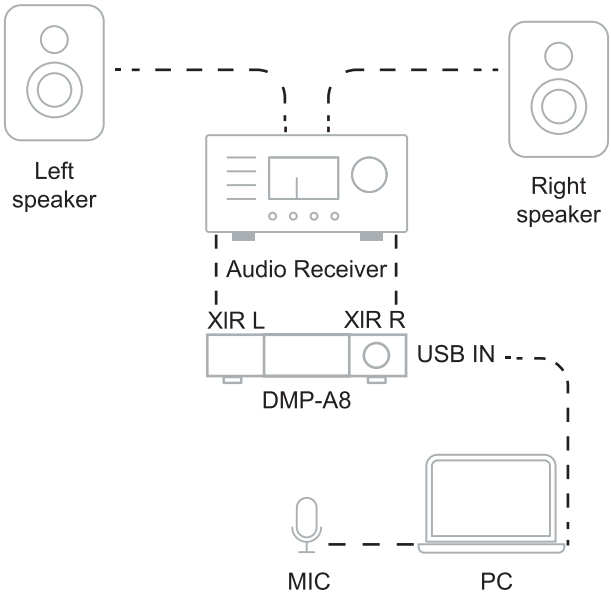
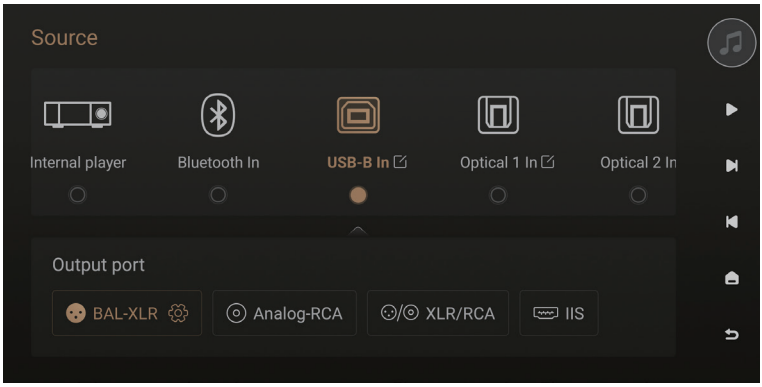
How to Use REW to Create a DMP-A8 DSP FIR Impulse Response File

The DMP-A8 supports improving room acoustic responds by using FIR filters(2046 taps). This article mainly introduces how to create FIR impulse response files for room acoustic correction by using the Room EQ Wizard(REW). This article does not cover the basic usage of REW. Readers are advised to first read the REW documentation and familiarize with the basic usage of REW.

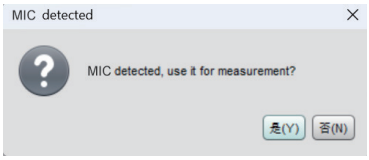
The connections between devices inside the room are as shown below:

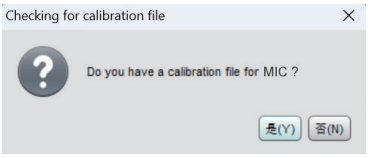


First, set the DMP-A8 as Soundcard, connecting your PC to DMP-A8 via USB cable. Recommended measuring MIC when using REW and connect it to PC through USB cable. Then, connect DMP-A8 to the amplifier using XLR cables, use the amp to drive the speaker for sound output. Please note that DMP-A8 and MIC are not mandatory, you can choose your trusted Soundcard and MIC. It is suggested to use calibrated sound card and MIC as the measuring devices.
Note: The MIC should be placed at where you listen to the music.

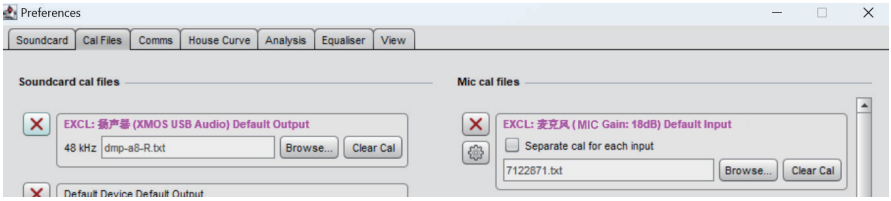


When all devices are ready and connected, it is time to start the REW. The REW will recognize the connected MIC when starting. If the MIC is supported by REW, there will pop up a prompt asking if you are going to use the MIC for measurement and load the calibration file. Please follow the instruction, use MIC for measurement and load the calibration file.

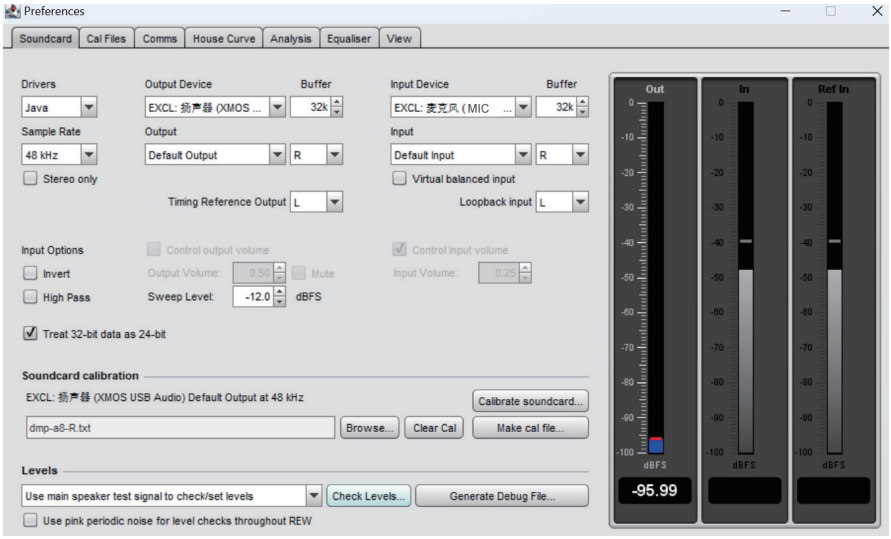




The loaded calibration file can be found in Preference-> Cal Files

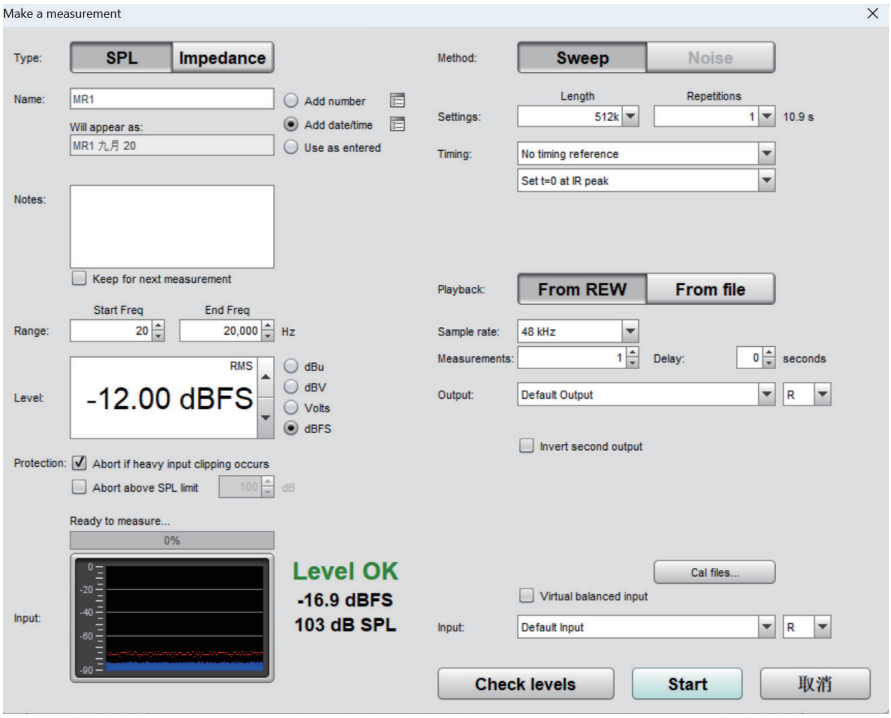


After launching REW, click the Preferences option on the top right corner to enter the configuration interface. You will see the Soundcard interface by default, please set the input and output device for the sound. In this test, we choose DMP-A8(the drive name of DMP-A8 is shown in the picture as below) and UMIK-1. Also, please select the measurement channel, in this example the measurement is done on the right channel.



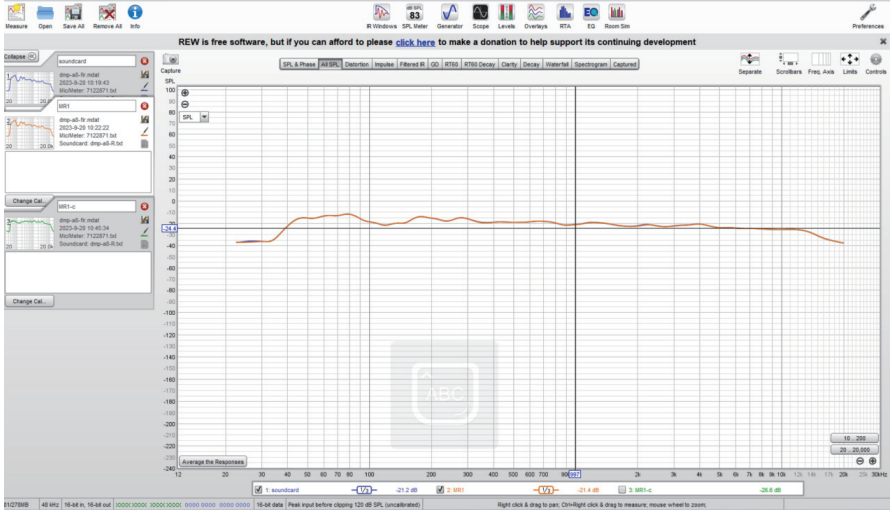
Before measuring, click on 'Check Levels' to inspect the input level and ensure it meets the requirements of REW. If the level is too low, you can increase the volume of DMP-A8, or decrease the volume if the level is too high. If your Soundcard is not calibrated, click on 'Calibrate Soundcard' and follow the prompts at the bottom of the interface to measure the Soundcard.

Next, click the 'Measure' icon on the left top corner to prepare for the measurement. Please configure some measurement settings here, such as the measurement length, measured frequency range, playback sampling rate and delay etc. Our configuration is shown as below.

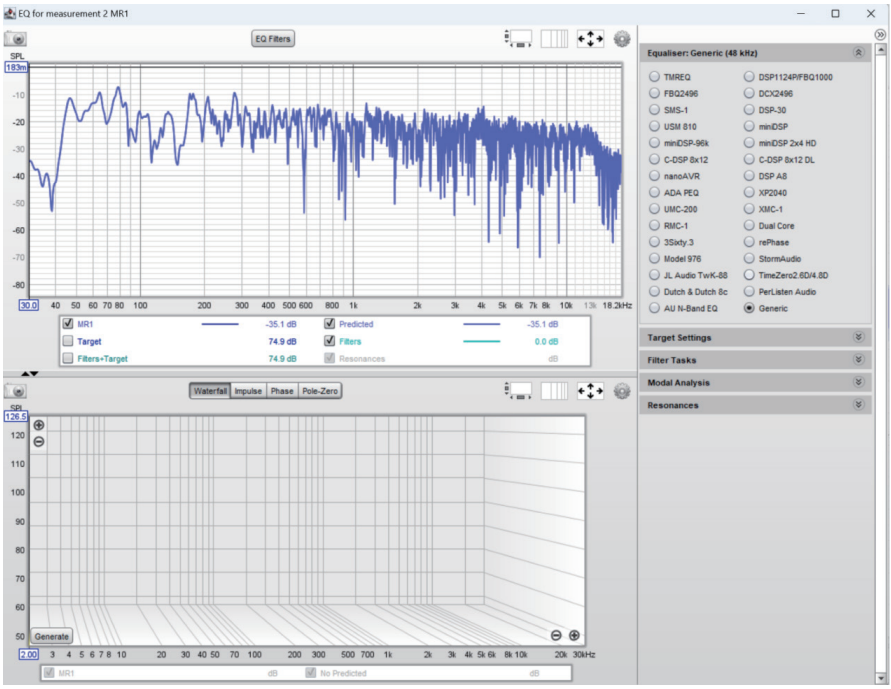


The level can also be inspected in this interface, as shown above, the ‘Level OK’ means the level meets the requirements. Next, click ‘Start’, REW will begin the measurement and get a set of room curves. We name this set as MR1. As it is shown below, 1/3 smoothing has been applied.

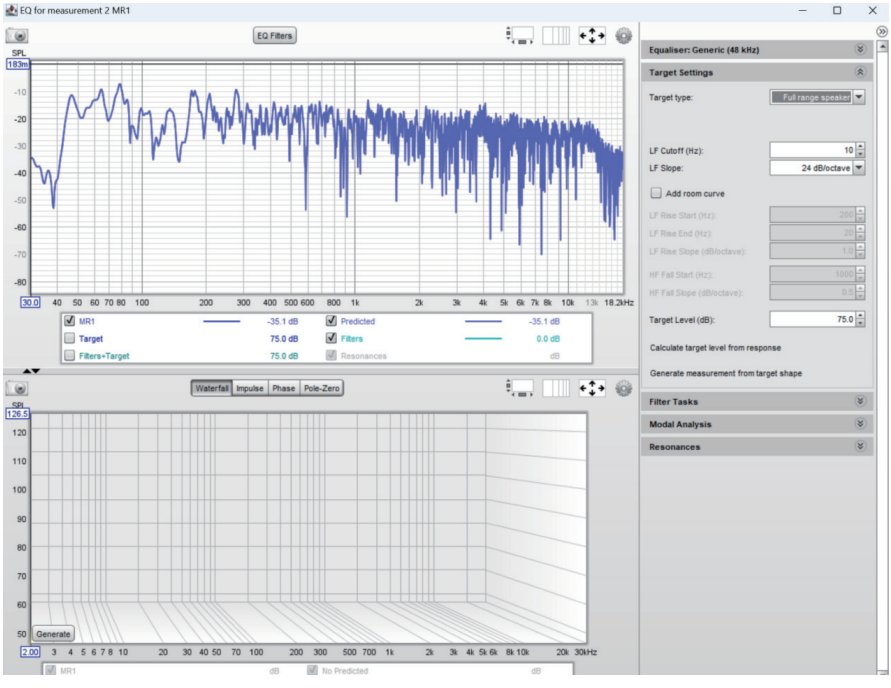
Select this measurement, click the  at the top of the REW to perform EQ correction on the measurement.



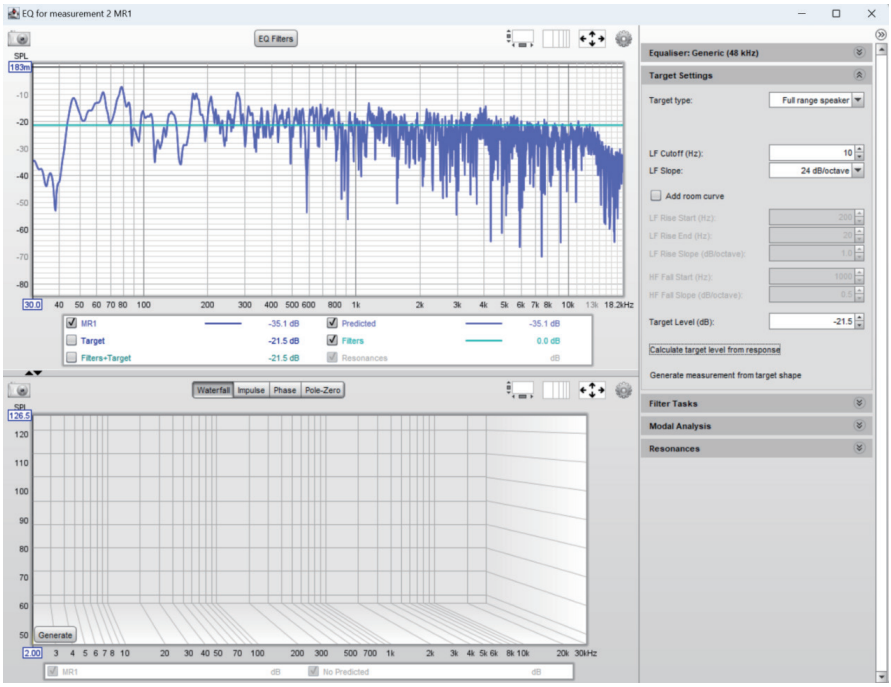
Choose ‘Generic’ for ‘Equaliser’.



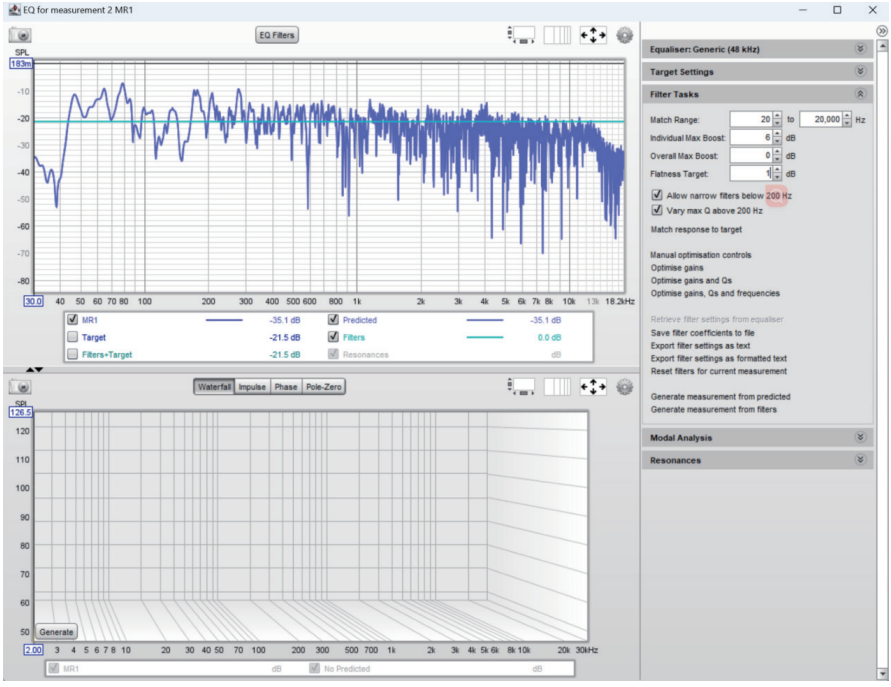
Choose ‘Full range speaker’ for ‘Target type’.



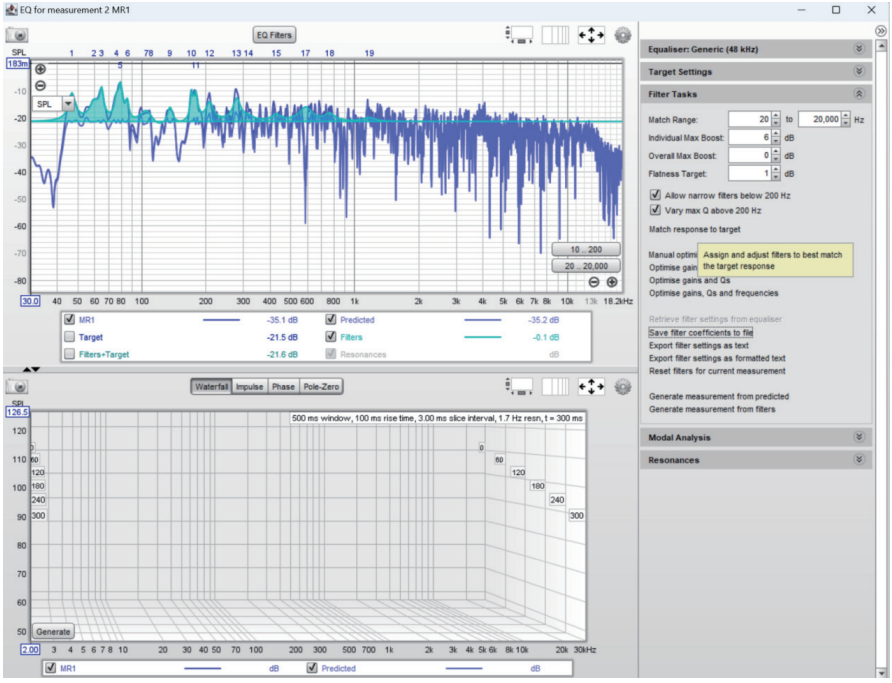
If you not sure about the Target Level. Click on ‘Calculate target level from response’ to calculate automatically.



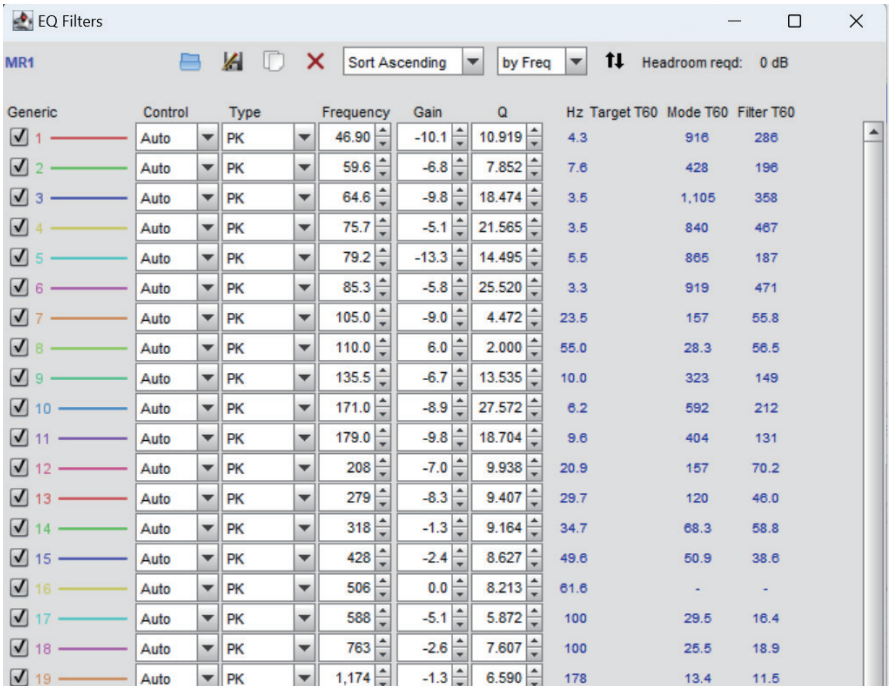
For ‘Filter Tasks’, we hope for a slight increase.



After the above parameters are set, you can click 'Match Response to Target' to initiate the automatic filter allocation and adjustment process in REW, generating the correction EQ and response.

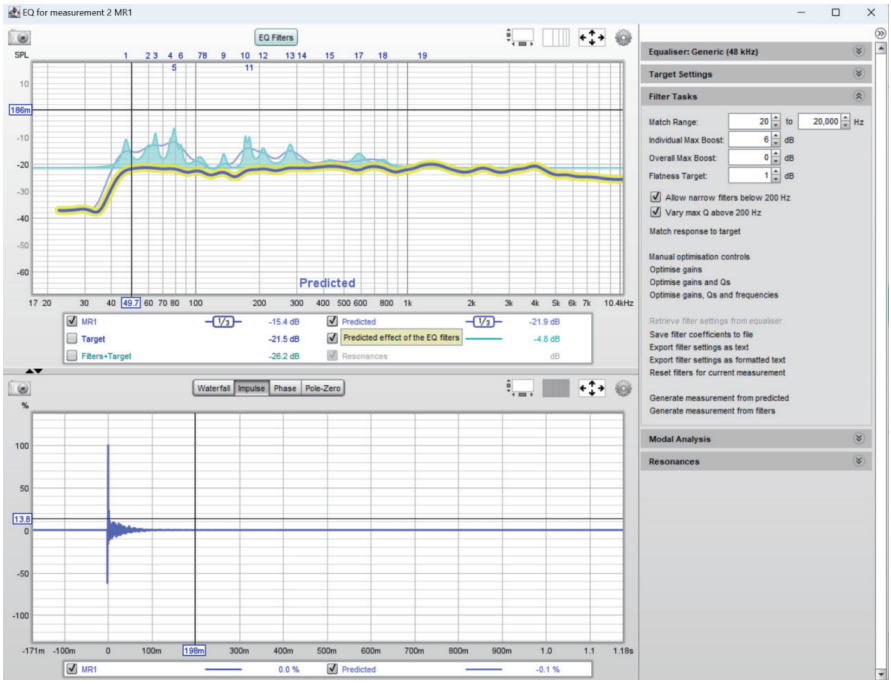


Click ‘EQ Filter’ to view all the adjusted EQ settings generated

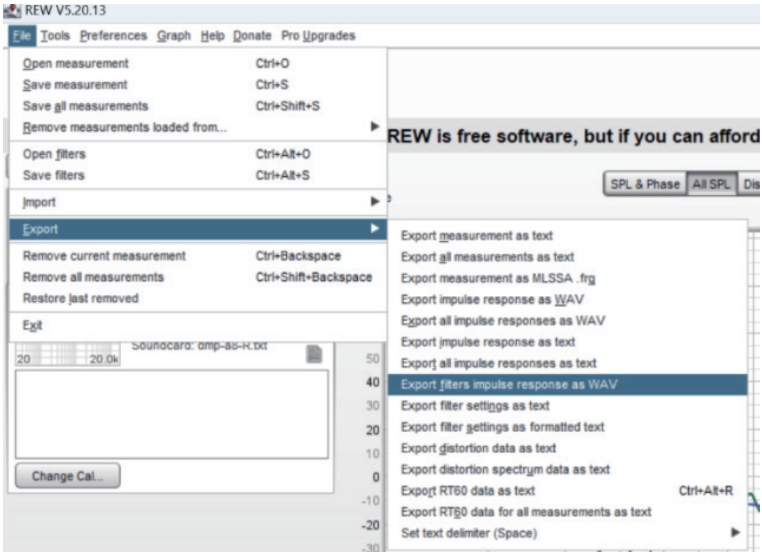


Generic	Control	Type	Frequency	Gain	Q	Hz	Target T60	Mode T60	Filter T60
1	Auto	PK	46.90	-10.1	10.919	4.3		916	286
2	Auto	PK	59.6	-6.8	7.852	7.6		428	196
3	Auto	PK	64.6	-9.8	18.474	3.5		1,105	358
4	Auto	PK	75.7	-5.1	21.565	3.5		840	467
5	Auto	PK	79.2	-13.3	14.495	5.5		865	187
6	Auto	PK	85.3	-5.8	25.520	3.3		919	471
7	Auto	PK	105.0	-9.0	4.472	23.5		157	55.8
8	Auto	PK	110.0	6.0	2.000	55.0		28.3	56.5
9	Auto	PK	135.5	-6.7	13.535	10.0		323	149
10	Auto	PK	171.0	-8.9	27.572	6.2		592	212
11	Auto	PK	179.0	-9.8	18.704	9.6		404	131
12	Auto	PK	208	-7.0	9.938	20.9		157	70.2
13	Auto	PK	279	-8.3	9.407	29.7		120	46.0
14	Auto	PK	318	-1.3	9.164	34.7		68.3	58.8
15	Auto	PK	428	-2.4	8.627	49.6		50.9	38.6
16	Auto	PK	506	0.0	8.213	61.6		-	-
17	Auto	PK	588	-5.1	5.872	100		29.5	16.4
18	Auto	PK	763	-2.6	7.607	100		25.5	18.9
19	Auto	PK	1,174	-1.3	6.590	178		13.4	11.5

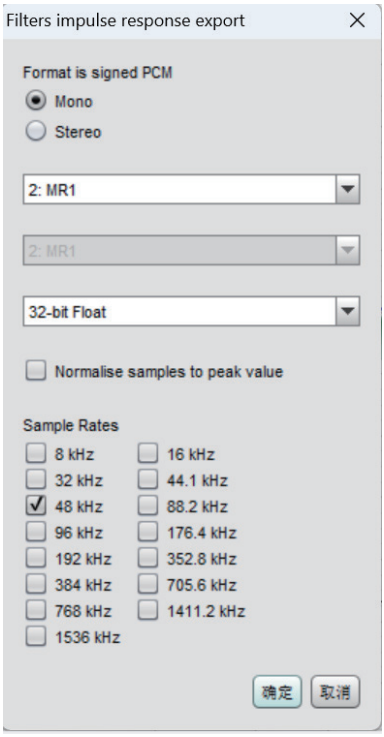
The predicted response after adjustment is shown in the following graph. A 1/3 smoothing has been applied.

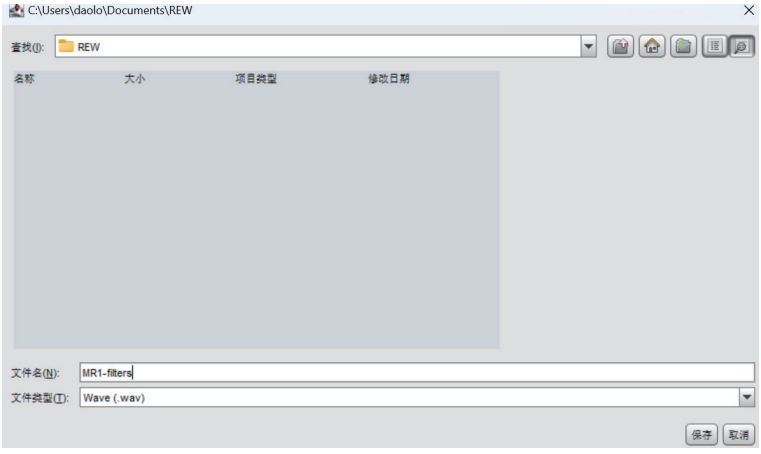


We have completed the calibration for one measurement at this point. If you are not satisfied with the calibration results, you can adjust by taking multiple sets of measurements and averaging them, as well as adjusting the target levels and filter parameters until the desired results are achieved.



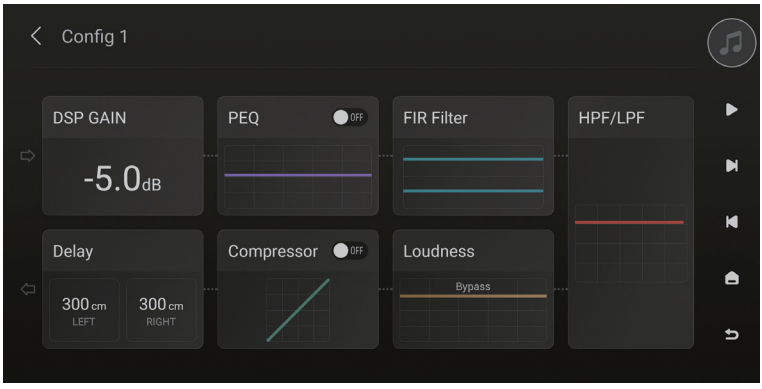
Because we only measure the right channel, please select mono audio and use 32-bit floating-point data type for saving. The most important thing is that the sampling rate must be set to 48000, consistent with the sampling rate used in the data processing of the DMP-A8 DSP. Click OK to save it as a WAV file, and we name it MR1-filters. Copy the file to a USB drive for backup.



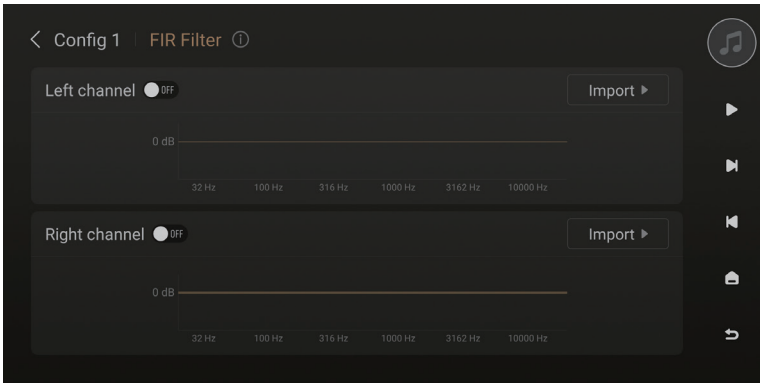


In the DMP-A8, enter the DSP interface, and navigate to the configuration page for the input source that requires DSP processing. Here, we choose USB-B input.

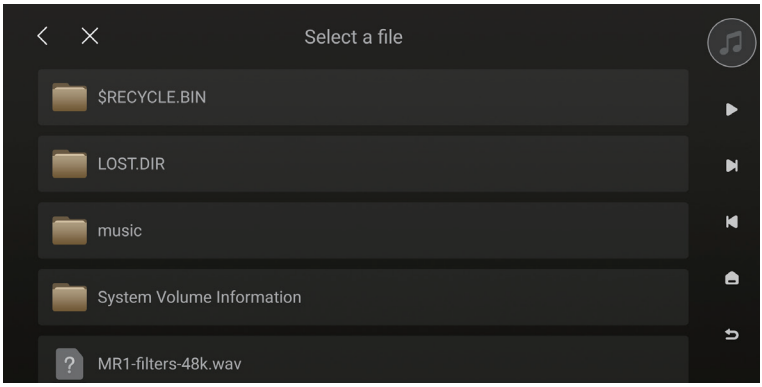
Select FIR filter.



Select right channel import.



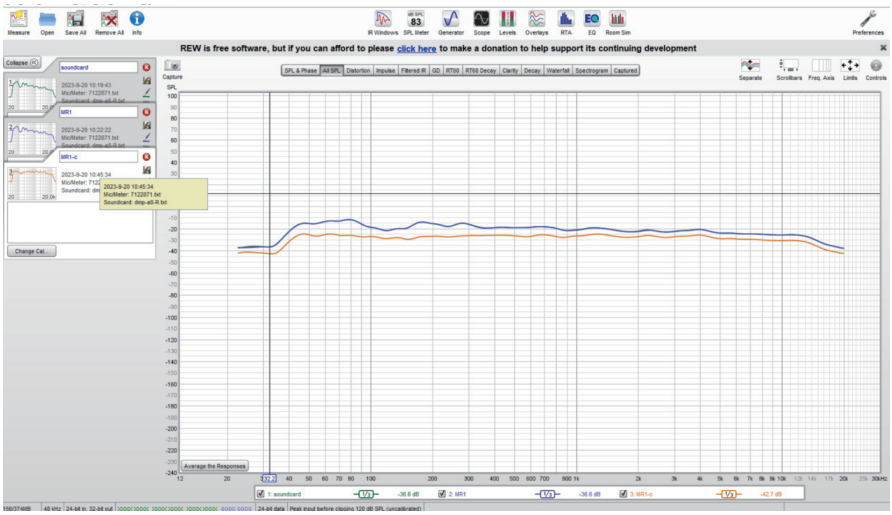
Find the previously saved MR1-filters-48k.wav



The successfully loaded FIR response file will be plotted as a graph.

Next, validate whether the FIR filter is functioning properly. Remember to turn on the switch for the right channel in the FIR filter interface, and also, make sure to turn on the input source DSP switch.

Returning to the REW, measure and calibrate the curve, naming it MR1-c. From the measured curve, we obtained a smoother curve compared to the previous measurement.

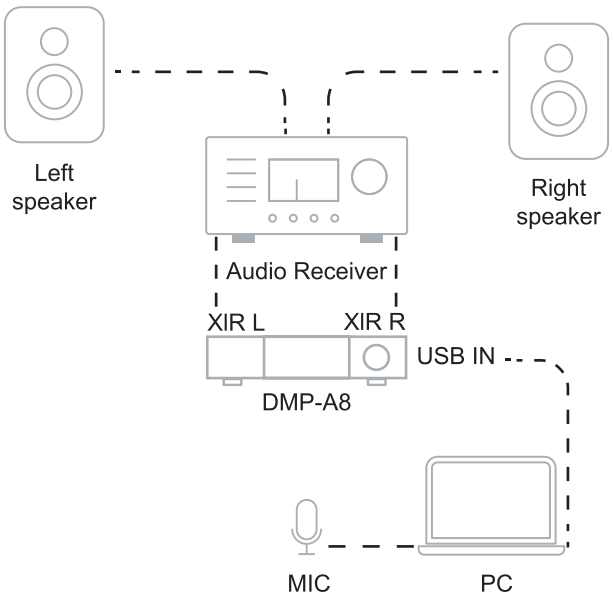


This article introduces the calibration method for the right channel, which is also applicable to the left channel.

如何使用 REW 制作 DMP A8 DSP FIR 脉冲响应文件

DMP-A8 支持通过使用 FIR 滤波器（2046 tap）来改善房间的声学响应。本文着重介绍如何使用 Room EQ Wizard (REW) 软件制作用于房间声学校正的 FIR 脉冲响应文件。本文不介绍 REW 的基本使用，建议读者先阅读 REW 的帮助文档并掌握 REW 的基本使用方法。

下面介绍房间里面的设备，设备间的连接示意图如下：

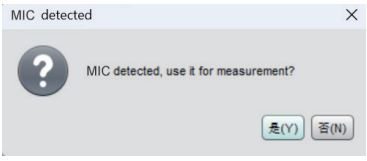


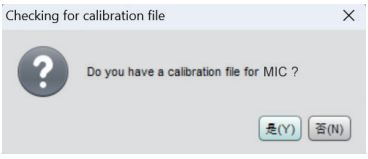
首先将 DMP-A8 设置为声卡， PC 通过 USB 线缆与 DMP-A8 连接。使用 REW 推荐的测量 MIC，同样通过 USB 线缆与 PC 连接。然后 DMP-A8 使用 XLR 连接到功放，功放驱动音箱发声。DMP-A8 和 MIC 不是必选的，你也可以自行选择信任的声卡和 MIC。我们建议使用经过校准的声卡和 MIC 作为测量设备。

注意：

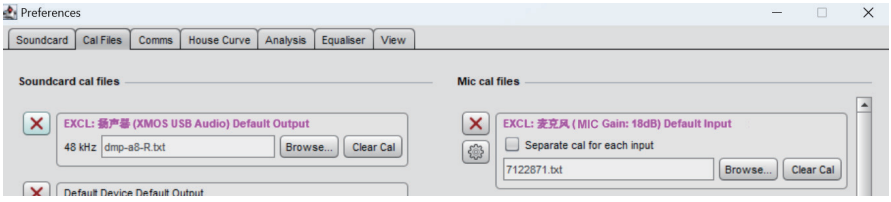
MIC 的位置要放在人耳聆听音乐的位置。

当所有设备连接就绪就可以启动 REW 了。 REW 启动的时候会去识别接入的 MIC，如果是 REW 支持的型号 ，自动会弹出是否要将该 MIC 作为测量用途，并提示加载校准文件。我们按照提示，将 MIC 用于测量，并加载了校准文件 。

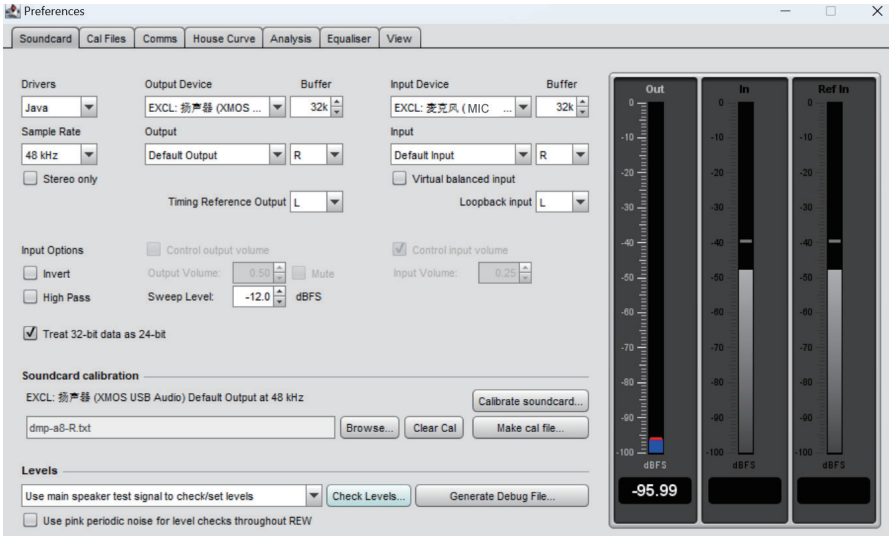




加载的校准文件可以在 Preferences --> Cal Files 界面查看

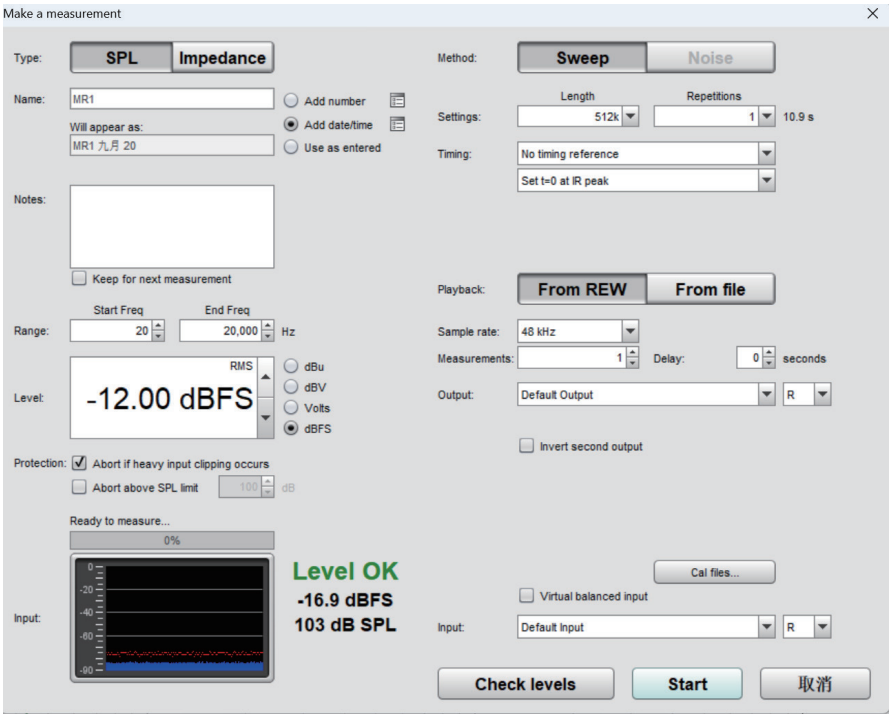


REW 启动之后，点击右上角的 Preferences 按钮，进入配置界面。默认看到是 Soundcard 界面， 在这里需要设置声音的输出和输入设备，我们选择了 DMP-A8 (图片中显示的是 DMP-A8 的驱动名字) 和 MIC 并选择测量的通道，示例测量的是右声道。



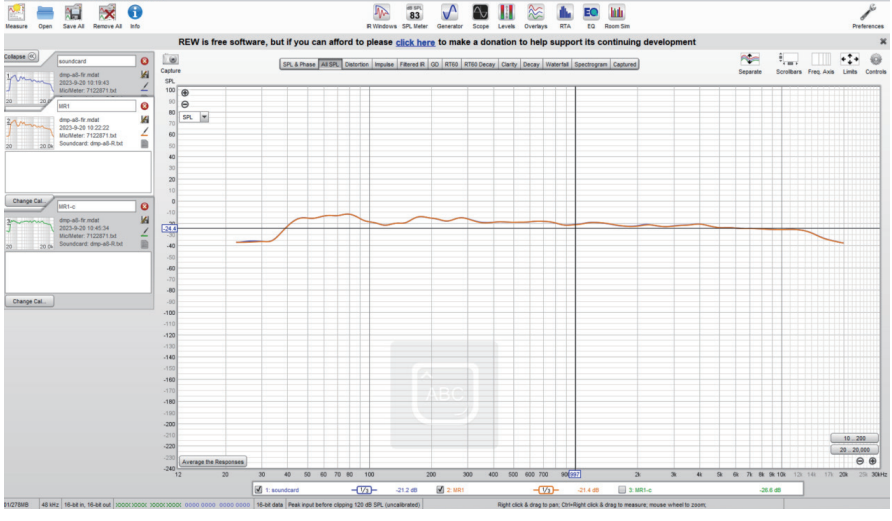
开始测量之前，点击 Check Levels 检查输入电平，确保其符合 REW 的要求，如果过低，可以增大 DMP-A8 音量。过高则减小 DMP-A8 的音量。如果没有校准过的声卡，可以点击 Calibrate soundcard ，依照界面下方提示测量声卡。

接下来可以点击左上角的 Measure 图标准备测量。这里需要对测量做一些设置，比如测量长度，测量频率范围，播放采样率和延迟等。我们的设置如下图

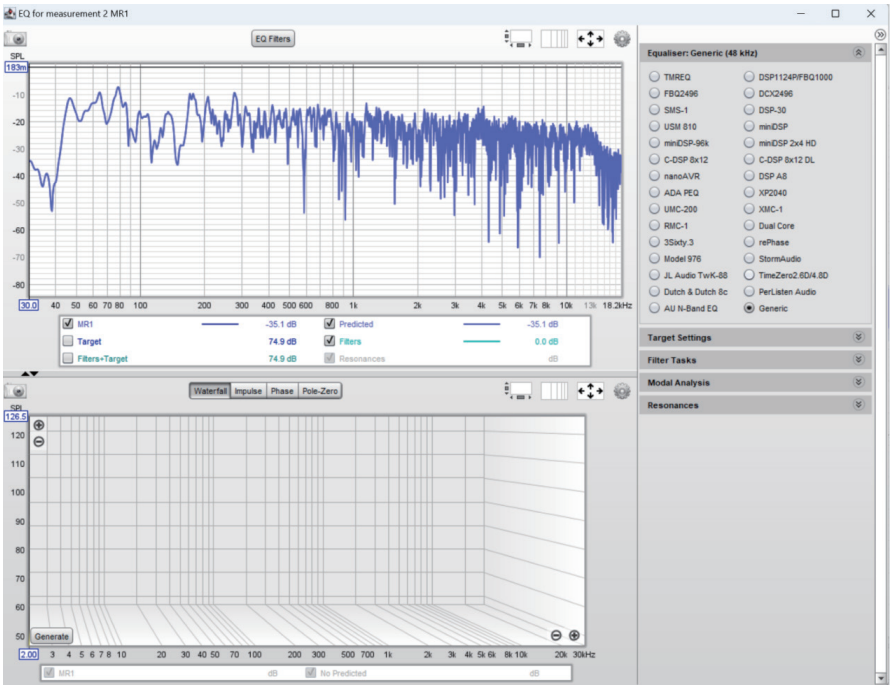


在这个界面也可以点击 Check Levels 检查电平，如上显示 Level OK 说明电平符合要求。然后点击 Start REW 会开始测量，得到 一组房间的曲线，我们命名为 MR1 ，如下图做了 1/3 的平滑。

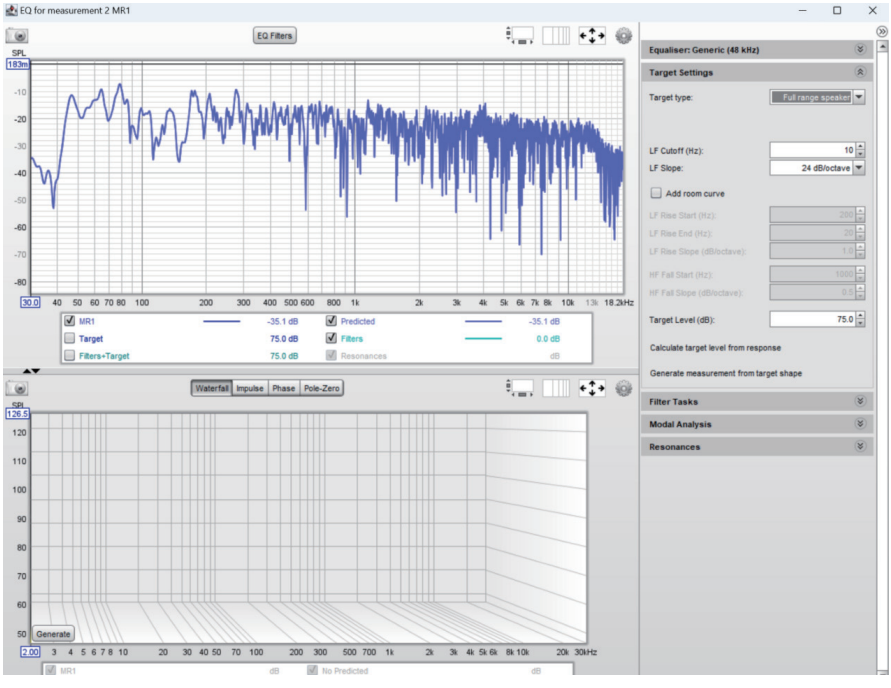
选择该次测量，然后点击 REW 上方的  图标，对测量进行 EQ 校正。



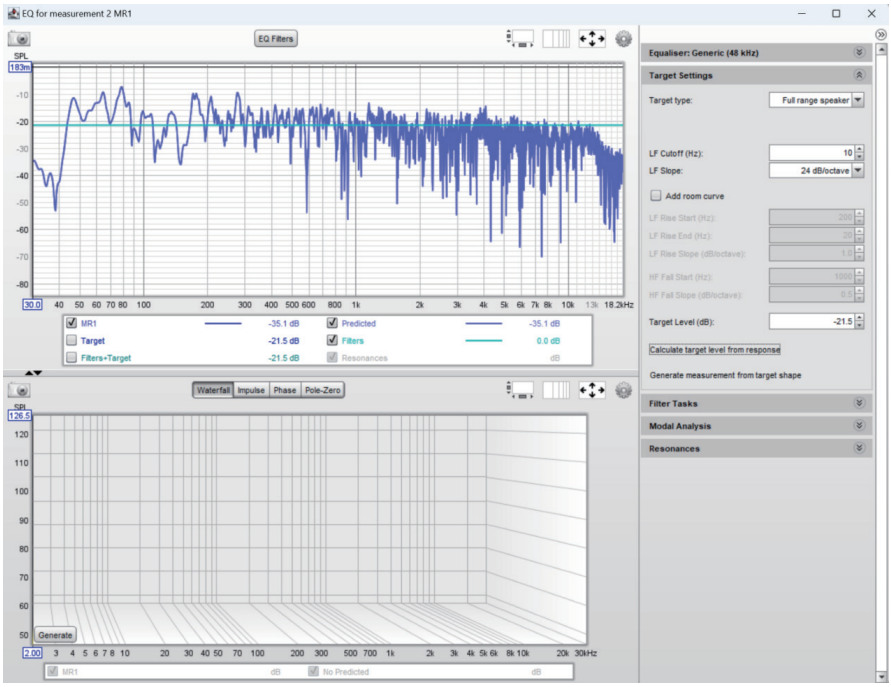
Equaliser 选择 Generic.



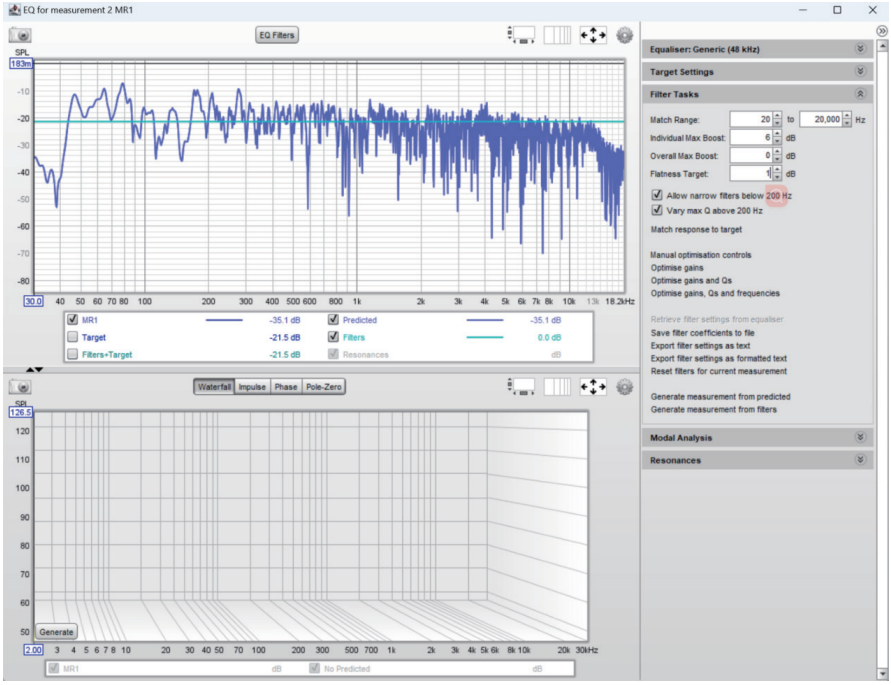
Target type 选择 Full range speaker.



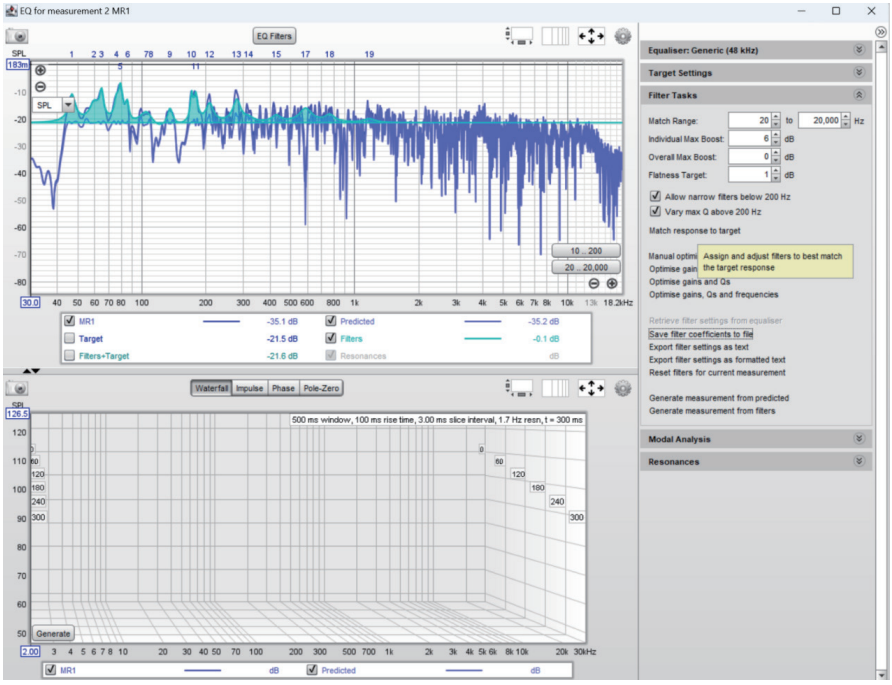
目标电平（Target）如果不确定的话，可以点击 Calculate target level from response 自动计算。



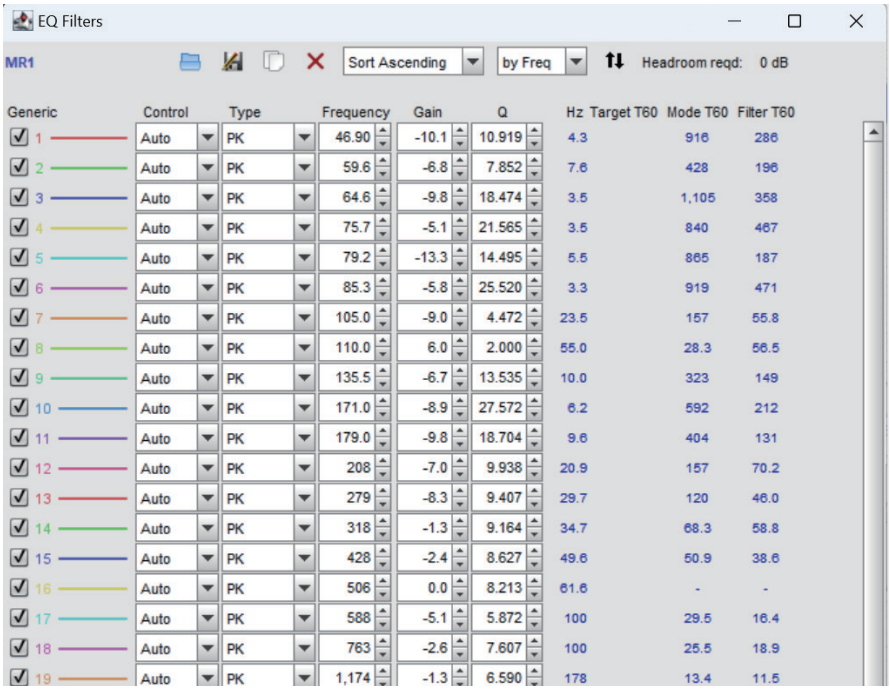
Filter Tasks, 我们希望小幅度抬升。



以上参数设置后之后，可以点击 Match Response to Target 启动 REW 的自动滤波器分配和调整过程，即生成校正 EQ 和响应。

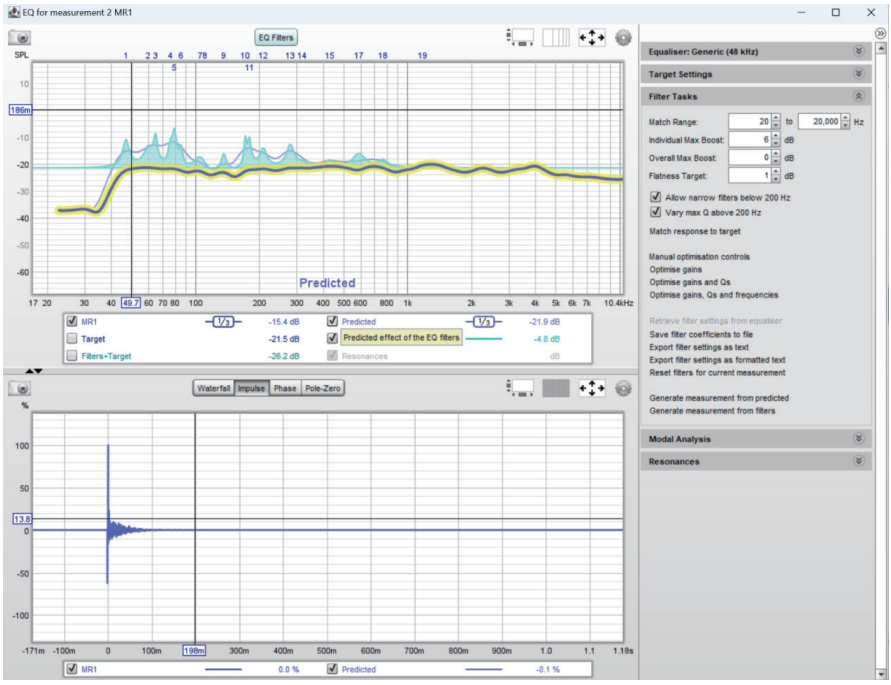


点击 EQ Filter 可以查看生成的所有调整 EQ。



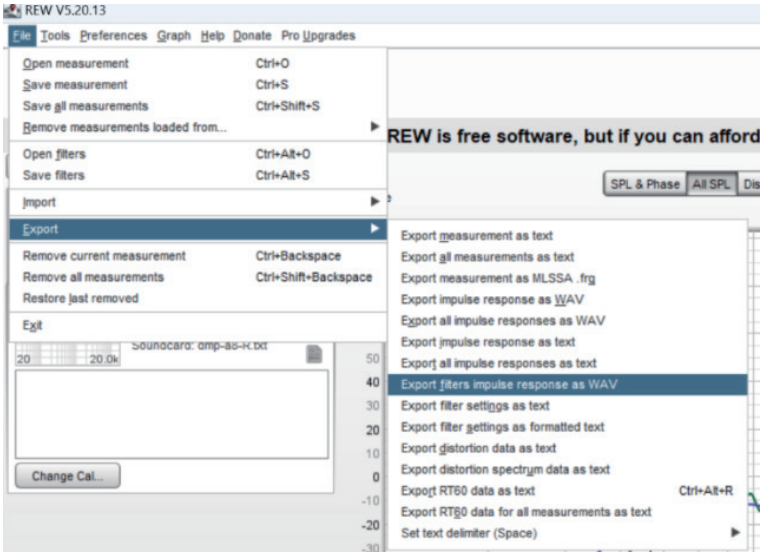
Generic	Control	Type	Frequency	Gain	Q	Hz	Target T60	Mode T60	Filter T60
1	Auto	PK	46.90	-10.1	10.919	4.3		916	286
2	Auto	PK	59.6	-6.8	7.852	7.6		428	196
3	Auto	PK	64.6	-9.8	18.474	3.5		1,105	358
4	Auto	PK	75.7	-5.1	21.565	3.5		840	467
5	Auto	PK	79.2	-13.3	14.495	5.5		865	187
6	Auto	PK	85.3	-5.8	25.520	3.3		919	471
7	Auto	PK	105.0	-9.0	4.472	23.5		157	55.8
8	Auto	PK	110.0	6.0	2.000	55.0		28.3	56.5
9	Auto	PK	135.5	-6.7	13.535	10.0		323	149
10	Auto	PK	171.0	-8.9	27.572	6.2		592	212
11	Auto	PK	179.0	-9.8	18.704	9.6		404	131
12	Auto	PK	208	-7.0	9.938	20.9		157	70.2
13	Auto	PK	279	-8.3	9.407	29.7		120	46.0
14	Auto	PK	318	-1.3	9.164	34.7		68.3	58.8
15	Auto	PK	428	-2.4	8.627	49.6		50.9	38.6
16	Auto	PK	506	0.0	8.213	61.6		-	-
17	Auto	PK	588	-5.1	5.872	100		29.5	16.4
18	Auto	PK	763	-2.6	7.607	100		25.5	18.9
19	Auto	PK	1,174	-1.3	6.590	178		13.4	11.5

调整后得到预测响应如下图，做了 1/3 平滑

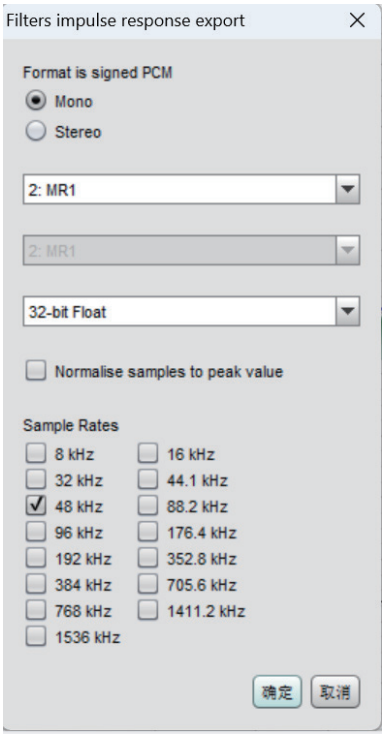


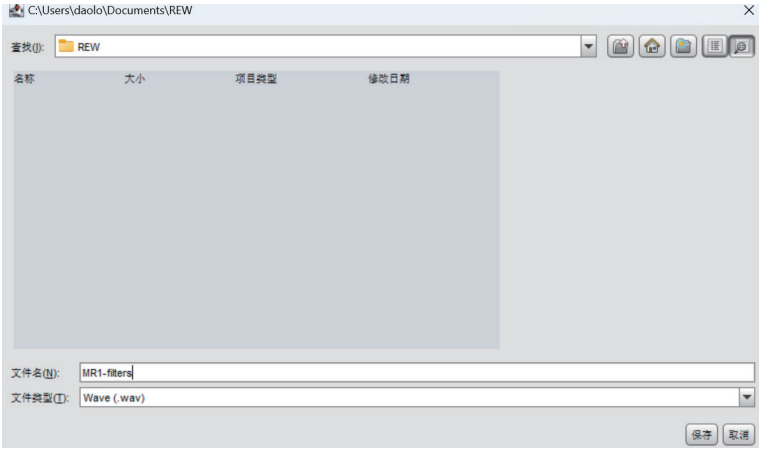
到此我们完成了对一次测量的校正。如果对校正结果不满意。可以调整做多组测量取平均值，调整目标电平和滤波器参数，直到达到预期的结果。

接下来我们要将滤波器脉冲响应导出。注意，我们使用的是 Export filters impulse response as WAV 。



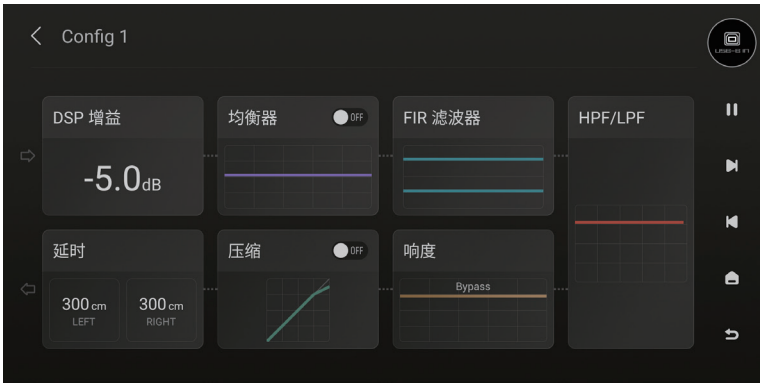
因为我们只测量右声道，所以选择单声道，保存的数据类型建议使用 32 位浮点数。最重要的一点是采样率必须设置为 48000 跟 DMP A8 DSP 的数据处理使用的采样率一致。点击确定保存成一个 wav 文件，我们命名为 MR1-filters ，将文件拷贝到 U 盘上备用。





在 DMP-A8 上进入 DSP 界面，进入需要 DSP 处理的输入源配置界面。这里我们选择是 USB-B 输入。

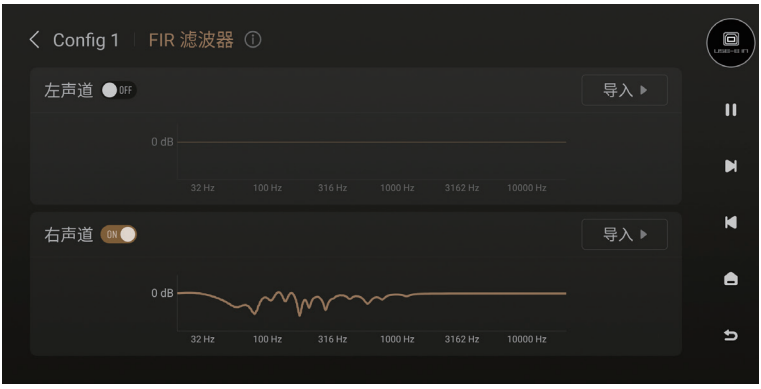
选择 FIR 滤波器



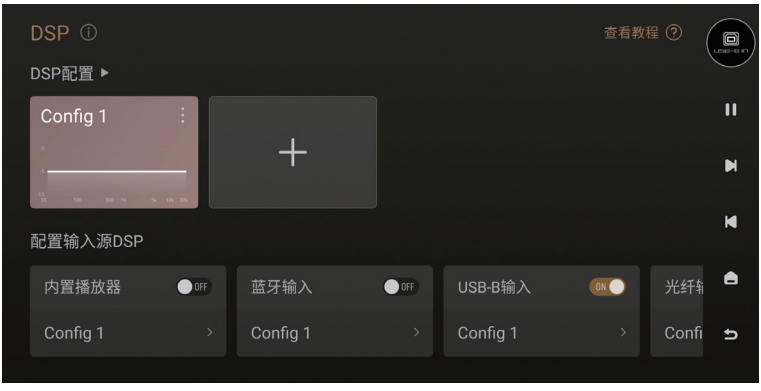
选择右声道导入

找到之前保存的 MR1-filters-48k.wav

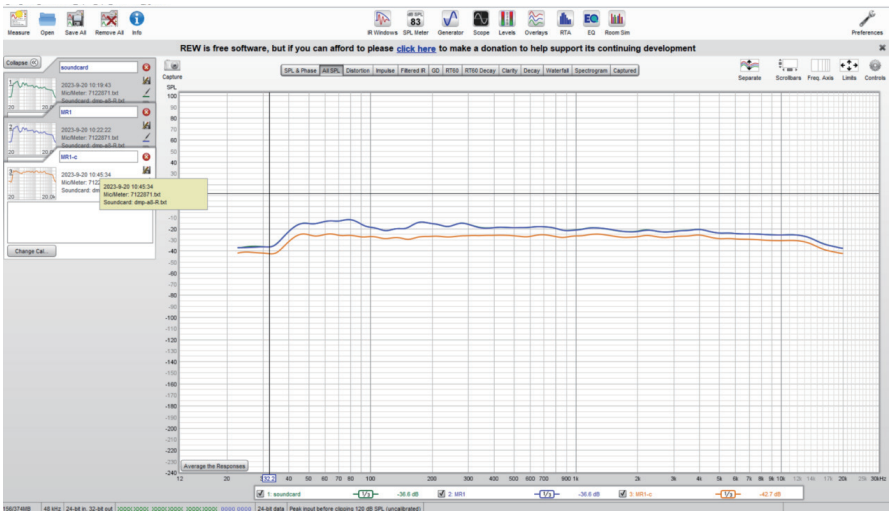
成功加载进来的 FIR 响应文件会绘制出图形



接下来，我们验证 FIR 滤波器是否生效。记得将 FIR 滤波器界面中右声道的开关打开，输入源 DSP 开关也要打开



回到 REW 开始测量校正后的曲线，我们命名为 MR1-c 。从测量的曲线看，我们得到了比上一次测量更平直的曲线。



本文介绍了右声道的校正方法，该方法同样适用于左声道。