



The Multinational Power Electronics Association

PSMA Magnetics Committee Meeting

February 5TH 2025

Ed Herbert, George Slama, Matt Wilkowski
Committee Chairs

PSMA is a not-for-profit organization and a CO-SPONSOR OF APEC



PSMA Magnetics Committee Meeting Agenda

February 5, 2025

- Introductions
- 2025 Workshop Planning
- 2025 Industry Session Planning
- Special Projects
 - Electrical parameters of magnetic materials
 - Core Loss Database
- Open Magnetics
- Power Technology Roadmap
- Magnetics Forum on PSMA Website
- Next Meeting



PSMA Magnetics Committee Meeting Agenda

February 5, 2025

- Introductions
- **2025 Workshop Planning**
- 2025 Industry Session Planning
- Special Projects
 - Electrical parameters of magnetic materials
 - Core Loss Database
- Open Magnetics
- Power Technology Roadmap
- Magnetics Forum on PSMA Website
- Next Meeting



PSMA Magnetics Committee Meeting Agenda Workshop Planning Notes

February 5, 2025

- Workshop Tab
 - Workshop partners
 - 2025 Workshop partners updates

The screenshot shows the PSMA website's Magnetics Forum page. At the top, the PSMA logo and navigation menu are visible. The main heading is "Magnetics Forum". Below it, there's a sub-heading "Magnetics Info & Resources for the Power Electronics Industry." and a navigation bar with links like "Introduction", "HF Task Force", "Magnetics Checklist", "Resources", "Presentations", "Core Loss Studies", "Meeting Minutes", "Special Projects", and "Workshop". The "Workshop" link is highlighted. The main content area features a banner for the "10th Annual Magnetics @ High Frequency Workshop" on March 15, 2025, in Atlanta, GA. The banner includes the PSMA logo and the IEEE Power Electronics Society (PELS) logo. Below the banner, there's a registration announcement: "Registration for the 2025 Power Magnetics @ High Frequency Workshop on Saturday March 15, 2025 at the Georgia World Congress Center in Atlanta, GA is now open. Early registration discounts extended through February 7." Two large buttons labeled "REGISTRATION" and "AGENDA" are prominently displayed. Below these buttons, there's a text block about partnership opportunities: "Partnership Opportunities available. Sign up to be a Workshop Partner Please contact the organizing committee through via e-mail to workshop@psma.com for more information. Click here for the pricing and benefits:". At the bottom, there's a section for "2025 Workshop Partners" categorized into Platinum Partners, Gold Partners, and Media Partners. The logos for these partners include Frenetic, RUBADUEWIRE, Niobium N5, WÜRTH ELEKTRONIK, YAGEO, MICROMETALS, and Bodo's Power Systems.

PSMA Magnetics Committee Meeting Agenda Workshop Planning Notes


February 5, 2025

- Workshop Tab
 - Registration
 - Open

PSMA News Publications Resources Conferences Technical Forums Membership About PSMA Contact Log in



Home

2025 Power Magnetics @ High Frequency Workshop Registration



10th Annual Magnetics @ High Frequency Workshop





PSMA Magnetics Committee - 15 March 2025, Atlanta, GA USA



Registration Rates (Early Bird Pricing Deadline: Friday January 31, 2025-February 7, 2025)*

- Member Early/ Regular \$295/ \$345
- Non-Member Early/ Regular \$395/ \$445
- Student Early/ Regular \$295/ \$345

Workshop Partners:

   WURTH ELEKTRONIK MORE THAN YOU EXPECT   Niobium N3  

First name* **Last name***

First name for name badge, if different from above

Title/ Job Function

Company/ Organization*

Address*

Address 2

City/Town* **State/Province** **ZIP/Postal Code**

Country*

Telephone:*

PSMA Magnetics Committee Meeting Agenda Workshop Planning Notes February 5, 2025

- APEC webpage
 - Schedule at a glance

Check Out Our Daily Activities

APEC 2025 SCHEDULE AT A GLANCE

Please note that times are subject to change as the final details of the conference are settled. Locations will be announced as they become available.

Unless otherwise specified all sessions and events are held in the Georgia World Congress Center.

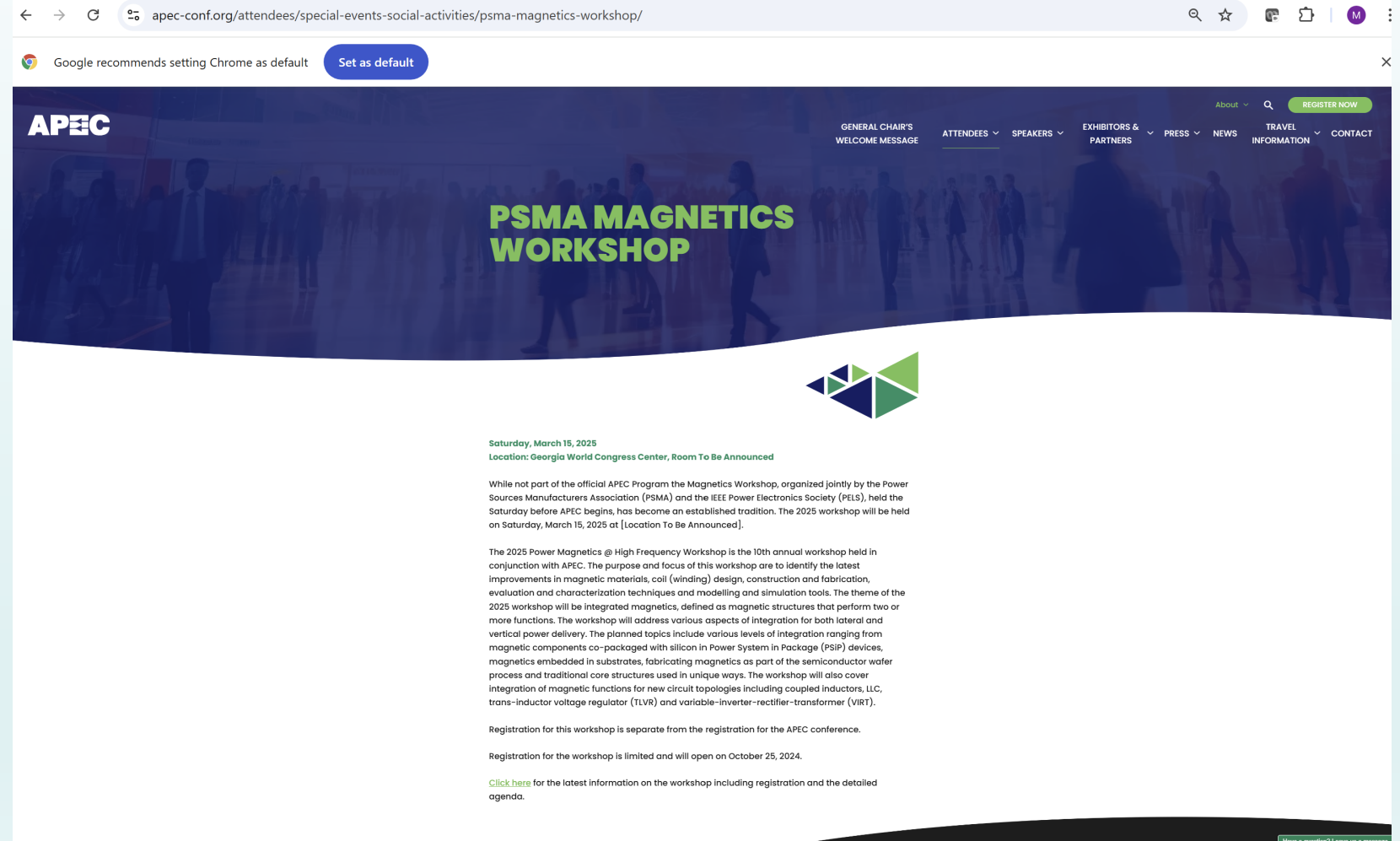
All events and sessions are in the Georgia World Congress Center, Hall A, unless otherwise noted.

SATURDAY, MARCH 15	
7:00 AM – 5:00 PM	PSMA/PELS Magnetics Workshop , Location To Be Announced (Separate Registration Required)
4:00 PM – 7:00 PM	Registration Open, Location TBA

PSMA Magnetics Committee Meeting Agenda Workshop Planning Notes

February 5, 2025

- APEC webpage
 - PSMA Magnetics Workshop



The screenshot shows a web browser displaying the APEC website. The URL in the address bar is apec-conf.org/attendees/special-events-social-activities/psma-magnetics-workshop/. The page features a dark blue header with the APEC logo on the left and a navigation menu on the right. The main content area has a dark blue background with a blurred image of people at a conference. The title "PSMA MAGNETICS WORKSHOP" is prominently displayed in green and white text. Below the title is a logo consisting of three overlapping triangles in blue, green, and white. The text on the page provides details about the workshop, including the date (Saturday, March 15, 2025), the location (Georgia World Congress Center, Room To Be Announced), and a description of the workshop's focus on high-frequency magnetics. It also mentions that registration is separate from the APEC conference and will be limited.

APEC

GENERAL CHAIR'S WELCOME MESSAGE | ATTENDEES | SPEAKERS | EXHIBITORS & PARTNERS | PRESS | NEWS | TRAVEL INFORMATION | CONTACT

PSMA MAGNETICS WORKSHOP

Saturday, March 15, 2025
Location: Georgia World Congress Center, Room To Be Announced

While not part of the official APEC Program the Magnetics Workshop, organized jointly by the Power Sources Manufacturers Association (PSMA) and the IEEE Power Electronics Society (PELS), held the Saturday before APEC begins, has become an established tradition. The 2025 workshop will be held on Saturday, March 15, 2025 at [Location To Be Announced].

The 2025 Power Magnetics @ High Frequency Workshop is the 10th annual workshop held in conjunction with APEC. The purpose and focus of this workshop are to identify the latest improvements in magnetic materials, coil (winding) design, construction and fabrication, evaluation and characterization techniques and modelling and simulation tools. The theme of the 2025 workshop will be integrated magnetics, defined as magnetic structures that perform two or more functions. The workshop will address various aspects of integration for both lateral and vertical power delivery. The planned topics include various levels of integration ranging from magnetic components co-packaged with silicon in Power System in Package (PSIP) devices, magnetics embedded in substrates, fabricating magnetics as part of the semiconductor wafer process and traditional core structures used in unique ways. The workshop will also cover integration of magnetic functions for new circuit topologies including coupled inductors, LLC, trans-inductor voltage regulator (TLVR) and variable-inverter-rectifier-transformer (VIRT).

Registration for this workshop is separate from the registration for the APEC conference.

Registration for the workshop is limited and will open on October 25, 2024.

[Click here](#) for the latest information on the workshop including registration and the detailed agenda.

[Have a question? Leave us a message.](#)

PSMA Magnetics Committee Meeting Agenda Workshop Planning Notes

February 5, 2025



News Publications Resources Conferences Technical Forums Membership About PSMA

The multinational power electronics association

Contact Log in

[Home](#)

Power Magnetics @ High Frequency Workshop 2025 Agenda



10th Annual Magnetics @ High Frequency Workshop

PSMA Magnetics Committee - 15 March 2025, Atlanta, GA USA



Date: Saturday, March 15, 2025

Location: Georgia World Congress Center, Atlanta, GA

Preliminary Agenda, Subject to change

7:00 AM - 8:00 AM Registration, Technical Demonstrations, Posters and Breakfast

8:00 AM - 8:05 AM Opening Remarks

8:05 AM - 9:25 AM Technical Session - Physical Construction and Structure for Integration of Power Magnetic Devices Part I

- **Keynote:** Trends of Physical Structures of Magnetic Devices for Power Applications Over the Past Ten Years; *Minjie Chen, Princeton University*
- Magnetics Integrations for 2.5D and 3D Packaging; *Ranjit Sai, Tyndall*

9:25 AM - 9:45 AM Break

9:45 AM - 12:00 Noon Technical Session - Physical Construction and Structure for Integration of Power Magnetic Devices Part II

- Inductive Components on Silicon Substrate 300mm Wafer; *Jens Kehl, Würth Elektronik*
- Ferrite Technology in Transition - Process and Shaping; *Sebastian Bachman, Tridelta Weichferrite*
- Magnetics for Power System in Package (PSiP); *John McDonald, Atlas Magnetics*
- Panel Discussion



PSMA Magnetics Committee Meeting Agenda Workshop Planning Notes

February 5, 2025



12:00 Noon - 2:00 PM Technology Demonstration and Poster Session

- Wattmeter for AC Power Loss Measurements; *TBD*
- Active Damping of EMI Filters Using Low Q Powder Materials; *Lukas Mueller, Micrometals*
- Open Magnetics Demo; *Alfonso Martinez, Open Magnetics*
- Double Pulse Testing of Magnetic Components; *Kevin Hermanns, PE Systems*
- Many Measurement Methods for the Complex Permeability and Complex Permittivity of Noise Suppression Sheets; *Akihiko Saito, Daido Steel*
- Construction of an Electromagnetic Wave Shielding Effect Measurement Method Using a Loop Antenna; *Kosuke Yuasa, Daido Steel*
- Integrated Magnetics, Optimization Common Mode Chokes (CMC) Integrated with Differential Mode Chokes (DMC), and Review of LLC Transformer with Integrated Inductor; *Andres Arias, Risha Yu, Premier Magnetics*
- Triple Pulse Testing Open-Source Project; *Jun Wang, University of Bristol*
- PowerBrain: AI-based Magnetic Database: Experimental and Generative Data; *Wilmar Martinez, KU Leuven*
- Linear Versus Non-Linear Magnetic Characteristics; *JC Sun, Bs&T*
- Dimensional Resonance and Fringing Mitigation Considerations for Magnetic Core Design; *Mike Arasim, Fair-Rite Products Corp.*
- Power Loss Distribution in Planar Windings; *Tom Wilson/ Andrija Stupar, SIMPLIS Technologies*
- Simple and Effective Technique to Verify Impact of High Temperature and High Voltage High Frequency Stresses on Inductor Electrical Performance; *Efrain Bernal, Würth Elektronik*
- A Low-Cost Novel High Q, High Bsat Electroplated Magnetic Meta-Material; *John McDonald, Atlas Magnetics*
- Roadmap for Nanocrystalline Materials in Power Electronic Applications; *Reddy Andapally Bharadwaj, CBMM*

Posters:

- Automated Temperature Regulated Core Loss Testing with High-Frequency Class D Amplifiers; *Jacob Anderson, Nick Kirkby, Arizona State University (ASU)*
- Optimization of Magnetics Design Across Broad Application Ranges; *Rachel Yang, MIT*
- Laminated Cores for High-power Inductive Power Transfer Application: High-efficiency Design with Fe-based Nanocrystalline Material; *Yibo Wang, City University of Hong Kong*
- Design Considerations and Multi-Objective Optimization for Magnetic Components in High-Power, Medium-to-High-Frequency Power Electronics; *Todd Marzec, UPITT*

Possible Additions:

Yageo

Iwatsu

NCSU Poster: Isaac Wong

Need confirmation:

Kevin Hermanns PE Systems



PSMA Magnetics Committee Meeting Agenda Workshop Planning Notes

February 5, 2025

2:00 PM - 3:50 PM Technical Session - Electrical Parameter Integration - Part I

- **Keynote:** Trends of Electrical Requirements, Modelling and Simulation Over the Past Ten Years; *Charles Sullivan, Dartmouth College*
- Variable-Inverter-Rectifier-Transformer (VIRT) Hybrid Electronics; *Mike Ranjram, Arizona State University*
- Magnetics Design for LLC Circuit Topology; *TBD*

3:50 PM - 4:10 PM Break

4:10 PM - 5:10 PM Technical Session - Electrical Parameter Integration - Part II

- Designing Soft Saturating, Low Loss TLVR 's Avoiding Air Gaps for Better Coupling and Highly Efficient Nanocrystalline Power Core Material; *Michael Freitag, Yageo*
- Panel Discussion

5:10 PM - 5:30 PM Closing Remarks

5:30 PM - 6:30 PM Networking Hour

- Technology Demonstrations and Posters

Two potential presenters
waiting on first presenter to confirm
if no confirmation then will use second presenter

REGISTRATION

Workshop Partners:



PSMA Magnetics Committee Meeting Agenda Workshop Planning Notes

February 5, 2025

IEEE.org | IEEE Xplore Digital Library | IEEE Standards | IEEE Spectrum | More Sites Join IEEE

IEEE POWER ELECTRONICS SOCIETY

ABOUT MEMBERSHIP CONFERENCES PUBLICATIONS EDUCATION TECHNICAL ACTIVITIES NEWS & MEDIA

Powering a sustainable future for the benefit of humanity

ABOUT US

IEEE Power Electronics Society

IEEE PELS is one of the fastest growing technical societies within IEEE. Our 13,000+ members, representing both academia and industry, span the globe and drive our success. Mission-focused, we strive to build knowledge and awareness of the latest technologies and other advances in power electronics, all to make the world a better place!

With access to a wide array of benefits and resources, both technical and professional, our members can stay current and competitive in the workplace. We invite you to join us!

[Read More](#)

Become a Member

Discover the advantages and become a member of IEEE PELS!

[Join Today](#) [Renew Your Membership](#)

NEWS, EVENTS & WEBINARS

What's Happening

News	Events	Webinars
<p>DECEMBER 9, 2024</p> <p>OPEL Transparent Peer Review - Deadline Extended</p> <p>NOVEMBER 27, 2024</p> <p>Register Today!!! WIE Power at the Table Webinar</p> <p>NOVEMBER 14, 2024</p> <p>November 2024 Products Newsletter</p> <p>NOVEMBER 12, 2024</p> <p>Meet the Candidates: PELS Member at Large Election for 2025-2027</p> <p>View News</p>	<p>JAN 7 3:00 PM - 4:00 PM 🗓</p> <p>TC 9 Monthly Meeting</p> <p>FEB 4 3:00 PM - 4:00 PM 🗓</p> <p>TC 9 Monthly Meeting</p> <p>MAR 4 3:00 PM - 4:00 PM 🗓</p> <p>TC 9 Monthly Meeting</p> <p>MAR 15 7:00 AM - 6:30 PM</p> <p>Power Magnetics @ High Frequency Workshop</p> <p>APR 1 3:00 PM - 4:00 PM 🗓</p> <p>TC 9 Monthly Meeting</p> <p>View Calendar</p>	<p>12/12/2024</p> <p>Photonic / BESS Power Converters and The Control Techniques for Energy Access</p> <p>12/12/2024</p> <p>A Review on High Power Density DC-DC Converters for Electromobility Applications</p> <p>View Webinars</p>

IEEE.org | IEEE Xplore Digital Library | IEEE Standards | IEEE Spectrum | More Sites Join IEEE


IEEE POWER ELECTRONICS SOCIETY

ABOUT MEMBERSHIP CONFERENCES PUBLICATIONS EDUCATION TECHNICAL ACTIVITIES NEWS & MEDIA

Calendar


Power Magnetics @ High Frequency Workshop

HOME / EVENTS / POWER MAGNETICS @ HIGH FREQUENCY WORKSHOP



10th Annual Magnetics @ High Frequency Workshop

PSMA Magnetics Committee - 15 March 2025, Atlanta, GA USA




The PSMA Magnetics Committee together with IEEE PELS are currently planning to conduct the tenth "Power Magnetics @ High Frequency" Workshop on Saturday, March 15, 2025, which is the day before and at the same venue as APEC 2025 in Atlanta, GA. The 2025 workshop builds on the ongoing dialogue of the workshop series over the first nine workshops.

The purpose and focus of this workshop are to identify the latest improvements in magnetic materials, coil (winding) design, construction and fabrication, evaluation and characterization techniques and modelling and simulation tools. This is to target the advancements that are deemed necessary by the participants for power magnetics to meet the technical expectations and requirements of new market applications for higher operating frequencies and emerging topologies that are being driven by continuous advances in circuits topologies and semiconductor devices.



PSMA Magnetics Committee Meeting Agenda Workshop Planning Notes

February 5, 2025



Answering Your Questions About Power Design

Design Guide | Newsletter | Special Sections | Resources | About Us | Sponsors | Home

infineon Power up, size down!
GaN transistor | 200 mΩ $R_{DS(on)typ.}$ | For consumer SMPS

[Download datasheet](#)

Calendar of Events

HOW2POWER's Events Calendar lists selected conferences, tradeshows, and workshops related directly or indirectly to power conversion. This listing includes a wide range of application or market-focused events where suppliers of power components or power supplies may be exhibiting, or where technical presentations related to power conversion/power electronics may be presented.

This section also lists seminars and workshops offering instruction in power supply design, magnetics design, EMI/EMC and various power electronics and related topics.

Virtual
 In-Person
 Hybrid
 USA
 International
 Find:
 Clear All

Sort by: Date Event City State Country Industry/Application
 From:
<<

Date	Event	City	State	Country	Industry	News
03/03/25 - 03/06/25	Device Packaging	Phoenix	AZ	USA	Packaging	
03/05/25 - 03/06/25	BATTERY TECH USA	Orange County	CA	USA	Batteries, Electric Vehicles	
03/10/25 - 03/13/25	Satellite	Washington	D.C.	USA	Space	
03/10/25 - 03/14/25	SEMI-THERM	San Jose	CA	USA	Thermal Management	
03/11/25 - 03/13/25	Embedded World	Nuremberg		Germany	Computing	
03/12/25 - 03/13/25	Data Centre World	London		U.K.	Data Centers	
03/15/25 - 03/15/25	PSMA Magnetics @ High Frequency Workshop	Atlanta	GA	USA	Magnetics, Power Electronics	

In-Person Seminar/Workshop.
Visit the event website
How2Power is a media partner for this event.

Sponsored Links (Webinars)

High-switching-frequency applications - Efficiency boost with OptiMOS 6 power MOSFET Technology

Semiconductor System Offering Enabling Combustion to Electric Transition in Power Tools

Novelties in battery-powered applications. From motor control to chargers

Webinar: High-performance PCB Layout and thermal design techniques

Webinar: Modular DC-DC System Design Done Right

Probing in Power



OTHER TOP POWER NEWS [Top ^](#)

- Infineon Technologies has announced a breakthrough in handling and processing the **thinnest silicon power wafers**, with a thickness of only 20 micrometers and a diameter of 300 mm, in a high-scale semiconductor fab.
- Texas Instruments has announced a massive expansion of its **internal GaN manufacturing**, increasing capacity 4x, by adding GaN manufacturing at its facility in Aizu, Japan and using the most advanced GaN manufacturing equipment available today.
- Wolfspeed has announced a total of **\$2.5 billion in funding** from various sources, which will aid its investments in next-generation 200-mm technology.

DMC 18 - 20 Novembre 2024 **Grenoble, France**

DESIGN METHODOLOGIES FOR POWER ELECTRONICS

10th Annual Magnetics @ High Frequency Workshop

PSMA Magnetics Committee - 15 March 2025, Atlanta, GA USA

PSMA

- Early bird registration is now open for the conference and professional education seminars at **APEC 2025**.
- Advanced Energy Industries has launched its 2025 - 2026 **STEM Scholarship Program**, which offers a \$20,000 grant toward payment of tuition fees. In addition, selected recipients will receive professional mentoring and internship opportunities.
- For a technical facelift and renovation of its North Area, CERN has selected the DM1200 zero-flux dc current transducer (DCCT) from **Danisense** for use in the CERN-designed POLARIS power converters.

URL: <https://www.how2power.com/newsletters/index.php>

URL: https://www.how2power.com/calendar/h2p_cal.php



PSMA Magnetics Committee Meeting Agenda Workshop Planning Notes

February 5, 2025

2024 December Bodo Newsletter

Early Bird Registration Now Open for the 40th Annual APEC 2025 in Atlanta

Early bird registration is now open for the 40th Annual Applied Power Electronics Conference (APEC), running March 16-20 at the Georgia World Convention Center in Atlanta. The APEC 2025 conference and exposition gathers power electronics engineers, academics



and students from all over the world to learn about the latest research, technologies and products. Early bird registration ends Jan. 13, 2025. Full registration includes access to the APEC Technical Program, comprising nearly 800 paper presentations, sessions and seminars, the conference offers a broad scope of content: APEC Plenary Session (visionary talks by distinguished speakers), Technical Sessions (lecture sessions and dialogue sessions based on peer-reviewed papers), Industry Sessions (presentations showcasing work in all areas of power electronics), Professional Education Seminars (in-depth seminars on practical aspects of power electronics), Debate – formerly RAP – Sessions (expert panelists identify three hot topics for friendly debate) as well as Exhibitor Presentations (exhibitor companies highlight new products and technologies). Also included in the full registration package is admission to the APEC 2025 Exposition and Special Events. The 2025 exposition will gather nearly 300 exhibitors to the sold-out exhibit floor. With its lively, interactive trade show environment, APEC 2025 offers participation in such events as the MicroMouse contest, the FIRST Robotics demonstration and the Wednesday evening Social Event celebrating APEC's 40th anniversary.

www.apec-conf.org

3D Power Design and Manufacturing Symposium (3D-PEIM) 2025

The PSMA Packaging and Manufacturing Committee announce its Fifth International Symposium on 3D Power Electronics Integration and Manufacturing (3D-PEIM-2025). 3D-PEIM will take place July 8-10, 2025 at the National Renewable Energy Laboratory (NREL) in Golden, Colorado. The symposium is designed for any engineer or manager involved in the design and manufacturing of high-density power sources using 3D technology. It will feature key speakers and technical sessions focused on increasing the power density and performance of power solutions. Plenary presentations will include: "Beyond 2030: Powering the E-Powertrain with High-Value and High-Efficiency Power Conversion Systems - A BorgWarner Perspective", presented by Harsha Nanjundaswamy, BorgWarner, "Ad-



vanced Packaging to System Integration - Trends and Challenges", presented by Devan Iyer, IPC and "The Power Delivery and Energy Storage Challenge in Advanced Packaging", presented by Subramanian Iyer, University of California Los Angeles. Attendees are also invited to tour the power electronics facilities of the National Renewable Energy Laboratory.

www.3d-peim.org



Strategic Partnership for Onboard Chargers and more

Nexperia has entered into a strategic partnership with Kostal, which will enable it to produce wide bandgap devices that more closely match the exacting requirements of automotive applications. Under the terms of this partnership, Nexperia will supply, develop, and manufacture WBG power electronics devices which will be designed-in and validated by Kostal. The collaboration will initially focus on the development of SiC MOSFETs in top-side-cooled QDPAK packaging for onboard chargers in electric vehicles.



www.nexperia.com

Bodo's Power Systems® · bodospower.com

 **10th Annual Magnetics @ High Frequency Workshop** 
PSMA Magnetics Committee — 15 March 2025, Atlanta, GA USA

Mar
15



Power Magnetics @ High Frequency Workshop

🌐 USA 📍 Atlanta, GA 🕒 1 day

psma.com

URL: <https://www.bodospower.com/events.aspx>



PSMA Magnetics Committee Meeting Agenda

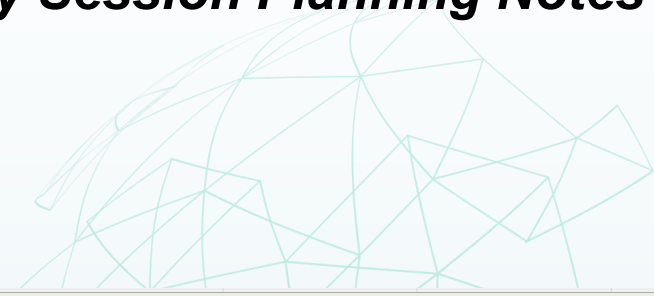
February 5, 2025

- Introductions
- Special Projects
 - Electrical parameters of magnetic materials
 - Core Loss Database
- 2025 Workshop Planning
- **2025 Industry Session Planning**
- Open Magnetics
- Power Technology Roadmap
- Magnetics Forum on PSMA Website
- Next Meeting



PSMA Magnetics Committee Meeting Agenda - Industry Session Planning Notes

February 5, 2025



Wednesday, March 19, 2025

8:30 AM – 11:55 AM ET	IS07 - The Transformer in the Solid-State Transformer Industry Session Chair: George Slama – Wurth Elektronik Industry Session Chair: Ed Herbert , BEEE – None	^
PSMA Session		
8:30 AM – 8:55 AM ET	IS07.1 - Recommended Practices for Solid State Transformer Design and Testing Location: A412 Industry Session Presenter: Paul Ohodnicki – University of Pittsburgh	★
8:55 AM – 9:20 AM ET	IS07.2 - Addressing Insulation and Isolation Issues in the Solid State Transformer Location: A412 Industry Session Presenter: Zhicheng Guo – Arizona State University	★
9:20 AM – 9:45 AM ET	IS07.3 - Enabling High Power Transformer Design With Advanced Magnetic Mmaterials Location: A412 Industry Session Presenter: Veda Duppalli – CorePower Magnetics	★
9:45 AM – 10:10 AM ET	IS07.4 - Thermal Design and Limits of the Transformer in the Solid State Transformer Location: A412 Industry Session Presenter: Subhashish Bhattacharya , PhD – North Carolina State University	★
10:40 AM – 11:05 AM ET	IS07.5 - Managing Trade-Offs in Design of High-Power Medium Frequency Transformers for Solid-State Transformers Location: A412 Industry Session Presenter: Drazen Dujic – PEL EPFL	★
11:05 AM – 11:30 AM ET	IS07.6 - Medium Frequency Transformers for Data Centers Location: A412 Industry Session Presenter: Isaac Wong – North Carolina State University	★
11:30 AM – 11:55 AM ET	IS07.7 - Evolution of the Solid State Transformer for Different Applications Location: A412	★

IS Committee		IS072: "The Transformer in the Solid State Transformer"				
REQUIRED	REQUIRED	REQUIRED	REQUIRED	REQUIRED	REQUIRED	REQUIRED
8:30 AM	8:55 AM	Recommended Practices for Solid State Transformer Design and Testing	Paul	Ohodnicki	PRO8@pitt.edu	University of Pittsburgh
8:55 AM	9:20 AM	Addressing Insulation and Isolation Issues in the Solid State Transformer	Zhicheng	Guo	Zhicheng.Guo@asu.edu	Arizona State University
9:20 AM	9:45 AM	Impact of Standards on Design Choices and Material Options	Veda	Duppalli	veda.duppalli@corepo	CorePower Magnetics
9:45 AM	10:10 AM	Thermal Design and Limits of the Transformer in the Solid State Transformer	Subhashish	Bhattacharya	sbhatta4@ncsu.edu	North Carolina State University
10:40 AM	11:05 AM	Managing Trade-Offs in Design of High-Power Medium Frequency Transformers for Solid-State Transformers	Drazen	Dujic	drazen.dujic@epfl.ch	EPFL
11:05 AM	11:30 AM	Medium Frequency Transformers for Data Centers	Isaac	Wong	twong3@ncsu.edu	North Carolina State University
11:30 AM	11:55 AM	Evolution of the Solid State Transformer for Different Applications	Rafal	Wojda	wojdarp@ornl.gov	Oak Ridge National Laboratory

PSMA Magnetics Committee Meeting Agenda - Industry Session Planning Notes

February 5, 2025

8:00 AM – 9:40 AM ET	IS24 - Core Loss - Making the Data Reliable and Relevant Industry Session Chair: Matt Wilkowski, MSEE – Wurth Elektronik Industry Session Chair: Ed Herbert, BEEE – None	PSMA Session
8:00 AM – 8:25 AM ET	IS24.1 - Core Evaluation Kit Initiative for the comparison of core loss measurement Location: A404-405 Industry Session Presenter: Jens Freibe – University of Kassel Co-Author: Wilmar Martinez, PhD – KU Leuven - EnergyVille	★
8:25 AM – 8:50 AM ET	IS24.2 - HFEMAG European Metrology Labs Correlation Project Location: A404-405 Industry Session Presenter: Massimo Pasquale – Istituto Nazionale Di Ricerca Metrologica	★
8:50 AM – 9:15 AM ET	IS24.3 - Triple Pulse Core Loss testing Location: A404-405 Industry Session Presenter: Jun Wang, PhD – University of Bristol	★
9:15 AM – 9:40 AM ET	IS24.4 - PSMA Core Loss Data Base Location: A404-405 Industry Session Presenter: George Slama – Wurth Elektronik	★

IS Committee		IS24: "Core Loss - Making the Data Reliable and Relevant"				
REQUIRED	REQUIRED	REQUIRED	REQUIRED	REQUIRED	REQUIRED	REQUIRED
8:00 AM	8:25 AM	Core Evaluation Kit Initiative for the comparison of core loss measurement	Jens	Freibe	Friebe@uni-kassel.de	University of Kassel
8:25 AM	8:50 AM	HFEMAG European Metrology Labs Correlation Project	Massimo	Pasquale	m.pasquale@inrim.it	Istituto Nazionale Di Ricerca Metrologica
8:50 AM	9:15 AM	Triple Pulse Core Loss testing	Jun	Wang	jun.wang@bristol.ac.uk	University of Bristol
9:15 AM	9:40 AM	PSMA Core Loss Data Base	George	Slama	george.slama@we-online.com	Wurth Elektronik

PSMA Magnetics Committee Meeting Agenda – Industry Session

February 5, 2025

- IS07
 - Still require drafts from three of seven presenters
 - Minor feedback provided to authors of the four received presentation
 - Next steps
 - final pptx presentations for APEC download due February 14
 - Pdf version of approved presentation slides due February 21
- IS24
 - Initial drafts for all four presentations were uploaded and reviewed
 - Minor feedback provided to all presenters
 - Next steps
 - final pptx presentations for APEC download due February 14
 - Pdf version of approved presentation slides due February 21

PSMA Magnetics Committee Meeting Agenda

February 5, 2025

- Introductions
- 2025 Workshop Planning
- 2025 Industry Session Planning
- **Special Projects**
 - **Electrical parameters of magnetic materials**
 - **Core Loss Database**
- Open Magnetics
- Power Technology Roadmap
- Magnetics Forum on PSMA Website
- Next Meeting



PSMA Magnetics Committee Meeting Agenda – Special Projects

February 5, 2025

- Special Projects
 - In Process
 - Electrical parameters of magnetic materials – interim activities since September 2024
 - Core Loss Database - active
 - Pending
 - Steinmetz Like Approximation
 - Electrical parameters of magnetic materials
 - Propagation in magnetic materials
 - Current driven core loss testing
 - Spice model

Discussion:

- Next phase of electrical parameters of magnetic materials - start Fall 2025
 - Use inventory of drilled cores from previous projects
- Discuss pending projects during next meeting on March 18 at APEC
- Future projects will most likely require financial sponsor



PSMA Magnetics Committee Meeting Agenda – Special Projects – Permittivity Measurements February 5, 2025 – November 5, 2024 Update

- Permittivity measurements with a saturating magnetic field
 - Background Info
 - We have a new student for the fall semester, Fabrice Locher. He is an undergraduate and will work under the supervision of Jonas Mühlethaler
 - Jonas has tailored the work under the project to the abilities of the student, the time and equipment available and the budget. Briefly, the work will continue the work started by Frédéric Mathieu, verifying it and extending the measurements to a higher frequency
 - Activities since September by Fabrice Lacher and Jonas Mühlethaler
 - Work on publication for APEC (The paper has been accepted for the Poster Session)
 - Re-did permeability measurements with DC field through extra wire, rather than through electromagnet (so we have a DC field in the same orientation as main flux)
 - “4-wire” measurements with Bode 100 (so far the results were almost the same, so we have a high confidence in the results)
 - Prepared toroid for permittivity / conductivity measurements
 - Ed started making sense of the results with a literature review (still ongoing, needs time, and cannot be outsourced to student)

PSMA Magnetics Committee Meeting Agenda – Special Projects – Permittivity Measurements February 5, 2025 – November 5, 2024 Update

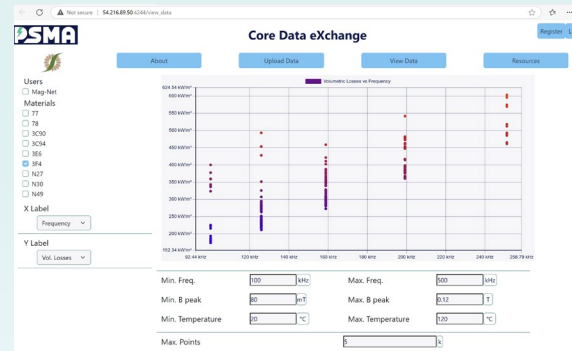
- Permittivity measurements with a saturating magnetic field
 - Activities going forward
 - 4 November, 2024
 - Permittivity measurements on toroid, see whether we have same results and can go to higher frequencies
 - Work on APEC publication / Literature study by Jonas
 - 11 November, 2024
 - Work on APEC publication / Literature study by Jonas
 - Try to observe dimensional resonance with new measurement setup (4-wire, toroids)
 - Try to make sense on the abrupt changes of permittivity under DC bias at higher frequency (see Frédéric's work)
 - 18 November, 2024
 - APEC Deadline publication
 - Work on new PCBs for permittivity measurements (reduce skin effect) / see E. H. Email with some suggestions; Include study of skin effect here (a comment: skin effect is a well understood problem, and can be simulated with FEM; in other words: I suggest to do a FEM study of the PCB. Try to make sense on the abrupt changes of permittivity under DC bias at higher frequency (see Frédéric's work)
 - FEM is not good in non-linear core materials, but good in linear copper

PSMA Magnetics Committee Meeting Agenda – Special Projects – Permittivity Measurements February 5, 2025 – November 5, 2024 Update

- Permittivity measurements with a saturating magnetic field
 - Activities going forward
 - 25 November, 2024
 - FEM/Skin effect study by Fabrice (Fabrice will most likely not find time to go into the flux propagation study)
 - *Here and in the following weeks Jonas can start thinking about flux propagation and 4-wire with scope, until here Jonas have to focus on the APEC paper which is related to the project as well*
 - 2 December, 2024
 - FEM/Skin effect study by Fabrice (Fabrice will most likely not find time to go into the flux propagation study)
 - 9 December, 2024
 - Flux propagation and 4-wire with scope by Jonas
 - 16 December, 2024
 - Flux propagation and 4-wire with scope by Jonas
 - Christmas break/Next year
 - We will work out a plan in detail, maybe with a graduate student. But keep in mind, the USD 10k is a limited budget and we did a lot already...

PSMA Magnetics Committee Meeting Agenda – Special Projects – Permittivity Measurements February 5, 2025 – November 5, 2024 Update

- Core Loss Database
 - Database should be on its own website
 - Link to the website on a tab in the PSMA Magnetics Forum
 - Project meetings separate from monthly magnetics committee meeting
 - Initial meeting during last week of September
 - September 25 10:00 AM CDT
 - Regular monthly project updates started in November 2024
 - Most previous meeting: Monday January 13, 2025 10:00 AM CST
 - Next meeting: Monday February 10, 2025 10:00 AM CST
 - Development URL: http://54.216.89.50:4244/view_data



PSMA Magnetics Committee Meeting Agenda – Special Projects – Core Loss Data Base February 5, 2025

← ↻ ⚠ Not secure | 54.216.89.50:4244/view_data ☆ ⋮ 🌐

PSMA Core Data eXchange

Register Login

About Upload Data View Data Resources

Users
 Mag-Net

Materials
 77
 78
 3C90
 3C94
 3E6
 3F4
 N27
 N30
 N49

X Label
Frequency ▾

Y Label
Vol. Losses ▾

Frequency (kHz)	Volumetric Losses (kW/m³)
100	180, 200, 220, 330, 350, 360, 370, 380, 390, 400, 410
125	210, 230, 250, 270, 290, 300, 320, 330, 350, 430, 450, 490
160	270, 280, 290, 300, 310, 320, 330, 340, 350, 360, 370, 380, 390, 400, 410, 420, 430, 440, 450, 460
200	360, 370, 380, 390, 400, 410, 420, 430, 440, 450, 460, 470, 480, 490, 540
250	460, 470, 480, 490, 500, 510, 520, 530, 540, 550, 560, 570, 580, 590, 600, 610, 620

Min. Freq. kHz Max. Freq. kHz

Min. B peak mT Max. B peak T

Min. Temperature °C Max. Temperature °C

Max. Points k

PSMA Magnetics Committee Meeting Agenda – Special Projects – Core Loss Data Base

February 5, 2025

← ↻ ⚠ Not secure | 54.216.89.50:4244/about ☆ ☆ ⋮

PSMA **Core Data eXchange** Register Login

About Upload Data View Data Resources

The Core Data eXchange website is a project sponsored by the Magnetics Committee of the Power Sources Manufacturers Association (PSMA). The PSMA provided the seed money to develop the project website, provides for the ongoing administrative costs and retains ownership and administrative responsibility for it. The day to day operation falls under the Magnetics Committee and a sub group of volunteers.

As an open source project one main objective is that the users will contribute to its further development.

Home Cookie Policy Legal

© 2024-2025 Core Data eXchange



PSMA Magnetics Committee Meeting Agenda

February 5, 2025

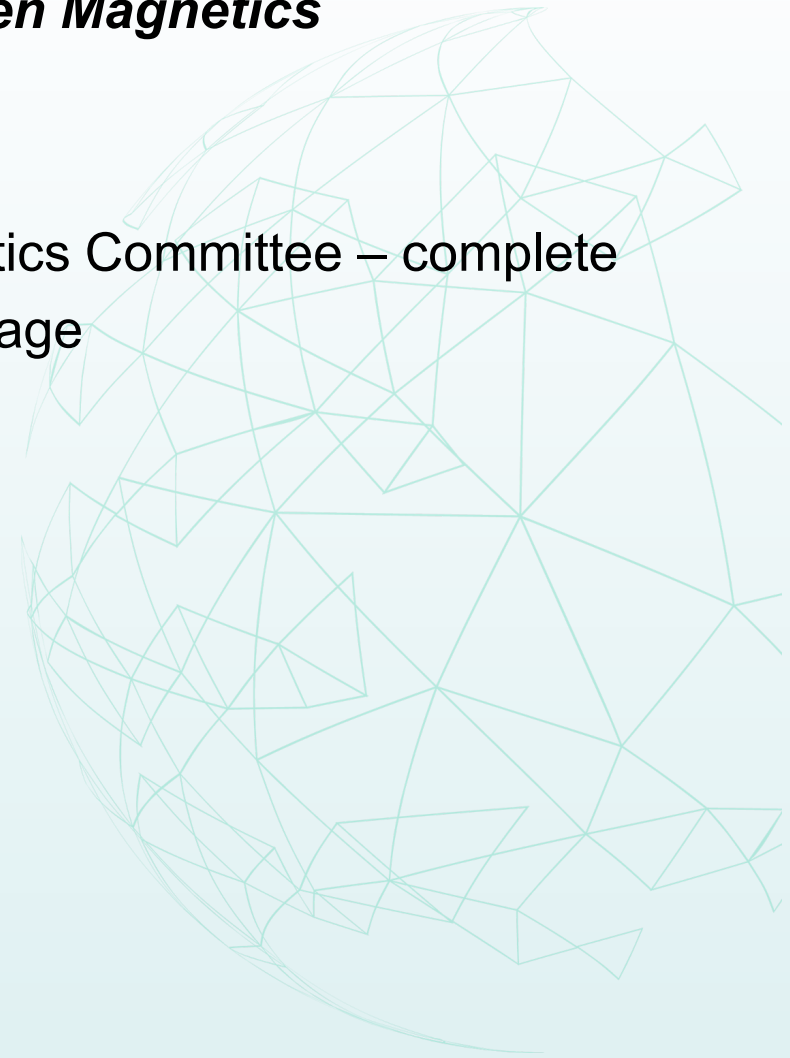
- Introductions
- 2025 Workshop Planning
- 2025 Industry Session Planning
- Special Projects
 - Electrical parameters of magnetic materials
 - Core Loss Database
- **Open Magnetics**
- Power Technology Roadmap
- Magnetics Forum on PSMA Website
- Next Meeting



PSMA Magnetics Committee Meeting Agenda – Open Magnetics

February 5, 2025

- What's next?
 - Distribute Nov 6 presentation to the PSMA Magnetics Committee – complete
 - Decide to proceed then integrate into PSMA webpage
 - need final decision
 - need to discuss with PSMA webmaster



PSMA Magnetics Committee Meeting Agenda

February 5, 2025

- Introductions
- 2025 Workshop Planning
- 2025 Industry Session Planning
- Open Magnetics
- Special Projects
 - Electrical parameters of magnetic materials
 - Core Loss Database
- **Power Technology Roadmap**
- Magnetics Forum on PSMA Website
- Next Meeting



2025 Edition PSMA Power Technology Roadmap

Magnetics Section

- 2022 Topics (Published)

- Energy Harvestings
- Integrated Voltage Regulators (IVR)
- Fully Integrated Voltage Regulators (FIVR)
- Hybrid Integrated Voltage Regulators (HIVR)
- Isolated Signal and Low Power Transformers
- Power Supply on Chip (PwrSoC)
- Power Management Integrated Circuits (PMIC)
- Power Systems in Package (PSiP)
- Mother Board Voltage Regulators (MBVR)
- Wireless Power Transfer (WPT)
- Solid State Transformers (SST)

- 2025 Topics (Proposed)

- Embedded Magnetics
 - Integrated Voltage Regulators (IVR)
 - Fully Integrated Voltage Regulators (FIVR)
 - Hybrid Integrated Voltage Regulators (HIVR)
 - Isolated Signal and Low Power Transformers
 - PwrSoC (Power Supply on Chip)
 - Power Systems in Package (PSiP)
- Solid State Transformers (SST)
- Trans-Inductor Voltage Regulators (TLVR)
- Mother Board Voltage Regulators (MBVR)
 - Lateral Power Delivery (LPD)
 - Vertical Power Delivery (VPD)
 - Dual Phase Power Block (DPPB)
- Wireless Power Transfer (WPT)
 - EV Charging
- Core Loss Measurement Methods & Databases
- Magnetic Material Alternatives Opportunities and Limitations

PSMA Magnetics Committee Meeting Agenda

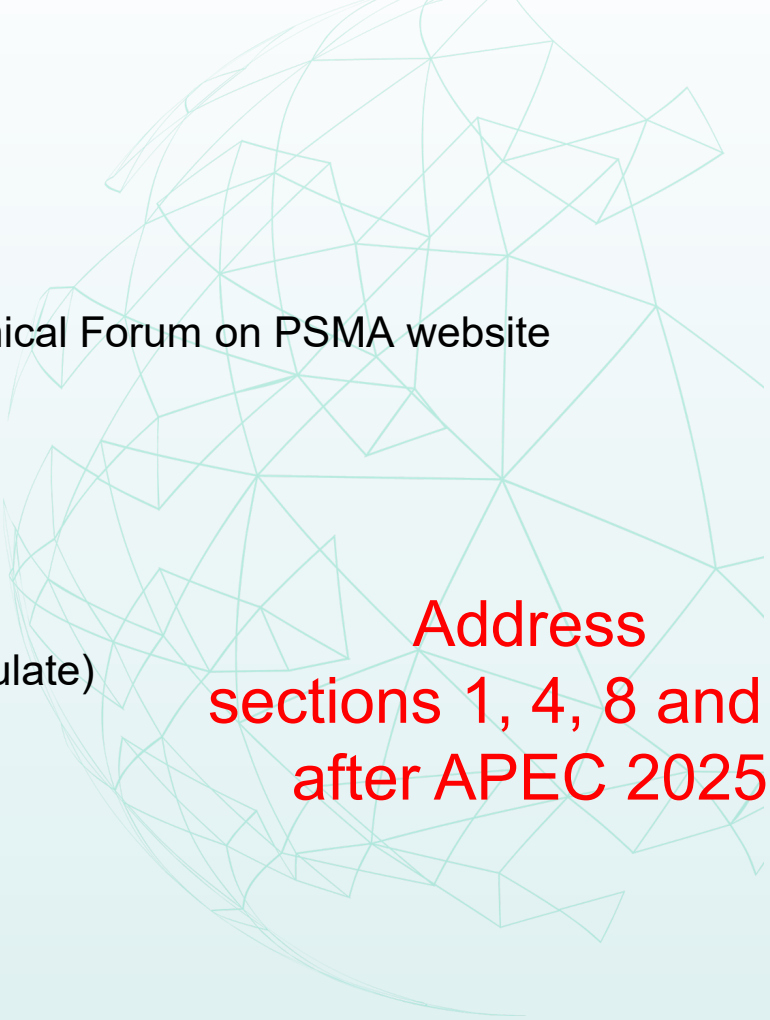
February 5, 2025

- Introductions
- 2025 Workshop Planning
- 2025 Industry Session Planning
- Open Magnetics
- Power Technology Roadmap
- Special Projects
 - Electrical parameters of magnetic materials
 - Core Loss Database
- **Magnetics Forum on PSMA Website**
- Next Meeting



PSMA Magnetics Committee –Magnetics Committee Forum on PSMA Website February 5, 2025

- In process
 - Section 1.3 Powdered metal
 - Proposal by Lukas Mueller has been accepted
 - Need to add to HF task force tab under magnetics Technical Forum on PSMA website
- Proposed additions/updates
 - Section 1 Core Materials
 - Sputtered (addition)
 - Electroplated (addition)
 - Section 1.4 Nanocrystalline and amorphous metals (populate)
 - Section 4 Inductors
 - TLVR inductors (addition)
 - Section 8 “Solid state” transformers (populate)
 - Section 12 Fabrication Technology
 - Section 12.3.2 Substrate embedded (populate)
 - Section 12.6 PSiP (populate)
 - Section 12.7 PwrSoc (populate)



**Address
sections 1, 4, 8 and 12
after APEC 2025**


PSMA Magnetics Committee –Magnetics Committee Forum on PSMA Website February 5, 2022

https://psma.com/technical-forums/magnetics/hf-task-force

PSMA News Publications Resources Conferences Technical Forums Membership About PSMA
The multinational power electronics association Contact Log in

PSMA / Technical Forums / Magnetics / HF Task Force / Magnetics Forum

Magnetics Forum

 **Magnetics Info & Resources for the Power Electronics Industry.**

Introduction HF Task Force **Magnetics Checklist** Resources Presentations Core Loss Studies Meeting Minutes Special Projects Workshop

HF Task Force

PSMA Magnetics Committee High Frequency Task Force

January 11, 2015

At the PSMA Planning meeting in September 2013, the PSMA Magnetics Committee was strongly encouraged to do a workshop on high frequency magnetics. Below is to the working document in which various topics of interest have been identified and grouped. This document will be revised as new topics are suggested and input is received.

For the various topics, we solicit inputs from experts in the related field. White papers, application notes, slide presentation, audio and video files all are welcome. As inputs are received, they will be summarized in the working document, and links will be added to original files.

We have created a LinkedIn group, "PSMA Magnetics Committee High Frequency Task Force." We will open threads on various topics to provide a forum for questions and open discussion.

We encourage engineers to identify problems with magnetics that have hindered their high frequency designs. The more interesting problems may become discussion threads, looking for solutions.

Steve Carlsen
Ed Herbert
Co-Chairmen
PSMA Magnetics Committee


High frequency magnetics

Revision: January 11, 2015

- ▶ 1. Core materials
- ▶ 2. Core geometry and scaling
- ▶ 3. Transformers
- ▶ 4. Inductors
- ▶ 5. Lossy suppressors
- ▶ 6. Magnetic circuits with saturating cores
- ▶ 7. Combination magnetic structures
- ▶ 8. "Solid state" transformers
- ▶ 9. Windings
- ▶ 10. Parasitic impedance
- ▶ 11. Core loss
- ▶ 12. Fabrication technology
- ▶ 13. Near field noise performance
- ▶ 14. Software, design and simulation
- ▶ 15. Test equipment, quality assurance and production testing
- ▶ 16. Reliability
- ▶ Appendix

PSMA Member Promotion

PSMA members who contribute to the workshop can have their name in a Promotional Box next to their contribution.



The members can include their logos and links to their web sites or promotional material.

[PSMA Membership Information](#)

Update

PSMA Magnetics Committee –Magnetics Committee Forum on PSMA Website February 5, 2025

High frequency magnetics

Revision: January 11, 2015

▼ 1. Core materials

This section discusses the characteristics of various materials used to make inductor and transformer cores. Manufacturers are encouraged to provide their catalogs and data sheets to be included. Manufacturers who are PSMA members may have a promotional block placed in this report.

A good over-view of the various magnetic materials and their selection criteria can be found in "Magnetic Core Materials in HF Applications."¹

- 1.1. Ferrite
- 1.2. Low temperature cured ferrites
- 1.3. Powdered metal
- 1.4. Nanocrystalline and amorphous metals
- 1.5. Composite cores
- 1.6. Tape-wound cores
- 1.7. Selection criteria

Populate section 1.3 and 1.7 with content proposed by Lukas Mueller

¹ Magnetic Core Materials in HF Applications; Dr. Jonas Mühlethaler, Gecko-Simulations, AG; an APEC2014 Industry Session

- ▶ 2. Core geometry and scaling
- ▶ 3. Transformers
- ▶ 4. Inductors
- ▶ 5. Lossy suppressors
- ▶ 6. Magnetic circuits with saturating cores
- ▶ 7. Combination magnetic structures
- ▶ 8. "Solid state" transformers
- ▶ 9. Windings
- ▶ 10. Parasitic impedance
- ▶ 11. Core loss
- ▶ 12. Fabrication technology
- ▶ 13. Near field noise performance
- ▶ 14. Software, design and simulation
- ▶ 15. Test equipment, quality assurance and production testing
- ▶ 16. Reliability
- ▶ Appendix

[PSMA Membership Information](#)

PSMA Member Promotion



Tyndall National Institute



Add Micrometals logo with link to Micrometals website to this section of HF task force

<https://psma.com/technical-forums/magnetics/hf-task-force>

PSMA Magnetics Committee –Magnetics Committee Forum on PSMA Website February 5, 2025

Proposal By Lukas Mueller on June 28, 2024

Section 1.3 Powder Materials

Powdered metal-based cores are made from small particles of magnetic material that are insulated, mixed with a binder and pressed into a solid core shape. The defining characteristic of powder cores is their low starting permeability ranging from 4 to 550 and soft-saturation characteristic. Unlike a gapped high permeability material, a powder material will gradually lose its permeability with increasing magnetization force. Coupled with powder materials with high saturation flux density, these materials can store higher amounts of energy per unit volume than ferrite. Core loss is generally higher for powder materials than ferrite.

There are three broad subtypes of powder metal cores depending on the base raw material used: iron, carbonyl iron and alloy.

1.3.1 Powder iron cores are made from reduced iron. The main advantage of powder iron is the materials high saturation flux density, high amplitude permeability, high damping and low cost. The main disadvantage of powder iron is its high core loss compared to other materials, making it more suitable for low frequency power conversion, line reactor or EMI filtering applications

1.3.2 Carbonyl iron-based cores feature low eddy current losses due its unique magnetic particle structure. This gives these types of materials a stable permeability over a wide frequency range. The main application for carbonyl iron-based cores is in high Q resonant inductors and broadband transformers at frequencies above 1MHz.

1.3.3 Alloy powder cores feature lower hysteresis losses than powder iron cores. The stability of these materials' permeability versus magnetization force is also significantly better. Alloy powder cores excel in DC inductors in filtering and power conversion applications. There is a large variety of alloy cores including but not limited to: Sendust, Permalloy, Molypermalloy and Silicon Steel.

PSMA Magnetics Committee –Magnetics Committee Forum on PSMA Website February 5, 2025

Proposal By Lukas Mueller on June 28, 2024

Section 1.3 Powder Materials

Powdered metal-based cores are made from small particles of magnetic material that are insulated, mixed with a binder and pressed into a solid core shape. The defining characteristic of powder cores is their low starting permeability ranging from 4 to 550 and soft-saturation characteristic. Unlike a gapped high permeability material, a powder material will gradually lose its permeability with increasing magnetization force. Coupled with powder materials with high saturation flux density, these materials can store higher amounts of energy per unit volume than ferrite. Core loss is generally higher for powder materials than ferrite.

There are three broad subtypes of powder metal cores depending on the base raw material used: iron, carbonyl iron and alloy.

1.3.1 Powder iron cores are made from reduced iron. The main advantage of powder iron is the materials high saturation flux density, high amplitude permeability, high damping and low cost. The main disadvantage of powder iron is its high core loss compared to other materials, making it more suitable for low frequency power conversion, line reactor or EMI filtering applications

1.3.2 Carbonyl iron-based cores feature low eddy current losses due its unique magnetic particle structure. This gives these types of materials a stable permeability over a wide frequency range. The main application for carbonyl iron-based cores is in high Q resonant inductors and broadband transformers at frequencies above 1MHz.

1.3.3 Alloy powder cores feature lower hysteresis losses than powder iron cores. The stability of these materials' permeability versus magnetization force is also significantly better. Alloy powder cores excel in DC inductors in filtering and power conversion applications. There is a large variety of alloy cores including but not limited to: Sendust, Permalloy, Molypermalloy and Silicon Steel.

PSMA Magnetics Committee –Magnetics Committee Forum on PSMA Website February 5, 2025

Proposal By Lukas Mueller on June 28, 2024

Section 1.7 Selection criteria

The defining selection criteria for magnetic materials are: core loss, saturation flux density, inductance stability, temperature range and mechanical ruggedness.

For AC applications like high Q resonant inductors or transformers low core loss at the intended switching frequency is the primary concern. The performance factor of different material grades can be used to identify the material with the lowest core loss at a certain frequency.

For DC switching inductors, like PFC inductors, a mixture of inductance stability and core loss is desirable.

For EMI filter inductors, high damping is beneficial to limit parasitic resonances in the filter. In addition, a high impedance over the desired filtering frequency range is crucial. For DC filter inductors, a high DC bias stability is desired. The material saturation constant can be used to evaluate different materials in this regard. For AC line filter inductors, a high saturation flux density and high amplitude permeability are beneficial.

PSMA Magnetics Committee –Magnetics Committee Forum on PSMA Website February 5, 2025

Proposal By Lukas Mueller on June 28, 2024

Section 1.7 Selection criteria (Continued)

Application	Material 1	Material 2	Material 3	Note
Common Mode Choke	MnZn Ferrite	Nanocrystalline	NiZn Ferrite	Carbonyl iron above 500MHz an option as well
DC Filter Choke	Powder Alloy	MnZn Ferrite	Powder Iron	
AC Line Choke	Power Iron	Powder Alloy	Fe-Si (laminated)	
AC Filter Choke	Carbonyl iron	Powder Alloy	MnZn Ferrite	
CCM Switching inductor	Powder Alloy	MnZn Ferrite	Nanocrystalline	Evaluate DC bias stability vs. core loss
DCM Switching Inductor	MnZn Ferrite	NiZn Ferrite	Carbonyl Iron	Carbonyl iron has higher core loss but lower AC copper loss due to distributed air gap
Tuned RF inductor	Carbonyl Iron	NiZn Ferrite	Air	
Transformer	MnZn Ferrite	Nanocrystalline	NiZn Ferrite	

PSMA Magnetics Committee Meeting Agenda

February 5, 2025

- Introductions
- 2025 Workshop Planning
- 2025 Industry Session Planning
- Special Projects
 - Electrical parameters of magnetic materials
 - Core Loss Database
- Open Magnetics
- Power Technology Roadmap
- Magnetics Forum on PSMA Website
- **Next Meeting**



PSMA Magnetics Committee Meeting Agenda

February 5, 2025 – Next Meeting

- Tuesday March 18 12:00 PM EDT – 2:00 PM EDT In-Person
 - Room *Omni Hotel Level M2 International B*



PSMA Magnetics Committee Meeting

February 5, 2025

- Attendance (15)

John Horzepa

Mike Arasim

Hasan Ahmadian Baghbaderani

Alan Cooper

Jim Cox

Doug Eaton

Frank Feng

Michael Freitag

Ed Herbert

Bryce Hesterman

Alfonso Martinez

Frank Oberlitner

Lukas Mueller

Mike Ranjram

Rodney Rogers

Ranajit Sai

George Slama

JC Sun

Mark Swihart

Jun Wang

Matt Wilkowski



PSMA Magnetics Committee
February 5, 2025

Thank You

