Sample Champion - Application note # 3

Equalization and pre-equalization

Sample Champion can perform a complex multiplication or division in the frequency domain of the MLS signal spectrum and/or of the calculated FFT data by a selected file. Here below there are some applicative examples of this feature.
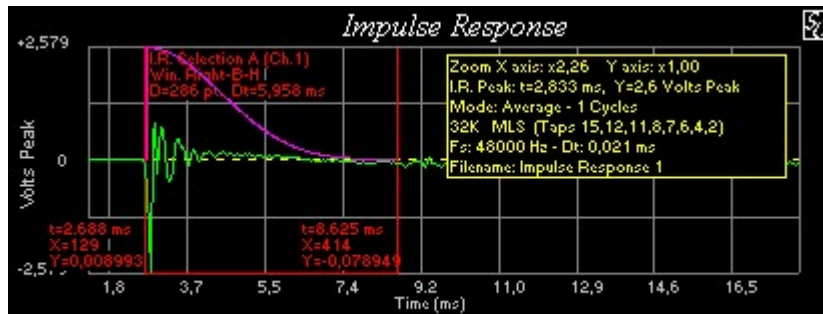

Figure 1

Figure 1 plots the impulse response of a loudspeaker. The anechoic part has been selected, rejecting the first reflected impulse. Figure 2 plots a Y zooming (8x) that helps in finding the reflection.
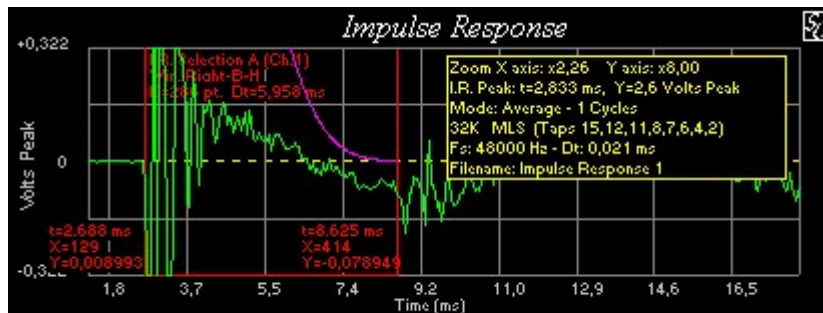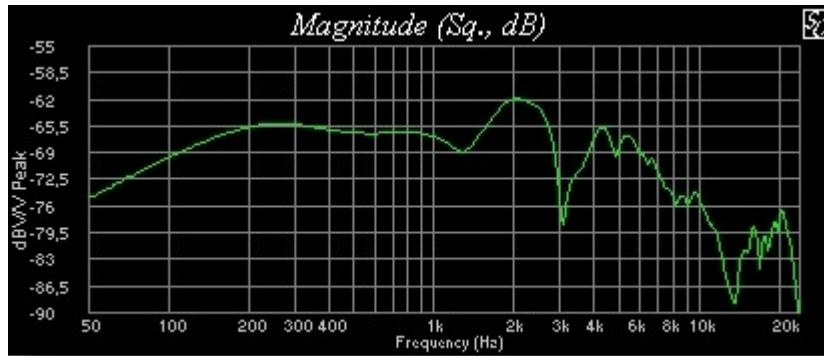

Figure 2

Figure 3

Figure 3 plots the spectrum of the selections in figures 1 and 2, obtained from a 32k points FFT.

This spectrum has been saved in a file and set as MLS compensation file ("divide by" option). The measurement has been repeated with the same configuration.

The result of the measurement with the equalized MLS is shown in figure 4. As expected, now the impulse is much more similar to a Dirac impulse. Note that only the samples within the selection have been equalized.
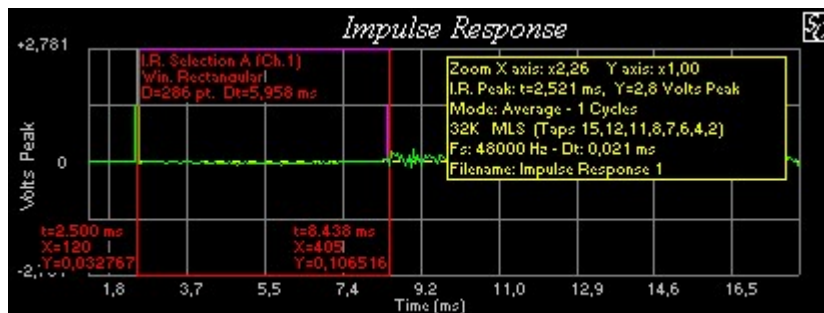

Figure 4

Figures 5 and 6 represent the spectrum (magnitude and phase) of the equalized impulse response, much flatter than previous one!
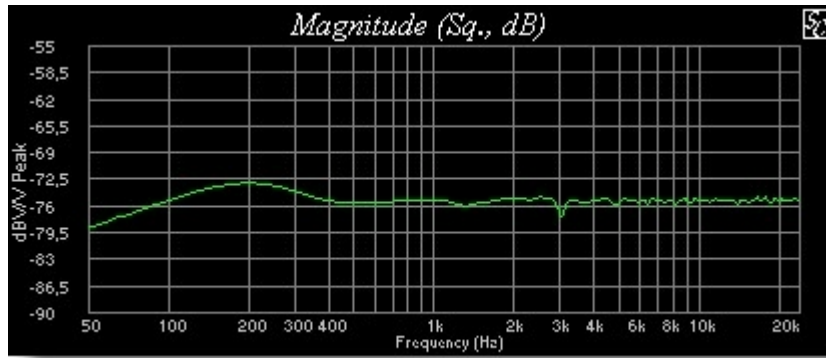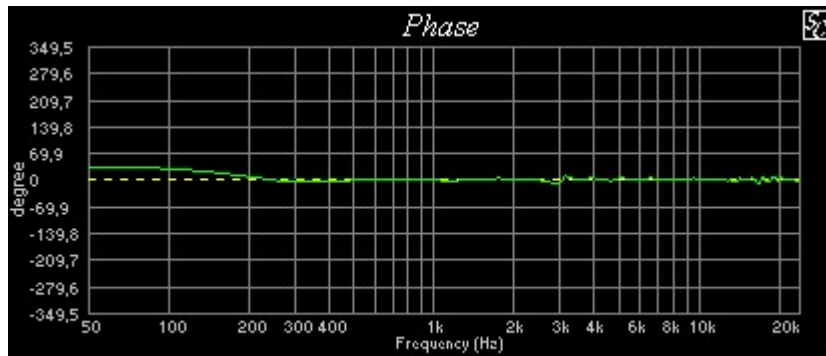
Figure 5

Figure 6

The following figures 7, 8 and 9, instead, report the measurement performed in the same configuration as before, by using an uncompensated (flat) MLS stimulus and computing a post-compensation on the FFT calculated data, with the same previous equalization file. Note that the different level is due to filtering while previously the amplifier level was increased in order to obtain a louder MLS stimulus.
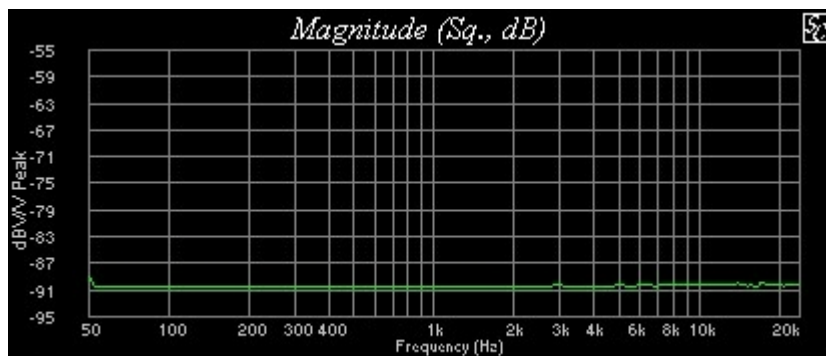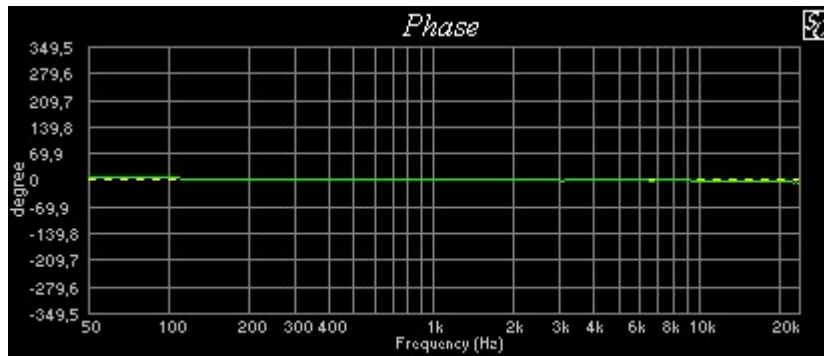

Figure 7

Figure 8

Figure 9 plots a Y zooming of the frequency data shown in figure 7. Note that the spectrum is flat within +/- 0.5 dB.
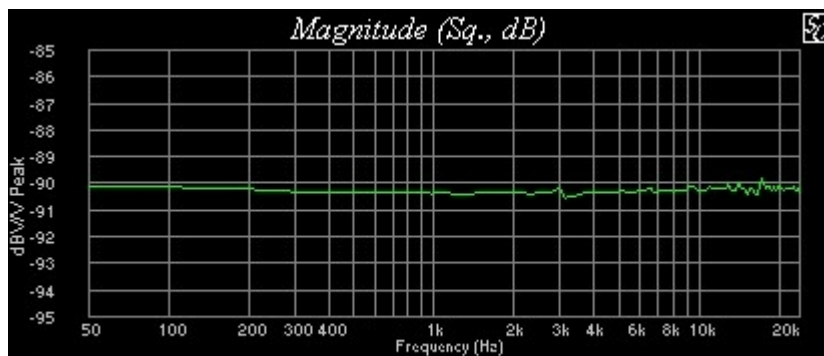

Figure 9

⚠️**WARNING:** In order to obtain a correct result, the FFT size, the number of spectrum data in the equalization file, the MLS length and the input buffer length **must** be the same!