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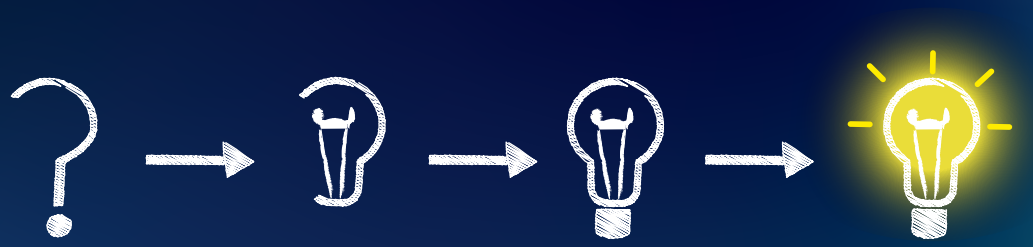

March 9th, 2022
9:00 - 17:00 CET
(Central European Time)

11th Power Analysis & Design Symposium

Advanced Characterization, Simulation and
Troubleshooting of Electronic Power Systems

Live Virtual Event

With lectures, practical examples and demonstrations
presented by international experts from:

Ansys, Biricha Digital, IISB Fraunhofer,
Microchip Technology, Picotest, Technical University Ilmenau,
University of Zaragoza and Würth Elektronik

More information &
free registration at:
www.omicron-lab.com/event

OMICRON LAB

Topics

The Simple Truth about Complex Impedance Probes
by Steve Sandler - Picotest

Power Integrity continues to become ever more challenging. Designs are becoming higher power and lower voltage, resulting in the need to accurately measure impedance well below 1milliOhm. Many applications are employing many output PMIC's or power modules, requiring stability to be assessed from impedance rather than from traditional Bode plots. If this wasn't challenging enough, these higher density designs lack the physical space to add high fidelity test points. Probes offer an ideal solution, but not without bringing their own challenges and a depth of understanding where and how to probe. This presentation will include simulations and theory as well as real-life measurement examples and best-practice tips & tricks.

Step-by-step Snubber and Clamp Design for Power Supplies
by Dr. Ali Shirsavar - Biricha Digital

In this session Dr. Ali Shirsavar will go through step-by-step design of RC snubbers and RCD clamps for power supplies. The circuit operation, practical considerations and all equations are presented as well as details of how to obtain all the unknown parameters in the equations. Two free to download spreadsheets are also presented which will do the calculations for you. These can be downloaded from www.biricha.com/snubber and www.biricha.com/rcd in advance or after the presentation. We highly recommend that you download these before the webinar so that you can go through the design examples along with Dr. Shirsavar during the webinar and design our own circuits. The session will conclude with a presentation of experimental results to verify the designs.

Automated PCB Parasitics Extraction from EDA Tools for Power Electronics Design Support
by Sven Fießer - Technical University Ilmenau

Designing a proper PCB layout is a crucial task in most electronic applications. Having low parasitic components on the PCB is especially of utmost importance in fast switching power electronics devices using GaN or SiC semiconductors. While using such high-performance semiconductors, the PCB designer's goal is often to improve the overall power density by increasing the switching frequency and so the influences of parasitic components are getting more pronounced. In order to speed up the PCB design process an algorithm for the extraction of parasitic components of a PCB directly from the designer's EDA tool is presented. The extracted parasitic components will be shown to the PCB designer and can be exported to a SPICE simulator.

Impedances in DC-Microgrids - from Offline to Online Measurements
by Raffael Schwanninger - IISB Fraunhofer

There are various use cases for impedance measurements in DC-microgrids. Impedance measurements can help to determine the stability of a system, give information about the state of energy storage systems, or detect faults within the microgrid. While these measurements are already often done for individual components offline, they can also be integrated into the DC-microgrid to offer online monitoring of the microgrid and its sub-systems. This talk will focus on where impedance measurements can be applied to DC-microgrid components and how those measurements can be integrated into the grid itself.

Comparing DC/DC conducted EMI Simulation with Measurement Results
by Markus Laudien - Ansys & Frank Puhane - Würth Elektronik

The CE mark is an important seal of quality for electronic components. To obtain this certification, the component must pass the EMC test. EMC testing includes various tests such as conducted and radiated emission and is often a very lengthy process that requires several iterations. Simulation and simulation tools are currently a very hot topic and are becoming more and more popular as the use of these tools becomes more intuitive. Apart from simulation tools that simulate electronic circuits, more complex tools that have integrated various solution mechanisms can simulate complex issues. Now the question arises whether these tools can be used to simulate the EMC behaviour of a power supply in order to obtain an estimate in advance of how they will behave during EMC testing. The procedure, the analysis, the simulation and a comparison of the test results will be explained and shown in this lecture.

The Danger of Underdamped Filters
by Arturo Mediano - University of Zaragoza

When designing EMI filters an underdamped response must be avoided. This is many times a very typical problem related with stability in switching mode power supplies where a filter is located at the input. Another important problematic case of an underdamped response is the effect caused by transients that appear at the input of the filter. In such a case, the transient will be amplified at the output of the filter with a voltage gain related to the Q of the undamped response. Many times, the load will be destroyed or damaged even if some transient protector is present at the input of the filter (i.e., a varistor or a TVS). In this presentation we will explain how the ringing or underdamped response is created in common LC filters, how the response in time and frequency domains looks like, and how this underdamped response can impact transient signals at the input port. Of course, some typical solutions to damp the filter will be presented.

Practical System Modelling using Bench Measurements of Plant Transfer Functions
by Andreas Reiter - Microchip Technology

Establishing reliable and robust control loops of switch-mode power supplies essentially requires detailed knowledge of the frequency domain characteristics of the plant. While for smaller, non-isolated converter circuits simple, first approximations of pole and zero locations may be sufficient for a rough estimate of the stable operation area, allowing to safely power up the circuit for the first time, more sophisticated converter types, high voltage and high efficiency designs may be less error tolerant and therefore considerably more challenging to work with. These designs commonly require detailed modeling of the power stage to derive their characteristics across the intended operating range as well as to identify critical corner cases, which are vital for establishing robust design margins ensuring mass production with minimum failure rates. However, even the most detailed theoretical model eventually requires verification before it can be considered reliable and serve as the basis for the loop design. In this lecture we will walk through practical invasive and non-invasive measurement techniques and procedures used to measure the plant transfer function of digitally controlled power supplies, introduce the procedure, discuss expected accuracy implications while highlighting tricks to avoid and work around typical pitfalls.