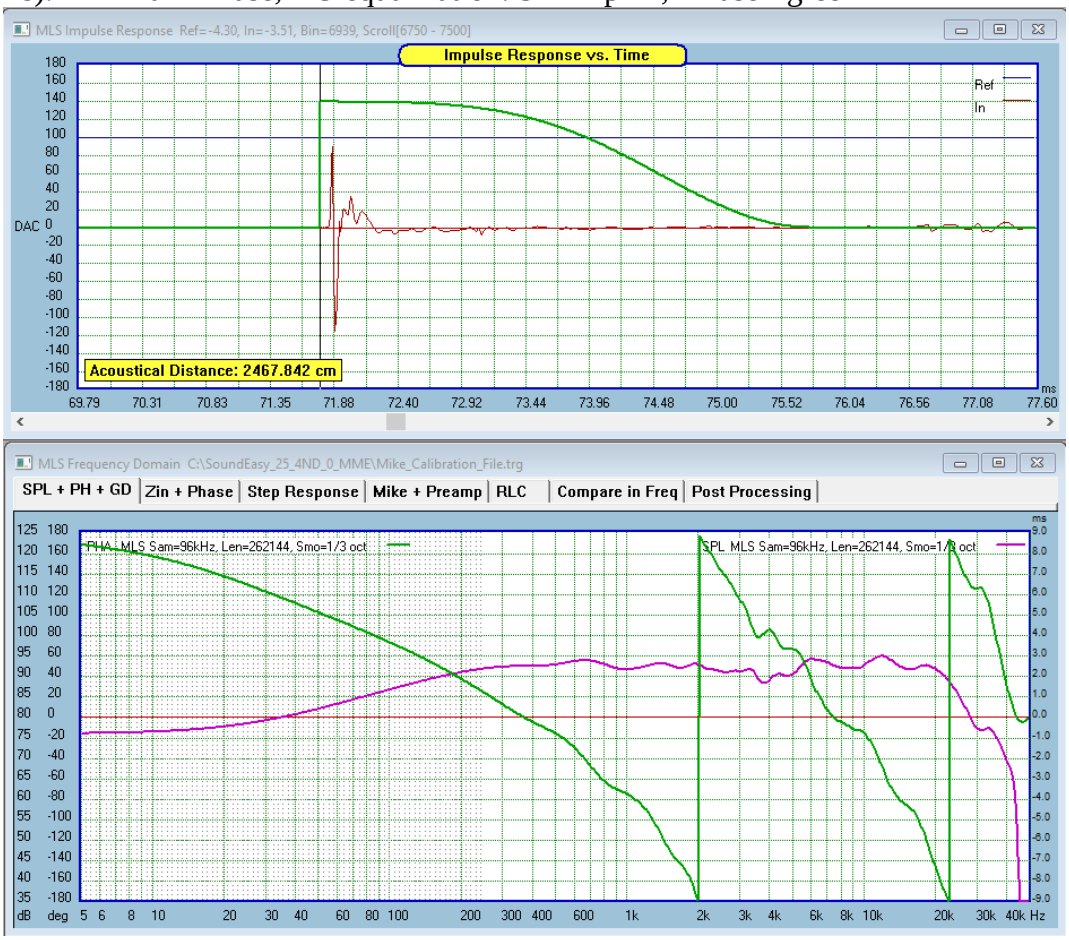
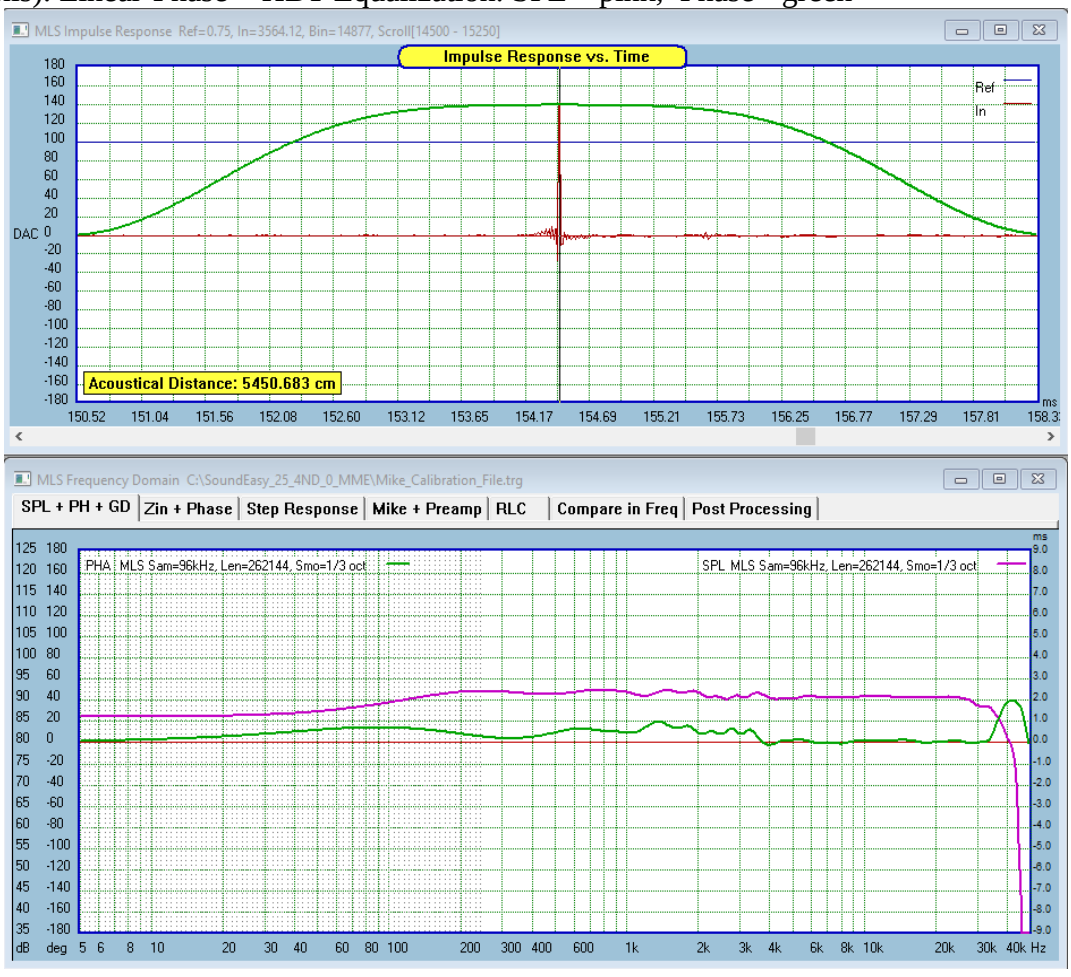
Linear Phase Loudspeakers – Off Axis

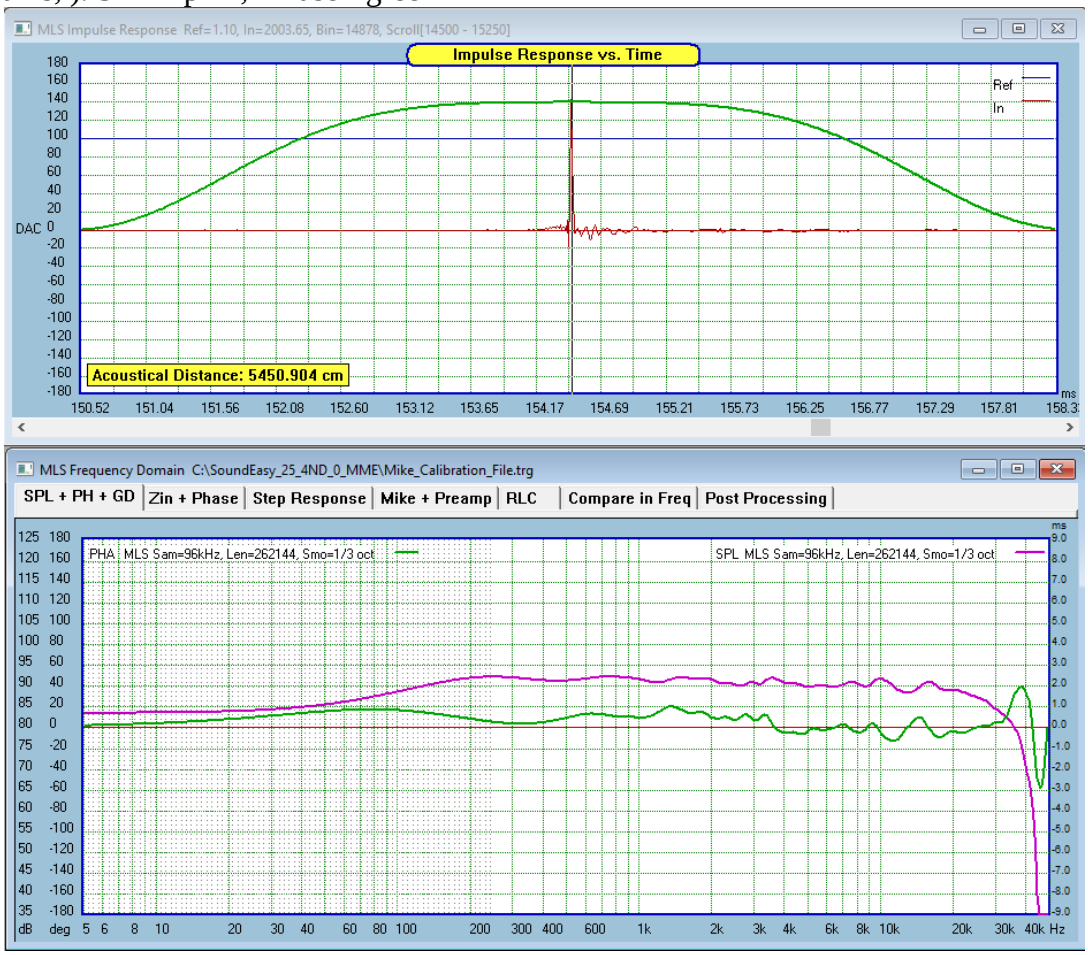
0 deg (on axis). Minimum-Phase, NO equalization. SPL – pink, Phase - green



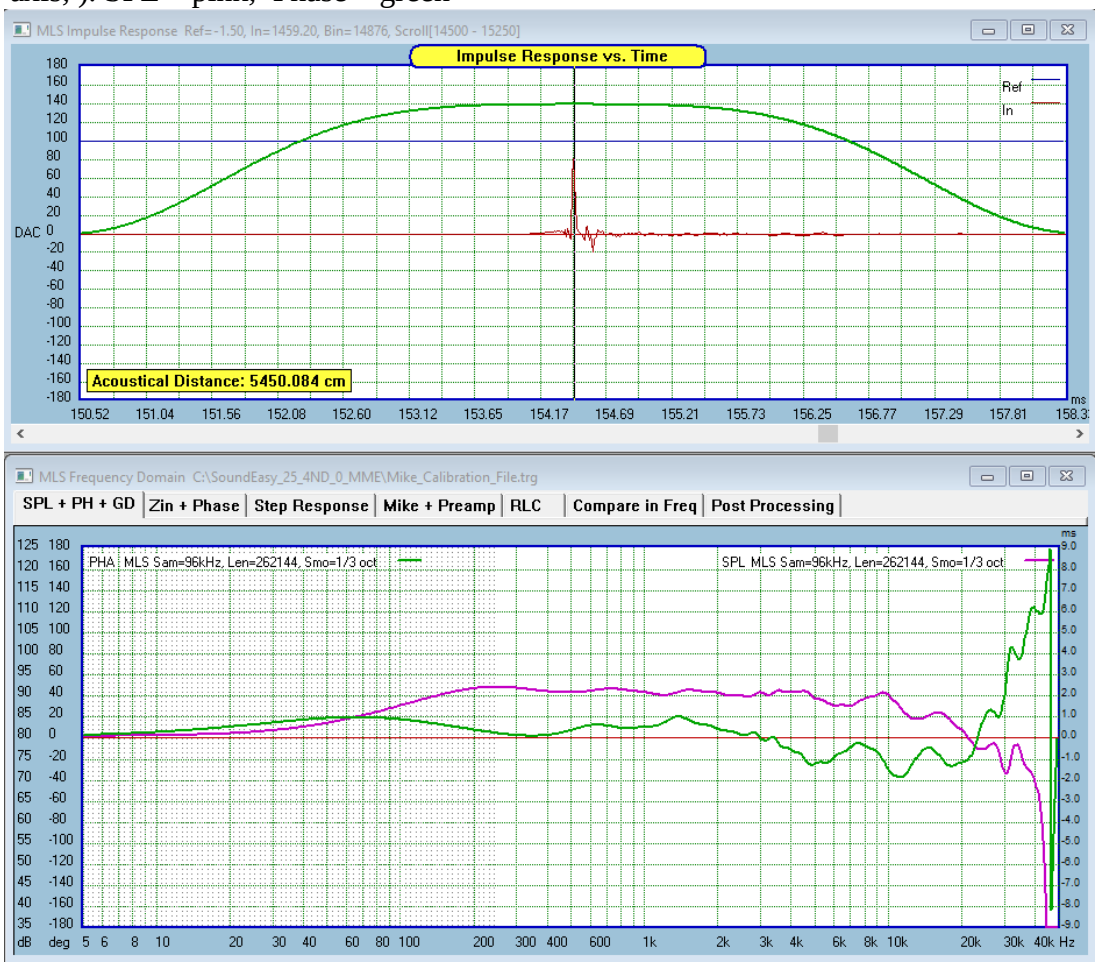
0 deg (on axis). Linear-Phase + HBT Equalization. SPL – pink, Phase - green



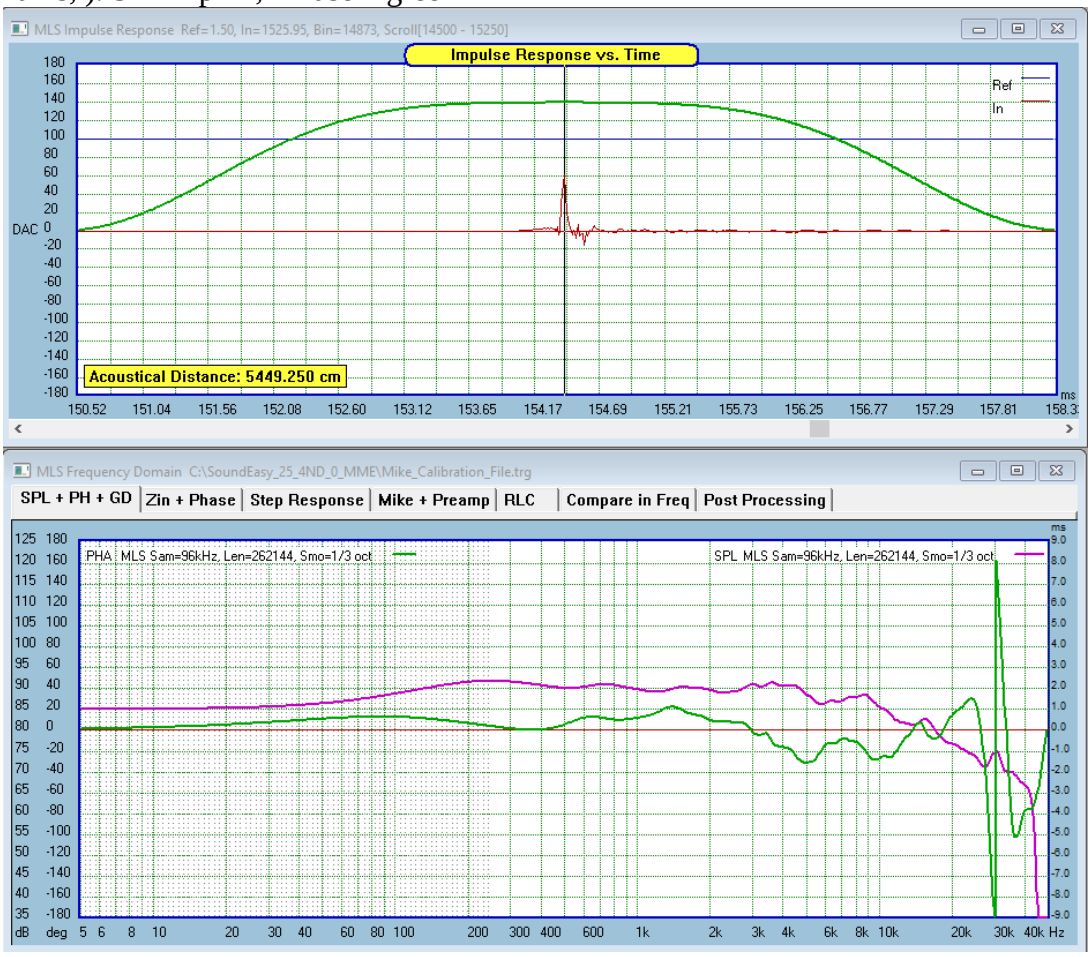
15 deg off-axis,). SPL – pink, Phase - green



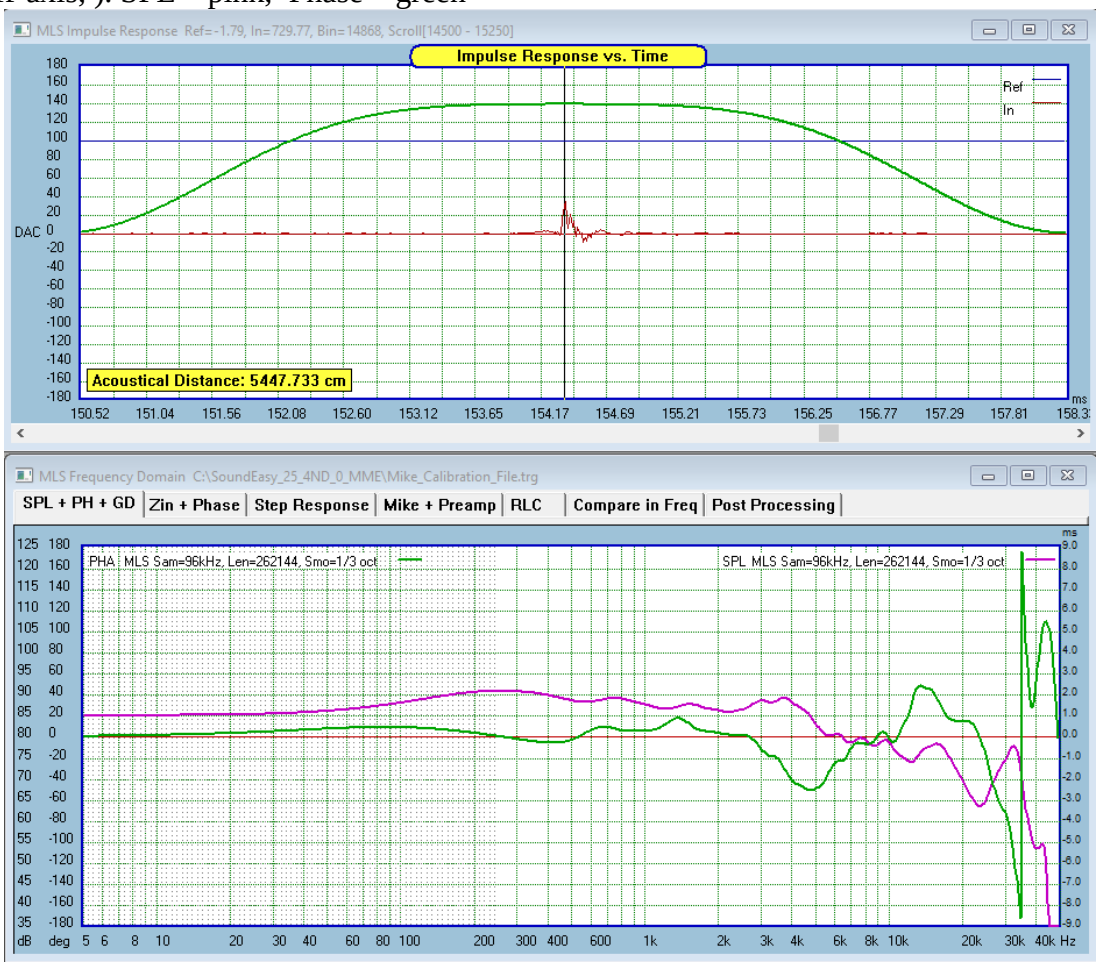
30 deg off-axis,). SPL – pink, Phase – green



45 deg off-axis,). SPL – pink, Phase – green



60 deg off-axis,). SPL – pink, Phase – green



Conclusions

Shown above is a SPL/Phase comparison between small, two-way loudspeaker consisting of a dome tweeter and 8inch woofer for On-Axis performance, and then a number of performance curves of the Linear-Phase, HBT equalized version of the same loudspeaker.

1. Please disregard performance curves above 20kHz. This is due to unspecified microphone performance above 20kHz.

2. Simple comparison of the first two pictures, indicates, that loudspeaker performance has been significantly improved for On-Axis performance. This is due to applied HBT equalization and phase linearization.

3. Even at 15deg Off-Axis, the equalized loudspeaker is performing very well indeed.

4. At 30deg Off-Axis, the performance deteriorates obviously, but the phase maintains linear characteristics and SPL is comparable with On-Axis, non-equalized loudspeaker. This is quite remarkable.

5. At larger off-axis angles (45deg and 60deg), the performance is deteriorated, as one would expect, however, the loudspeaker continues to exhibit linear-phase characteristics.

In summary, the benefits of DSP equalization and phase linearization were evident in +/-30deg (that is 60deg listening angle). Even though the DSP processing was applied only to single, On-Axis measurement. Each driver was individually HBT-equalized and phase-linearized. The measurements were conducted on the whole system.