# PRESS RELEASE

**Study by Würth Elektronik on acoustic effects caused by aluminum electrolytic capacitors**

**Audio Myth Debunked**

Waldenburg (Germany), February 1, 2024 – Würth Elektronik’s [Application Note ANP125](https://www.we-online.com/en/support/knowledge/application-notes?d=anp125-acoustic-effect-of-harmonic-distortions) publishes the results of a study “The acoustic effects of harmonic distortion of aluminum electrolytic capacitors” on harmonic distortion of electrolytic capacitors. The result: Capacitors don’t cause any appreciable signal distortion.

The discussion is ongoing in the audio technology world about what circuit elements affect the sound quality of amplifiers. The app note by Würth Elektronik provides empirical evidence to add to this discussion and answers questions that most audio engineers have.

Application Note ANP125 is the result of international research collaboration between R&D teams at production sites in Asia and the Würth Elektronik Competence Center in Berlin. The text begins with an introduction to human hearing and psychoacoustics and goes on to examine harmonic distortions in capacitors. Furthermore, results from model calculations are presented in order to check the plausibility of the measured results. The measurements show no appreciable distortion of signals caused by capacitors.

Material variations also tested

Dr. René Kalbitz, Product Manager in the Capacitors & Resistors Division at Würth Elektronik eiSos and author of the study, explains:

“The investigations indicate that material variations have a negligible influence on distortions, and these are below the hearing threshold. Electrolytic capacitors do not add any appreciable harmonics to the fundamental frequencies in signal transmission, so, to a good approximation, they can be considered as linear components. It is likely that other voltage-independent capacitor types and passive components, as a rule, generate similarly low distortion amplitudes compared to the audibility threshold. Consequently, the choice of non-linear components such as operational amplifiers and diodes has a greater distortion impact on the audio quality of the amplifier, i.e., the overall distortion characteristics, than the choice of electrolytic capacitor.”

**Available images**

The following images can be downloaded from the Internet in printable quality: <https://kk.htcm.de/press-releases/wuerth/>

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| Image source: Würth Elektronik  **Measured frequency spectrum of a 470 µF aluminum electrolytic capacitor (WCAP-ASLI) for a voltage signal with fundamental frequency of 448.9 Hz. Also shown: the threshold value for audible distortion, as determined in a psychoacoustic experiment for a fundamental frequency of 500 Hz.** |

About the Würth Elektronik eiSos Group

Würth Elektronik eiSos Group is a manufacturer of electronic and electromechanical components for the electronics industry and a technology company that spearheads pioneering electronic solutions. Würth Elektronik eiSos is one of the largest European manufacturers of passive components and is active in 50 countries. Production sites in Europe, Asia and North America supply a growing number of customers worldwide.

The product range includes EMC components, inductors, transformers, RF components, varistors, capacitors, resistors, quartz crystals, oscillators, power modules, Wireless Power Transfer, LEDs, sensors, radio modules, connectors, power supply elements, switches, push-buttons, connection technology, fuse holders and solutions for wireless data transmission. The portfolio is complemented by customized solutions.

The unrivaled service orientation of the company is characterized by the availability of all catalog components from stock without minimum order quantity, free samples and extensive support through technical sales staff and selection tools.

Würth Elektronik is part of the Würth Group, the global market leader in the development, production, and sale of fastening and assembly materials, and employs 7,900 people. In 2023, the Würth Elektronik Group generated sales of 1.24 Billion Euro.

Würth Elektronik: more than you expect!

Further information at [www.we-online.com](http://www.we-online.com)

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