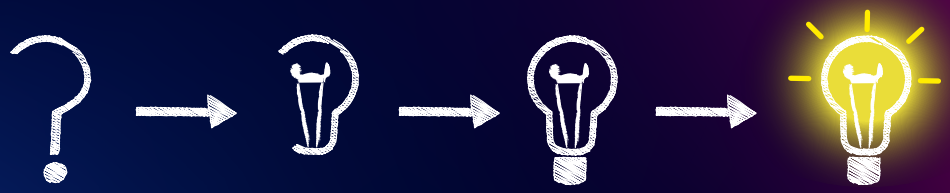
POWER
YOUR IDEAS!



March 15th, 2023
9:00 - 17:00 CET
(Central European Time)

12th Power Analysis & Design Symposium

Advanced Characterization, Simulation and
Troubleshooting of Electronic Power Systems

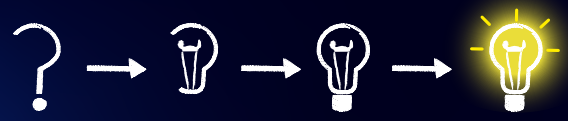
Live Virtual Event

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

Biricha Digital, Future Electronics,
Microchip Technology, Picotest,
University of Zaragoza and OMICRON Lab

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

OMICRON LAB



Topics

PSRR – Why measure it, the Measurement Errors and how to correct them
by Steve Sandler - Picotest

Modern distributed systems are noise sensitive. Power rail noise is one of the most significant sources of jitter in high-speed systems, phase noise in RF systems and noise in A/D and D/A converters. Recommendations abound, from adding ferrite beads and ceramic caps, to LDO's to clean the power supply rails. The most basic of measurements is the frequency domain PSRR measurement. Many manufacturers include data for their components, but in the system, they act very differently than they do in isolation. Measuring high PSRR challenges the best of test engineers, making us question even the manufacturers data. Learn the major measurement errors and how to correct them. That's the key to making accurate PSRR measurements.

Shielding Low Frequency Magnetic Fields
by Arturo Mediano - University of Zaragoza

It is common to consider EMI problems appear at high frequencies. Higher frequencies are usually responsible for parasitic couplings, undesired effects of non-ideal components, and other unexpected results for electronic designers.
But, there are a lot of situations where low frequencies can create serious problems for electronic systems. Any sector can be affected by this problem: medical, instrumentation, consumer, audio, home appliances, communications, etc.
When EMI problems are conducted, filters are a common solution. When EMI problems are non-conducted, we use shielding. And with the shield we prevent aggressive systems from interfering with sensitive circuits.
Shielding uses two main mechanisms: absorption and reflection. And the effectiveness of a shield is dependent of frequency and nature of the field (electric or magnetic). As the frequency of EMI is reduced both reflection and absorption losses decrease for the magnetic field so low frequency magnetic fields are harder to shield than medium and high frequency EMI signals. Then, we will need to apply special shielding techniques as reorientation or using highly permeable materials offering low reluctance (i.e. mu-metal or steel).

In this presentation we will ...
1. review (briefly) the theory of shielding,
2. understand why electric/magnetic fields work in a different way for shielding,
3. discover what is "low frequency" for shielding,
4. review common techniques to solve this problem.

Of course we will use demonstrations for a more effective and funny session.

Digital Average Current Mode Control of Switch-Mode Power Supplies
by Andreas Reiter - Microchip Technology

Average Current Mode Control (ACMC) of switch-mode power supplies has substantial, practical advantages over common Voltage Mode Control (VMC) or Peak Current Mode Control (PCMC) implementations in terms of robustness, reliability, and flexibility. Especially in dynamic applications, such as battery chargers, bidirectional converters, multiphase converters, PFC stages and inverters, ACMC solves key design challenges from low-level stability issues to high-level feature integration. However, the complex nature of this loosely coupled, non-serial cascaded feedback loop type requires proper analysis and a good understanding of its dependencies to prevent inner oscillations and hidden instability.
This lecture guides through the design and configuration process of a digital ACMC implementation, showing how to tackle common challenges and how to avoid typical pitfalls.

Control Methods of LLC Converters
by Christophe Basso - Future Electronics

Targeting practicing engineers and graduating students, this seminar starts with a review of soft-switching definitions and explains how a typical LLC converter operates. The description of the direct-frequency control opens the discussion on control methods and more recent approaches are covered such as charge- and current-mode controls. Control-to-output transfer functions are plotted and the responses of each approach are compared. Simulation is used throughout the examples to illustrate typical operating waveforms but also extract the ac response from a switching circuit. Several examples of loop stabilization are covered in continuous- and discrete-time-domains.
Using mathematical analysis and SIMPLIS, the author maintains a permanent link between theory and market reality. Several working design examples are used to apply the techniques described in the presentation. Balancing analytical aspects and real case examples, the seminar targets an audience with an intermediate background in the presented subject.

How to use Off-the-Shelf Transformers in Switching Power Supplies
by Dr. Ali Shirsavar - Biricha Digital

Configurable, off-the-shelf transformers have been available for many years. However, their use is not common and general consensus is that you need a custom transformer even for the simplest of designs. A quick search on the internet shows that when it comes to off-the-shelf transformers, design information is very scarce, few guidelines are available and Application Notes do not show how to change and scale the specifications.

Wouldn't it be great to be able to order your transformers from your favorite part supplier along with all your other components? In this session, we will teach how to make all the necessary calculations to show how we can use off-the-shelf transformers in power supply designs. We will provide all of the necessary equations for scalable hand calculations first, but also provide a comprehensive spreadsheet with a multitude of possible combinations of turns ratios and parameters to enable extremely fast design of low power PSUs. The session concludes with a step-by-step design example of a Flyback converter.

As a thank-you for joining the Symposium, Biricha is offering a fully-featured complementary 6-month license for the Biricha WDS - Power Supply Design Tool. The download link will be provided during the session.

Accurate Loop Gain Measurements, Tips & Tricks
by Florian Hämmerle - OMICRON Lab

Loop Gain measurements are a powerful tool when designing a compensator of a switching power supply or to verify the small-signal stability of voltage regulators or switchers having a feedback circuit for a stabilized output voltage.
Since the availability of price effective vector network analyzers like the Bode 100, loop gain measurements have gained in popularity enabling the systematic stabilization and control design for simple as well as complex topologies in power electronic circuits.
In this presentation, the basics of the loop gain measurement method using voltage injection are reviewed and common pitfalls, like noise at low frequency, are explained in detail. Choosing the right measurement signal size is not only crucial to fight noise but also to get accurate results. The presentation includes tips and tricks for better measurements and demonstrates some of the most common challenges in a real-life demonstration.