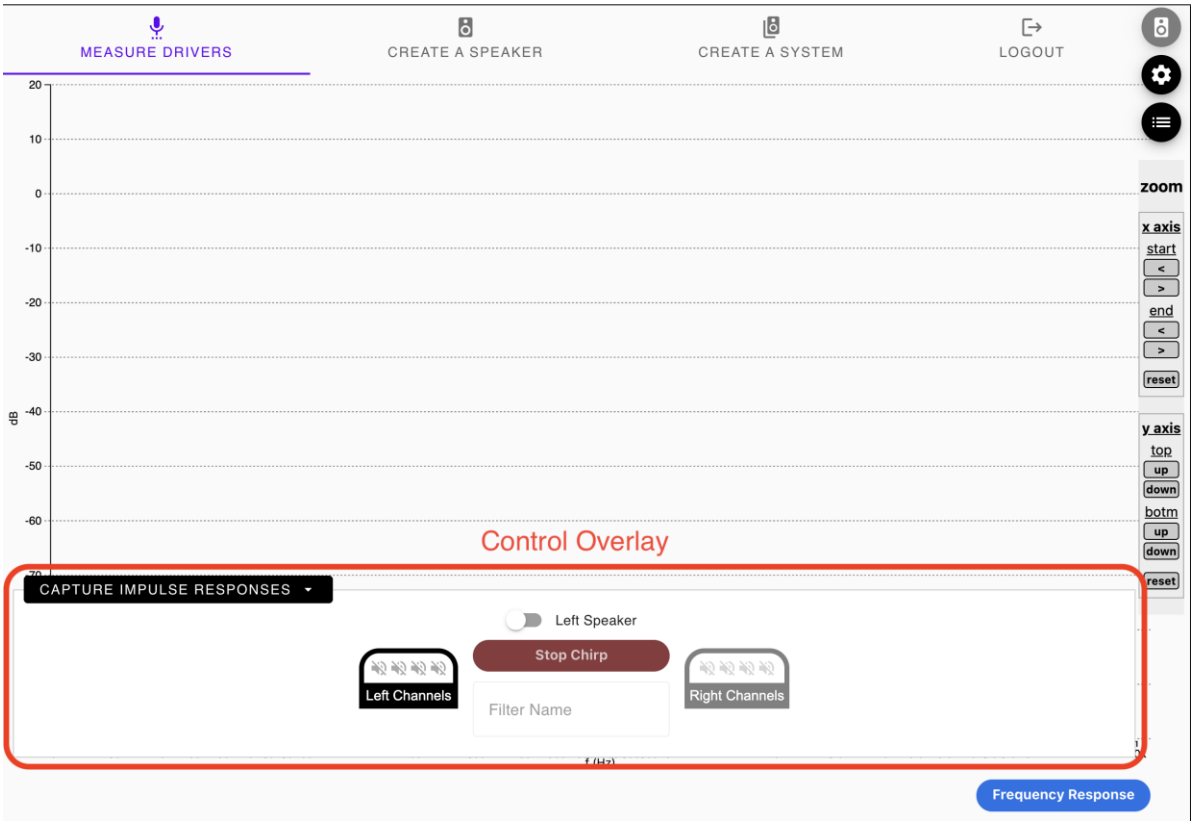
Before proceeding, position the speaker and microphone for pseudo-anechoic measurement, as described on page 6.

4.2 CONTROL OVERLAY BUTTONS

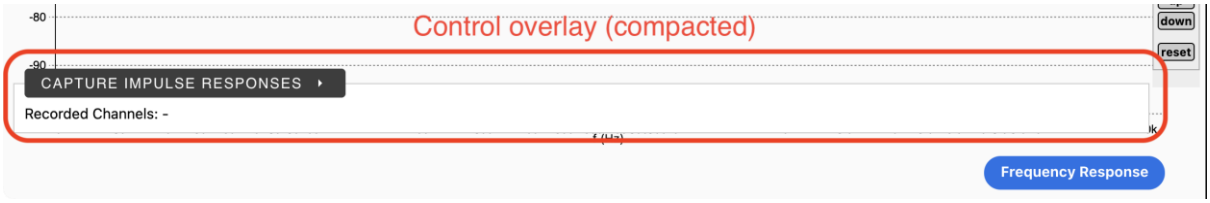
First, familiarize yourself with the three control overlays. The buttons that turn these on and off are at the top right of the window.



A button is greyed out when active. When a button is active, its control overlay appears in the bottom section of the window. Here is an example showing the **Capture Impulse Responses** overlay:



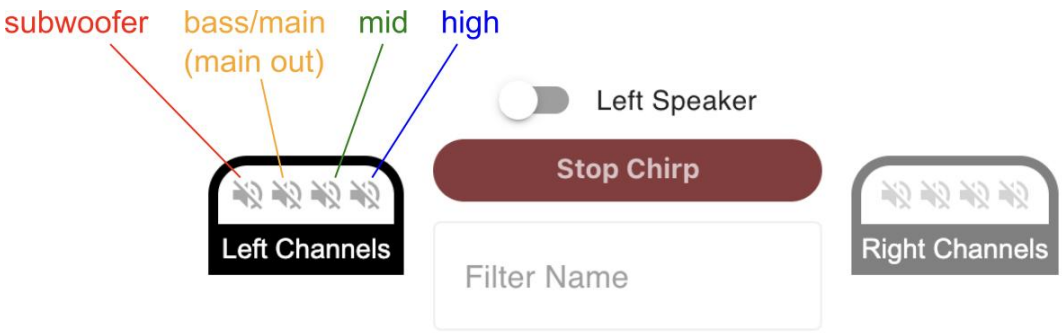
The overlay can be compacted without closing it by clicking on its name. Typically, a very short summary of the contained information is shown. Here is an example of the bottom section of the window with the overlay compacted:



To unfold it to show the contents, click on the name again. From now on, we will show only the overlay when necessary and not the whole window.

4.3 CAPTURE IMPULSE RESPONSES

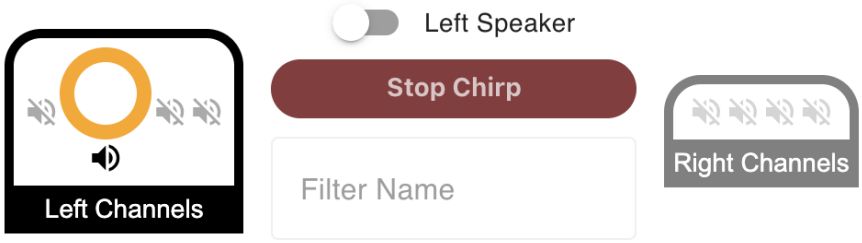
To begin, open the **Capture Impulse Responses** overlay. It will look like this:



We've added labels to the left channels to show which speaker icon maps to which output connector on the rear panel.

4.3.1 Enable the main output channel

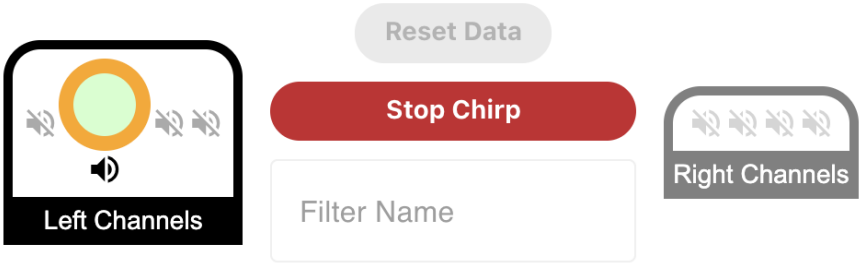
To enable an output channel, click on the corresponding icon. To measure a single full-range speaker, click on the bass/main icon so the overlay looks like this:

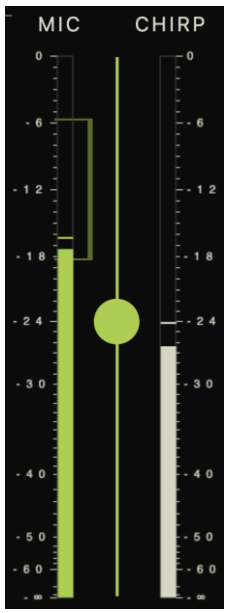


4.3.2 Run a measurement

Click in the orange circle to run the measurement. A quiet sweep sound will be heard from the left speaker. The measurement pane changes as shown below.

Gradually increase the main volume control slider until the test signal is at a moderately loud level. The microphone signal level in the meters on the right should usually be in the green zone. If the speaker sounds "distressed" or strained in any way, reduce the volume. Then stop and restart the chirp so that the whole measurement runs at a consistent level.

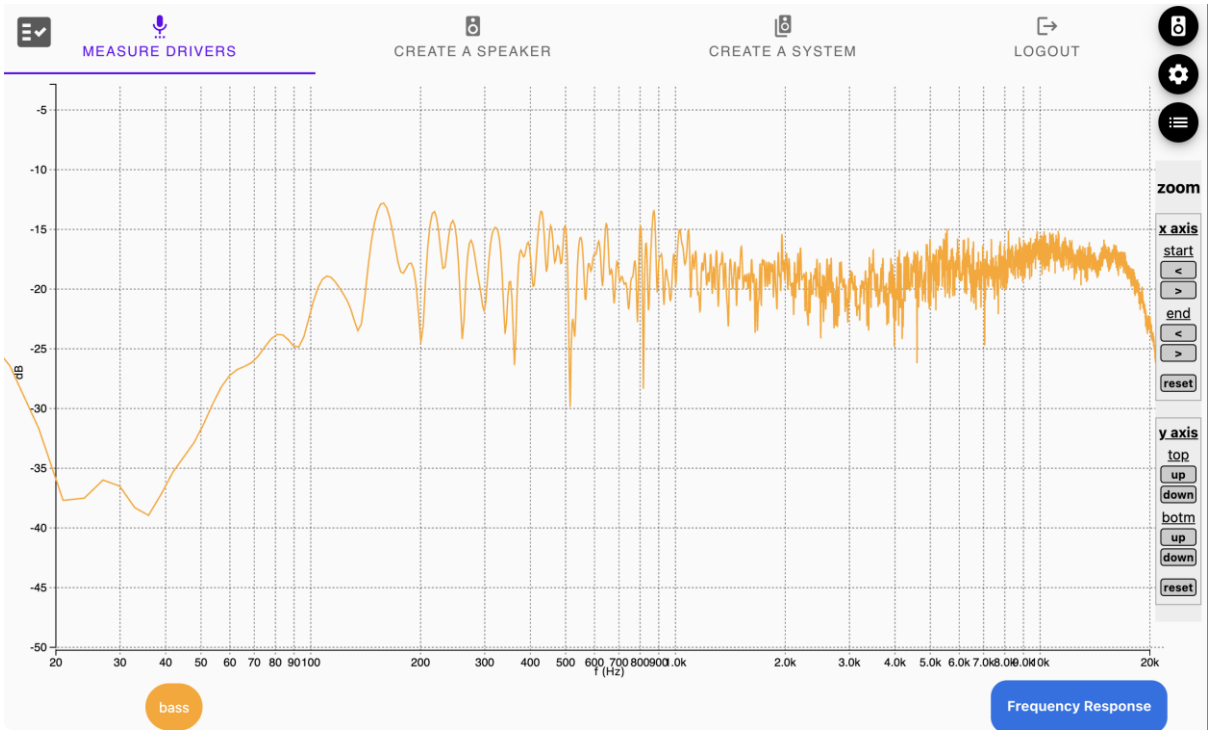




4.3.3 View the amplitude response

When the chirp completes, close the **Capture Impulse Responses** overlay (click on the control button at the top right of the graph).

You will see the frequency response (technically: the amplitude response) of the speaker:



The measurement includes a lot of narrow dips and peaks due to room reflections. If averaged out, a good quality speaker should be within a few dB of the average level from 100 to 10,000 Hz, and roll off at the bass end.

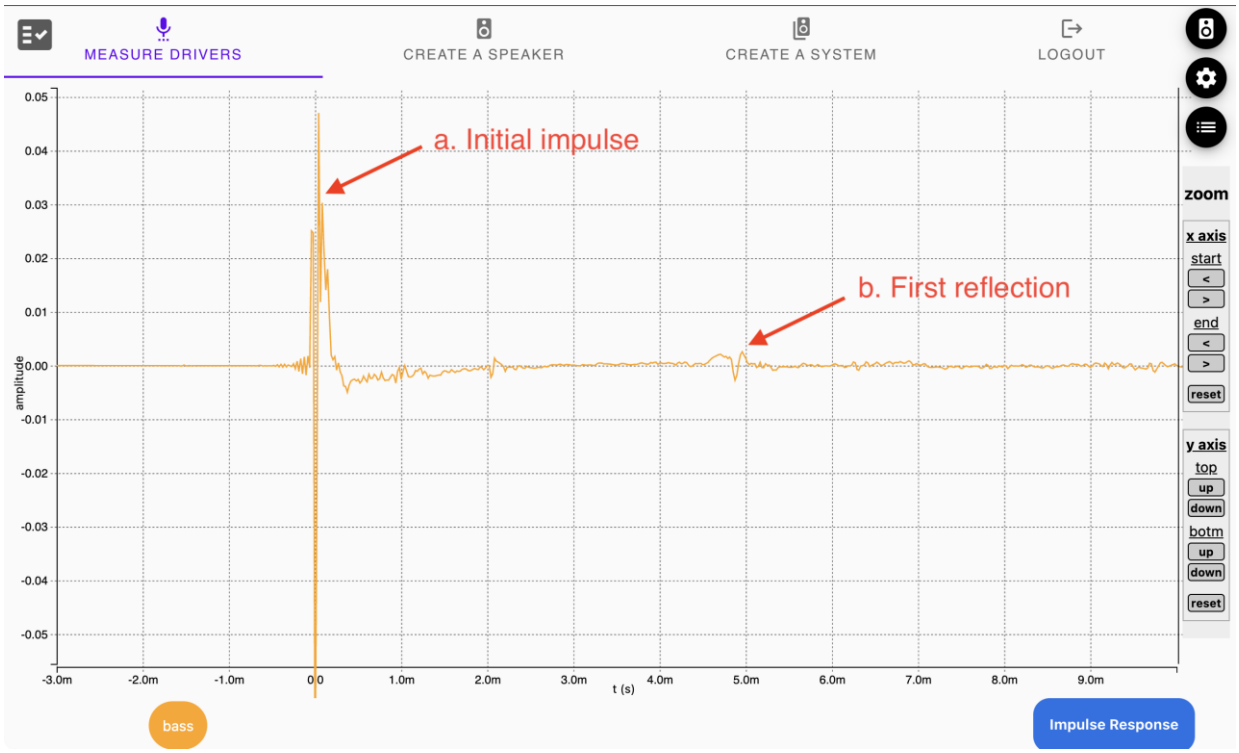
4.3.4 Adjust the graph range

Now is a good time to learn how to adjust the graph range. All graphs have the same set of controls.

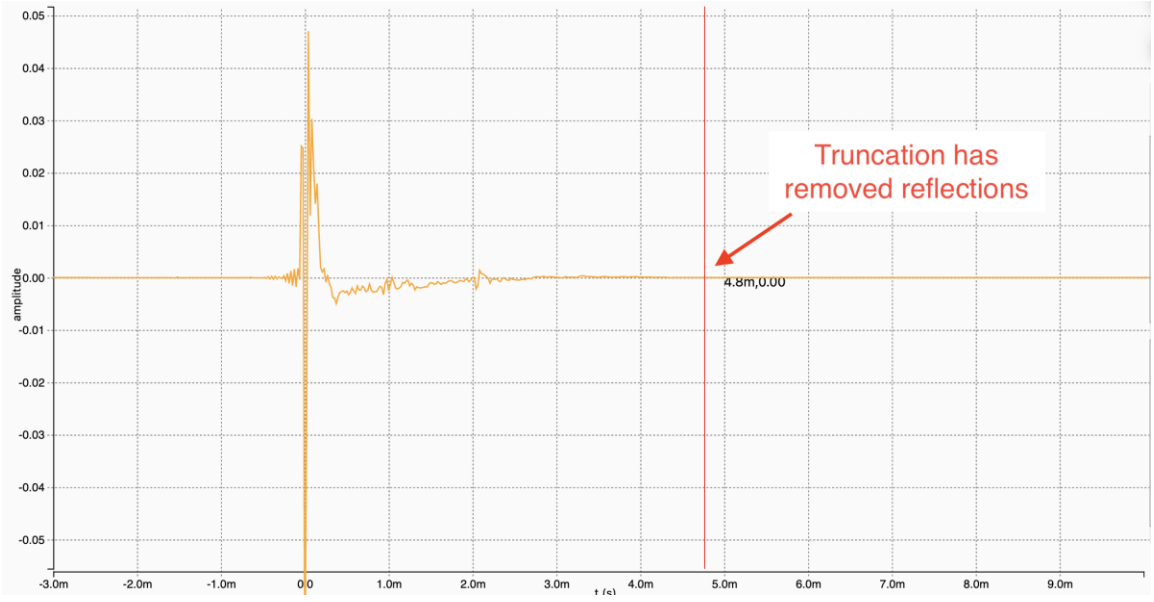
[screenshots and explanation]

4.3.5 View the impulse response and set truncation window

To remove reflections, we need to view the measured signal in the time domain. This is called the impulse response. Click on the blue button at the lower right twice, so that it displays "Impulse Response." Use the x-axis graph controls to zoom in, so that the impulse response is shown more clearly. You should be able to see clearly see a. the initial impulse and b. the first reflection:

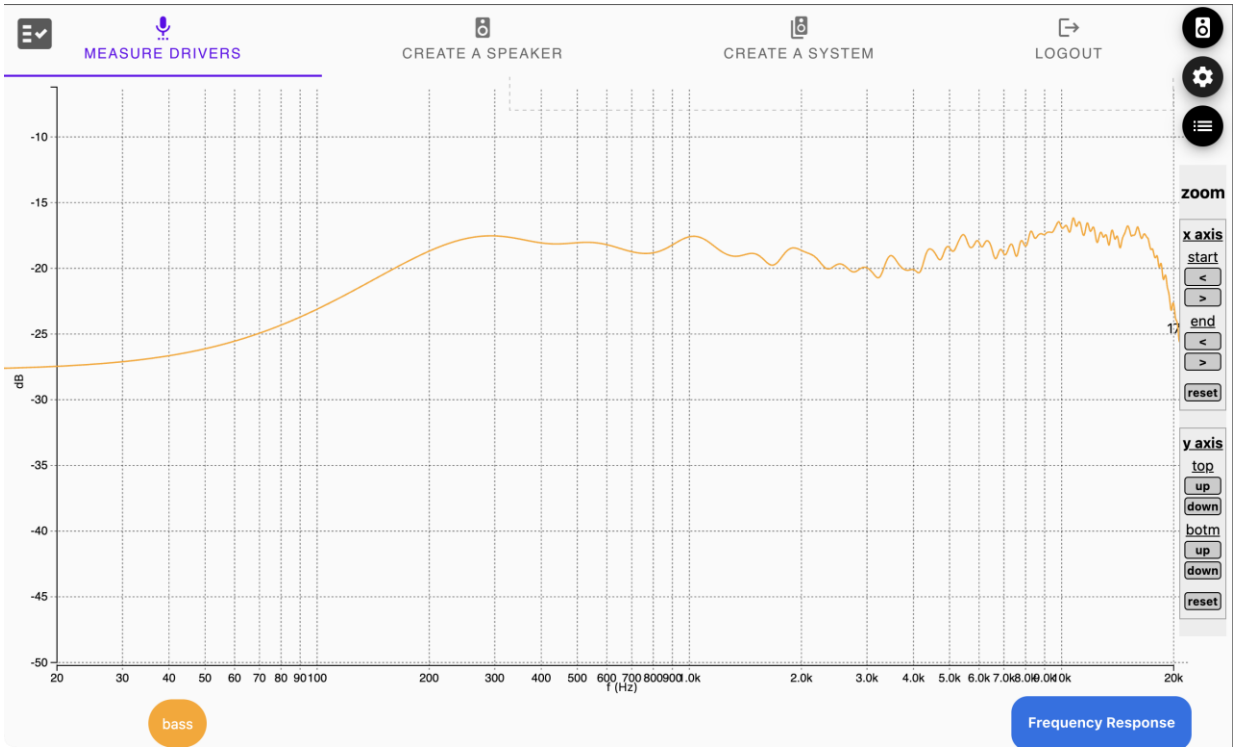


Ideally, a correction filter should exclude all reflections from its calculation. This is referred to as *truncation*, *gating* or *windowing*. To truncate the measurement, click on the graph where the first reflection occurs. The graph will change to show the impulse response with the reflections excluded:



4.3.6 Check the amplitude response again

Click on the blue button at the lower right to display the amplitude response again. It will look different to before:



The key differences to note are:

1. The graph is smoother. This is because the reflections – that cause the "ripples" in a measurement due to interference of the reflected waves with the direct wave – have been removed.
2. The bass response rolls off at a higher frequency. This is not real – it is an unavoidable result of using a short window in time to calculate the frequency response. As the truncation time gets shorter, the minimum frequency that can be resolved in the response graph gets higher.

Prior to uploading the measurement to the cloud for processing, you will want to adjust your settings in the **Chirp Config** overlay.

> Technical note: the interaction between the truncation time and the frequency resolution is one of the key factors in speaker response correction. A longer truncation window is desirable because then the frequency resolution is better. However, if reflections are included, the correction algorithm will not have accurate data of just the speaker.
>
> In practice, some compromise is often necessary. Wherever possible, increase the time to the first reflection, as discussed on page **Error! Bookmark not defined.**. Damping the first reflection with absorbing materials can reduce the effect of reflections, and in some cases can make a longer truncation time usable. Some experimentation may be necessary to get the best result.

4.4 THE CHIRP CONFIG OVERLAY

Before you upload your measurement to the cloud for processing, check and adjust the processing parameters.

Click on the **Chirp Config** button (top right) to open its overlay:

The parameters are:

Truncation

Set the amount of time that is used to calculate the frequency response to use for correction. If you have followed this guide, this is already set to as suitable value. Note that the value is in seconds; multiply by 1000 to get milliseconds.

Boost

Set the maximum amount of boost that will be used for the correction filter. The default is quite conservative at 3 dB, and changing this to a higher value is not necessarily a bad idea. You will see the effect of the Boost and Cut limits on the **Build a System** tab.

Cut

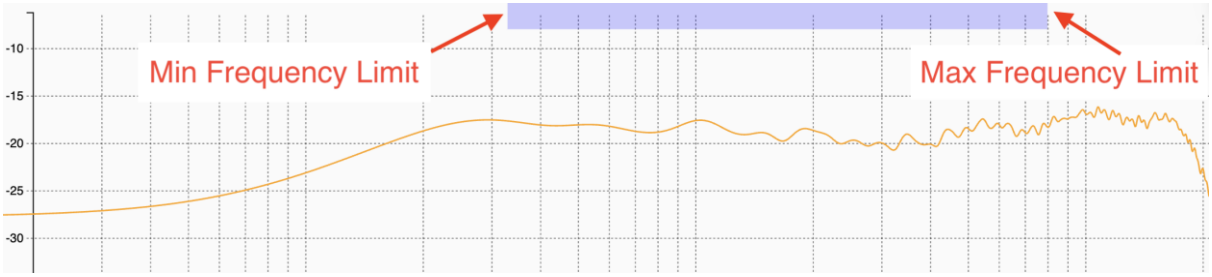
Set the maximum amount of cut that will be used for the correction filter.

Min Frequency Limit

Set the lowest correction frequency. This should always be higher than 1 / truncation. For example, if the truncation time is 0.003, the correction frequency should be 330 Hz or higher. As you change the value, a bar above the graph will indicate the range.

Max Frequency Limit

Set the highest measurement frequency. This setting is a matter of personal preference, and is worth experimenting with. For full range correction, set it to 20 or 24 kHz. Some listeners prefer to set this lower, as low as 5 kHz.

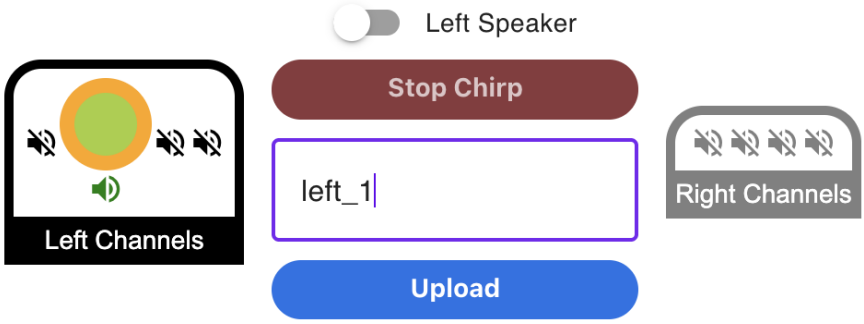


4.5 UPLOAD THE MEASUREMENT

At this point, you have:

1. Measured the left speaker
2. Set the truncation window
3. Set the correction frequency limits

It is time to upload your measurement to the cloud for correction filter calculation. Open the **Capture Impulse Response** overlay and enter a suitable name:



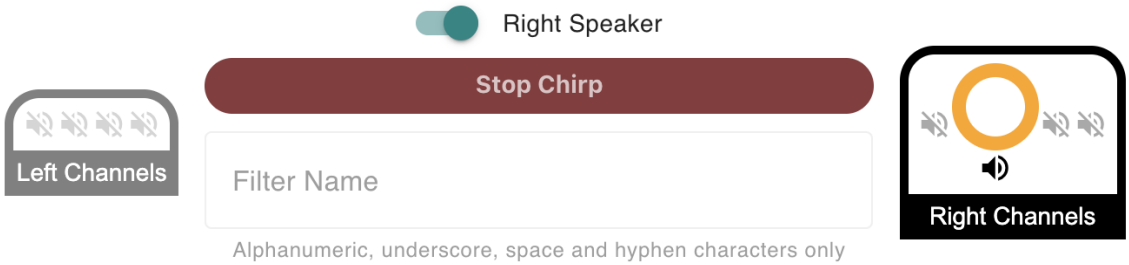
Click **Upload**. The measurement will be uploaded and processed with the parameters set in **Chirp Config**.

After processing is complete, you will be directed to the **Create a System** tab, on the assumption that you want to proceed with room measurement. You do, however, have several options:

1. Proceed on the **Create a System** tab using the left speaker's correction filter for both speakers. Proceed to page 19.
2. Return to the **Measure Drivers** tab and measure the right speaker. Continue on page 17.
3. Return to the **Measure Drivers** tab and create a correction filter with a different set of **Chirp Config** parameters. Repeat from page 12.

4.6 MEASURE THE RIGHT SPEAKER

To measure the right speaker, reposition the microphone in front of the right speaker. Open the **Measure Drivers** tab and its **Capture Impulse Responses** overlay. Click on the Slider to select the right speaker, and click the corresponding speaker icon to enable the right Main/Bass channel:



Click on the orange circle to start measuring the right speaker. The procedure is the same as for the left speaker.

Your **Chirp Config** parameters should be the same for the right speaker as for the left speaker.

When your measurement is complete and the chirp parameters set, upload with a meaningful name:

4.7 RELOADING AND REVISING MEASUREMENTS

To go back and reload or revise any of your correction filters, open the **Measurements** overlay. It displays all uploaded correction filters as a horizontal list:

- To go back in the list, click on the arrow at the right.
- To move forward in the list, click on the arrow at the left.
- To load a measurement, click on its name.
- To delete a measurement, click on the trash can icon next to its name.

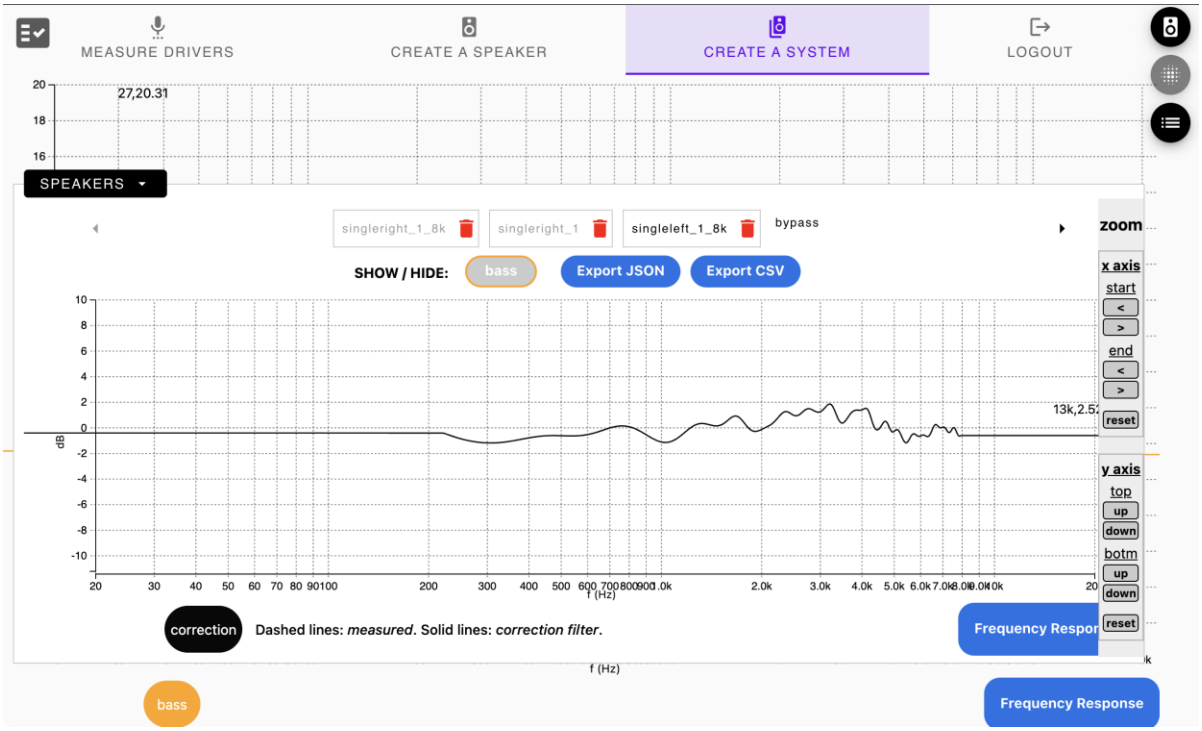
Note: the names stored in the cloud are prefixed with the type of measurement. In this case, they are all prefixed with "single."

Once you have reloaded, you can change the chirp parameters in the **Chirp Config** overlay, and upload the revised version in the **Capture Impulse Responses** overlay. If you attempt to upload it with the same name, you will be asked to confirm that you want to overwrite it:

Click on **Overwrite** to confirm that you want to overwrite the file stored in the cloud.

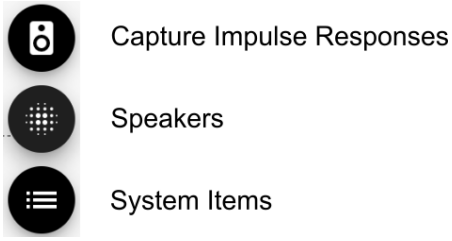
5. CREATE A SYSTEM

After uploading a measurement, you will be taken to the **Create a System** tab automatically. It will open its **Speakers** overlay with the correction filter that was just created:



5.1 THE CONTROL OVERLAY BUTTONS

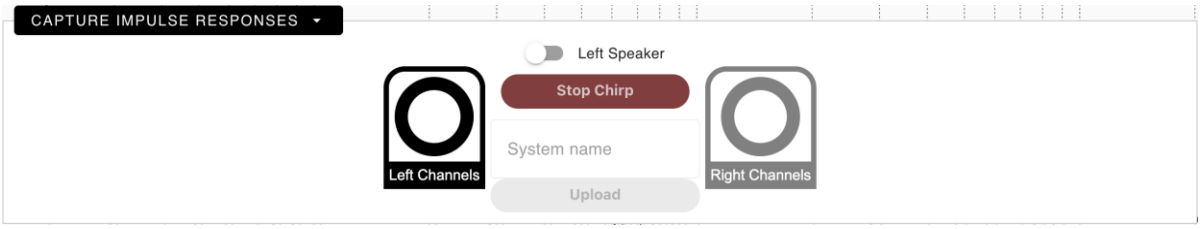
The Create a System tab has three overlays. The buttons that turn these on and off are at the top right of the window.



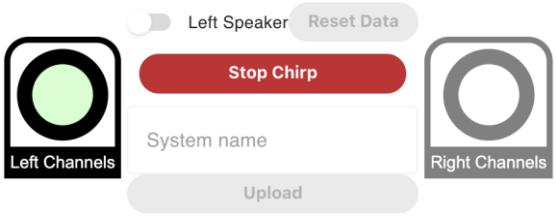
A button is greyed out when active. When a button is active, its control overlay appears in the bottom section of the window.

5.2 MEASURE THE LEFT SPEAKER'S IN-ROOM RESPONSE

Open the **Capture Impulse Responses** overlay.

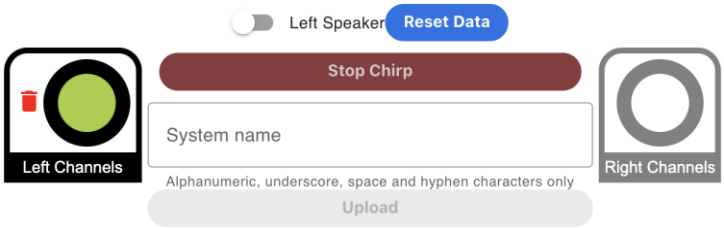


Click on the circle above the Left Channels label. The chirp will start:



If necessary, adjust the main volume so that the microphone level reaches into the green region on the meter. (But if the speaker sounds strained, reduce it again.) If you do need to adjust the volume, stop the chirp and start it again to measure.

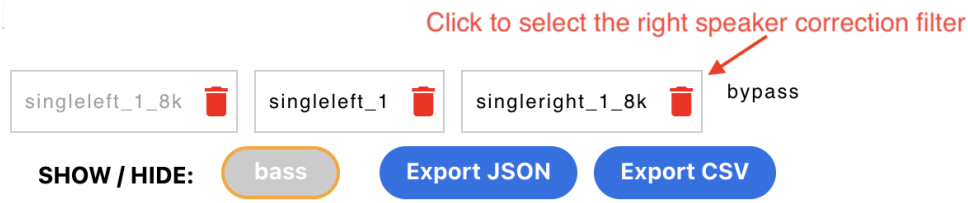
When the chirp completes, the left channel icon will be green:



5.3 (OPTIONAL) SELECT THE CORRECTION FILTER FOR THE RIGHT CHANNEL

You now have a choice: use the same correction filter for both speakers, or use a different correction filter for the right speaker.

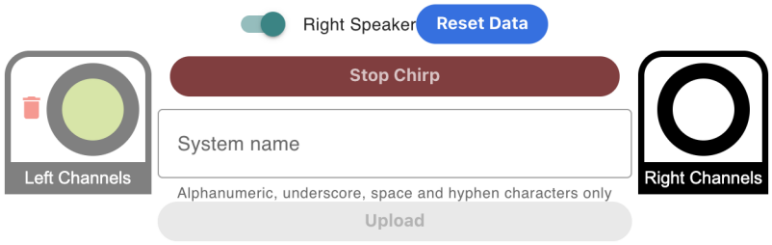
If you have already measured the right speaker, open the **Speakers** overlay and select the filter that you want to use for the right:



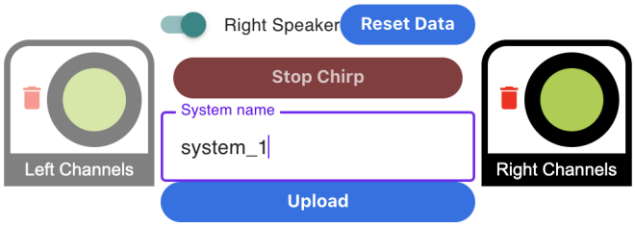
If you have not yet measured the right speaker, reposition the microphone for pseudo-anechoic measurement of the right speaker. You will need to return to the **Measure Drivers** tab to make another measurement.

5.4 MEASURE THE RIGHT SPEAKER'S IN-ROOM RESPONSE

Once the desired correction filter has been loaded, use the switch to select the right speaker:

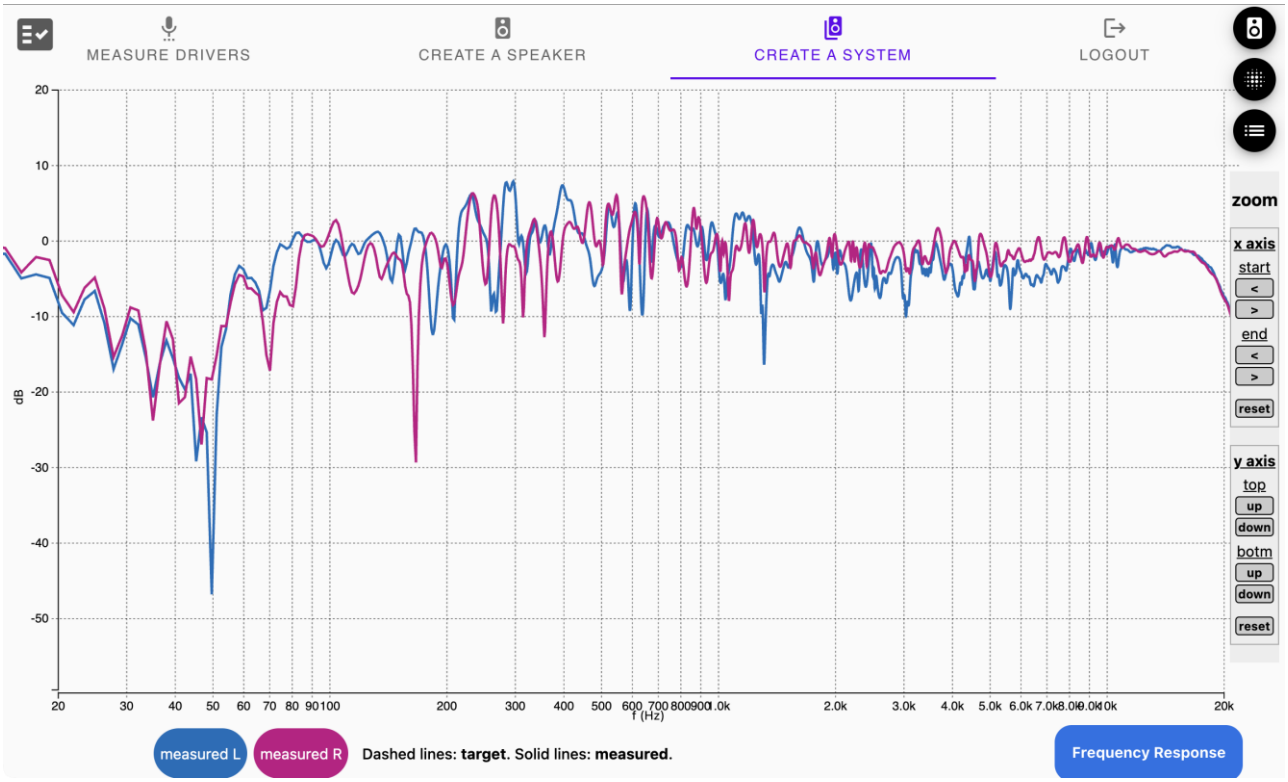


Click on the circle above the label "Right Channels." The chirp will start. When it completes, enter the name of the system and click **Upload**:



Note: the name that you enter here will appear on the **PROFILE** tab of DEQX Control.

When the upload completes, the in-room measurements of left and right speakers will display:

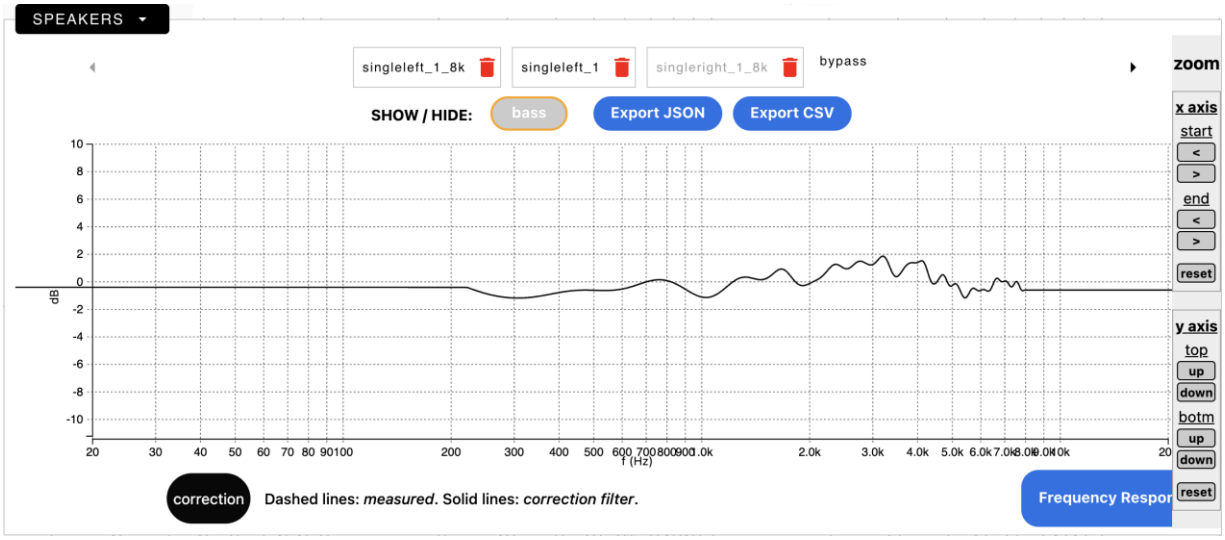


Note: if the measurements don't display, use the **System Items** overlay to select a different system, then select the just-measured system again.

5.5 THE SPEAKERS OVERLAY

The **Speakers** overlay lists all correction filters created on the **Measure Drivers** tab in a horizontal list. Use the left and right arrows to scroll through them. Click on a filter name to load it prior to running an in-room measurement.

The name of the currently-selected filter is shown in grey, and its response is shown in the graph below the list:

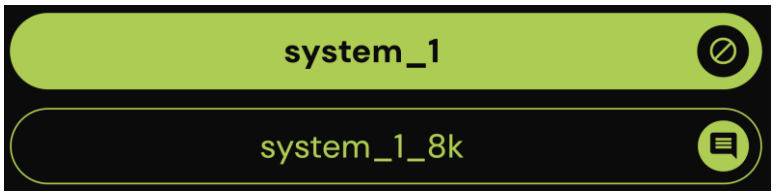


5.6 THE SYSTEM ITEMS OVERLAY

The **System Items** overlay lists the uploaded system profiles in a horizontal list. Use the left and right arrows to scroll through them. Click on any system name to view its in-room measurements. The name of the currently-selected system is shown in grey.

6. WRAPPING UP

To exit the setup process, click on the **EXIT** button at the top left of the main window. Then click on the PROFILE button. Select the newly-created calibration by clicking on it:



The next step is to adjust the parametric EQ for room correction. Refer to the **Para EQ** section of the DEQX Gen4 User Manual.