

Sample Champion - Application note # 13

Step Response of a Loudspeaker

The loudspeaker Impulse Response often is difficult to interpret. More information can be achieved by using FFT for obtaining the Frequency Response ([Application note # 1](#)) or by computing a Waterfall Plot ([Application note # 10](#)). Another good source of information is the **Step Response** Plot.

While Impulse Response is the response of the loudspeaker to an ideal impulse (even if obtained by MLS techniques), the Step Response is the response of the loudspeaker to an ideal step (a signal equal to 0 for $t < t_0$ and equal $K = \text{const}$ for $t \geq t_0$).

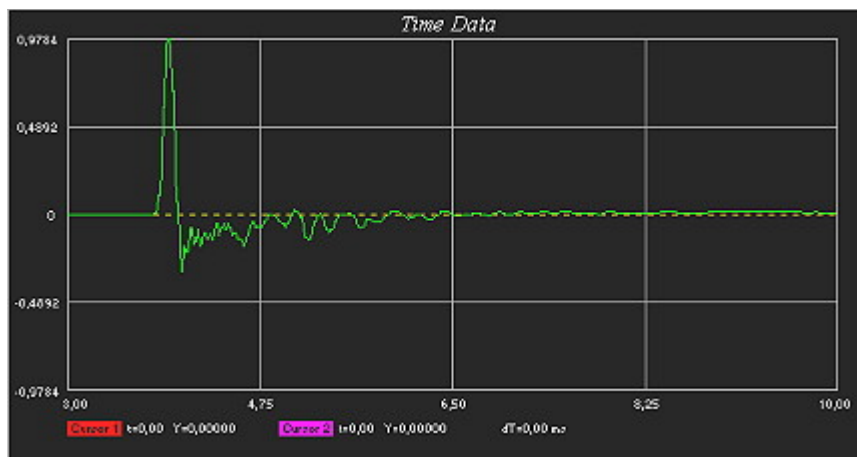


Figure 1 - Loudspeaker Impulse Response

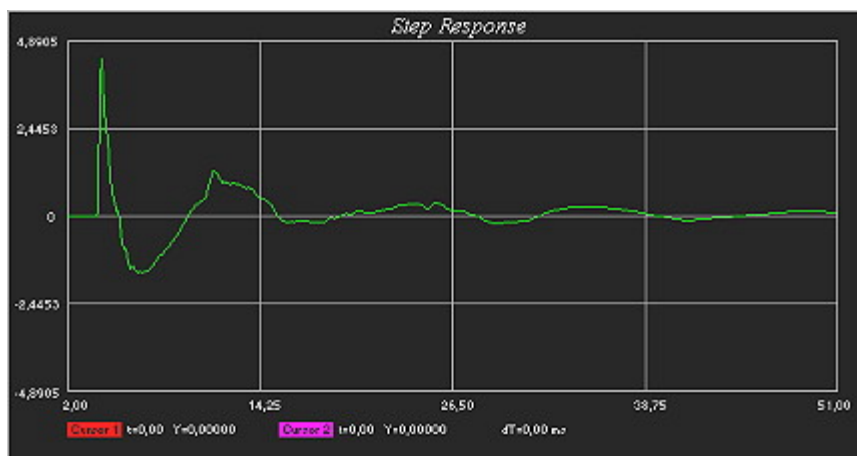


Figure 2 - Loudspeaker Step Response

Figure 1 shows a typical loudspeaker Impulse Response and Figure 2 the Step Response. The computation of the **Step Response** Plot can be obtained from the Impulse Response and this allows avoiding the potentially dangerous application of a constant voltage to the loudspeaker.

The Step Response Plot gives information about the time-coherence of the loudspeaker system. The Step Response of a very good loudspeaker should resemble a right rectangle triangle.

More information about Step Response and other Loudspeakers Measurements can be found in the following paper:

- **Atkinson J.**, Loudspeakers: *What measurements can tell us... and what they can't tell us!*, AES Preprint 4608, 103rd AES Convention, New York, September 1997

The author of this paper kindly offers an on-line version of this paper (in three parts) on the Stereophile website (<http://www.stereophile.com>).

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