



The Multinational Power Electronics Association

PSMA Magnetics Committee Meeting

December 18TH 2023

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

December 18, 2023

- Introductions
- 2024 Workshop Planning
- 2024 Industry Session Planning
- Power Technology Roadmap
- Special Projects
 - Electrical parameters of magnetic materials
 - Core Loss Database
- PSMA Conference/Exhibit Strategic Schedule



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PSMA Magnetics Committee Meeting Agenda – Workshop Planning

September 11, 2023

- Workshop Themes
 - Overall: Design of Optimal Magnetics Across Applications and Environments
 - Morning Session: Design and Optimization of Magnetics for Different Applications
 - Afternoon Session: Thermal design and other special issues such as insulation, partial discharge, etc.,
 - Tech Demos
- Industry Session Theme
 - Circuit and Construction Simulation and Modelling of Magnetic Components
- Propose not to cover core loss modelling for the 2024 workshop due to
 - Survey results requesting core loss modelling was based on a survey on Saturday March 18 however there were two PSMA Magnetics Committee related activities at APEC 2023 after the survey
 - George Slama Professional Education Seminar on Sunday March 19 – Core Loss Data for Everyone
 - Magnetics Committee Industry Session on Tuesday March 21 – Core Loss Measurements For Different Materials and Excitations
 - MagNet Activities will may results in some presentation and sessions on core loss modelling at APEC 2024
 - May have some tech demos related to MagNet

PSMA Magnetics Committee Meeting Agenda – Workshop Planning December 18, 2023

- When does registration open – ✓
- Workshop on PSMA Website - ✓
- Workshop on APEC website - ✓
- Workshop on How2Power - ✓
- Presentations from 2023 Workshop page of Magnetics Technical Forum - ✓
- Workshop on PELS Website - ✓
- Presenter instructions sent circa November 30 - ✓
- Tentative Agenda – Update – ongoing
 - Need student posters



PSMA Magnetics Committee Meeting Agenda – Workshop Planning

December 18, 2023

- From Tentative Agenda Workbook

Time	Event	Presenter	Affiliation	
7:00 AM - 8:00 AM	Breakfast Plus Technology Demonstrations			
8:00 AM - 8:05 AM	Opening Remarks	Ed Herbert	PSMA	
8:05 AM - 8:45 AM	Keynote Speaker Power Magnetics Design - Design and Optimization of Magnetics for Different Applications - Intro	George Slama	Wurth Elektronik	
	Opportunities for new magnetics designs to address a broad range of market driven technology trends across automotive and data center applications	Johan Kolar/Jannik Schafer	ETH	Accepted
8:45 AM - 9:20 AM	Technical Session - Design and Optimization of Magnetics for Different Applications			
	Advanced Algorithms in Magnetic Design: Trends in Modeling and Optimization	Jonas Muhlethaler	Frenetic	Accepted
9:20 AM - 9:40 AM	Q&A		Kolar, Muhlethaler	
9:40 AM - 10:00 AM	Break			
	Technical Session - Design and Optimization of Magnetics for Different Applications - Part 2			
10:00 AM - 10:35 AM	Magnetics for VRM Applications	Qiang Li	Virginia Tech - CPES	Accepted
10:35 AM - 11:10 AM	Inductor Optimization Based on Choice of Different Magnetic Materials	Lukas Mueller	Micrometals	Accepted
11:10 AM - 11:45 AM	Optimizing Trade-Offs Between Capacitors and Inductors	David Zawacki	Cornell Dubilier	Accepted
11:45 AM - 12:00 Noon	Panel Q & A		Kolar, Muhlethaler, Li, Mueller, Zawacki	

Time	Event	Presenter	Affiliation	
2:00 PM - 2:50 PM	Keynote Speaker Addressing Thermal Design and other special issues as partial discharge, insulation, etc., Intro	George Slama	Wurth Elektronik	
	Overview of special issues for the design of magnetics	Charlers Sullivan	Dartmouth College	Accepted
	Q & A		Sullivan	
	Technology Session - Thermal Design and other special issues as partial discharge, insulation, etc., - Part 1			
	Opening Remarks	George Slama	Wurth Elektronik	
2:50 PM - 3:15 PM	Leading Edge Power Magnetics design - multi -physical, multi-dimensional Optimization Relative to Electrical, Thermal and Commercial Objectives	Roman Jamy	Yageo - Kemet	Accepted
3:15 PM - 3:40 PM	Characterization of Partial Discharges in High-frequency Transformer under PWM Pulses	Zhicheng Guo	Arizona State University	Accepted
3:40 PM - 4:00 PM	Break			
	Technology Session - Thermal Design and other special issues as partial discharge, insulation, etc., - Part 2			
4:00 PM - 4:25 PM	Thermal Issues with Power Magnetics	Subhashish Bhattacharya	NCSU	Accepted
4:25 PM - 4:45 PM	Panel Q & A		Sullivan, Roman, Guo, Bhattacharya	
	Closing Remarks			
4:45 PM - 5:00 PM	Best of the Best Survey	Alex Gerfer	Wurth Elektronik	Accepted
		George Slama	PSMA	Accepted
5:15 PM - 6:30 PM	Networking Hour			

PSMA Magnetics Committee Meeting Agenda – Workshop Planning

December 18, 2023

- From Tentative Agenda Workbook

Time	Event	Presenter	Affiliation	
12:00 Noon - 2:00 PM	Technology Demonstration Session	George Slama	Wurth Elektronik	
	Oscilloscope	George Slama	LeCroy, Keysight or Tektronix, Pico	Pending
	Near field measurements useful techniques for electronics engineers	Arturo Mediano	HF Magic Labs	Accepted
	Computer Aided Inductor Optimization	Lukas Mueller	Micrometals	Accepted
	Magnetics for Energy Harvesting Applications	Sergiy Tykhonov	Fraba Ubito	Invited (Responded)
	Core Loss Correlations Across Equipment and Different Core Materials	George Slama	Wurth Elektronik	Accepted
	Capacitor/Inductor Filter	Frank Puhane	Wurth Elektronik	Accepted
	High-Q SMD measurements of various components (low ESR and ESL measurements)	Tim Ashworth	Zurich Instruments	Declined
	Circuit Simulation of Magnetic Components	Andrija Stupar	SIMPLIS Technologies	Accepted
	Nanocrystalline-based CMC filters for EV – reducing footprint	Bharadwaj Reddy Andapally	CBMM	Accepted
	3D FEM-based software for low-frequency electromagnetic behavior in transformers and inductors	Juris Vencels	Trafo	Accepted
	Scaleable and Sustainable Electroplated Wafer Level Magnetics	Mohammad Khodadadi	EnaChip	Accepted
	AC Power Loss Measurements	Nadja Laeaeperi	Iwatsu	Invited
	Non Linearity of metal alloyed powdered core with micro Pulse 2.0	JC Sun	Bs&T	Accepted
	Different Ferrites for Different Applications	Mike Arasim	Fair Rite	Accepted
		Chuck Wild	Miles Platt	Invited
		Naomichi Nao Miyari	Hioki	Never Responded
		Mark Rine	Proterial America	Invited
	Posters			
	TBA-1	TBA-1	CPES	Accepted
	TBA-2	TBA-2	NCSU	Invited
	TBA-3	TBA-3	ETH	Invited
	TBA-4	TBA-4	UPITT	Invited
	TBA-5	TBA-5	Dartmouth College	Invited

- Standing at ten (10) technology demos
 - Still waiting on responses from Iwatsu, Miles Platt, Proterial America
- Only one poster committed, require three additional posters
 - Kolar has responded that he will provide feedback this week regarding poster
 - Matt will pursue posters from Minjie Chen's program at Princeton if no other feedback this week

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PSMA Magnetics Committee Meeting Agenda – Industry Session Planning

December 18, 2023

Tuesday, February 27, 2024	
8:30 AM – 11:55 AM PST	<p>IS01 - Modelling and Simulation of Magnetics - Closing the Loop</p> <p>Industry Session Chair: George Slama – Würth Elektronik</p> <p>Industry Session Chair: Ed Herbert – PSMA</p> <p>PSMA Session</p>
8:30 AM – 8:55 AM PST	<p>IS01.1 - Magnetics Material Data for Simulation Tools</p> <p>Industry Session Presenter: Minjie Chen, PhD – Princeton University</p> <p>PSMA Session</p>
8:55 AM – 9:20 AM PST	<p>IS01.2 - Impedance Over Wide frequency Ranges for EMI Filtering</p> <p>Industry Session Presenter: Fang Luo – Stony Brook University</p> <p>PSMA Session</p>
9:20 AM – 9:45 AM PST	<p>IS01.3 - 2D vs 3D Finite Element Analysis of Magnetic Components? How to decide!</p> <p>Industry Session Presenter: Mark Christini, MSc, PE – Ansys</p> <p>PSMA Session</p>
9:45 AM – 10:10 AM PST	<p>IS01.4 - Modelling Magnetics in Circuit Simulation Tools</p> <p>Industry Session Presenter: Tom Wilson – SIMPLIS Technologies</p> <p>Industry Session Presenter: Andrija Stupar – SIMPLIS Technologies</p> <p>PSMA Session</p>
10:40 AM – 11:05 AM PST	<p>IS01.5 - Measurement and characterization of magnetic fields with near field probes</p> <p>Industry Session Presenter: Arturo Mediano – University of Zaragoza</p> <p>PSMA Session</p>
11:05 AM – 11:30 AM PST	<p>IS01.6 - Leakage Inductance and Coupling</p> <p>Industry Session Presenter: Bryce Hesterman – Utah State University</p> <p>PSMA Session</p>
11:30 AM – 11:55 AM PST	<p>IS01.7 - Thermal Modelling of Magnetic Components</p> <p>Industry Session Presenter: Juris Vencels – Trafolo</p> <p>PSMA Session</p>

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2022/2023/2024 PSMA PTR Webinar Series

Potential Contributions from the Magnetism Committee

- Tyndall – Ranajit Sai
 - Core Loss Mechanisms
 - Presentation delivered November 30 ✓
- Utah State University – Reebal Nimri
 - High Power (1 MW) Charging
 - 2024 Q1/Q2
 - Confirmed 8/16/23
- Fraunhofer – Florian Ziegler (Powder MEMS Micromagnets - Technology for innovative magnetic MEMS)
 - MEMS
 - Fall 2024
 - Confirmed 8/18/23 – follow up sent December 17
- CBMM - Bharadwaj Reddy Andapally (Technology Roadmap for Nanocrystalline Cores)
 - New magnetic materials
 - ~~Fall 2023~~/Spring 2024
 - Confirmed: 9/1/23 – follow up sent December 15

Potential Source of Info Inter Mag
Japan
Presentations
Measurement Techniques
New Materials

PSMA Magnetics Committee Meeting Agenda – Special Projects

December 18, 2023

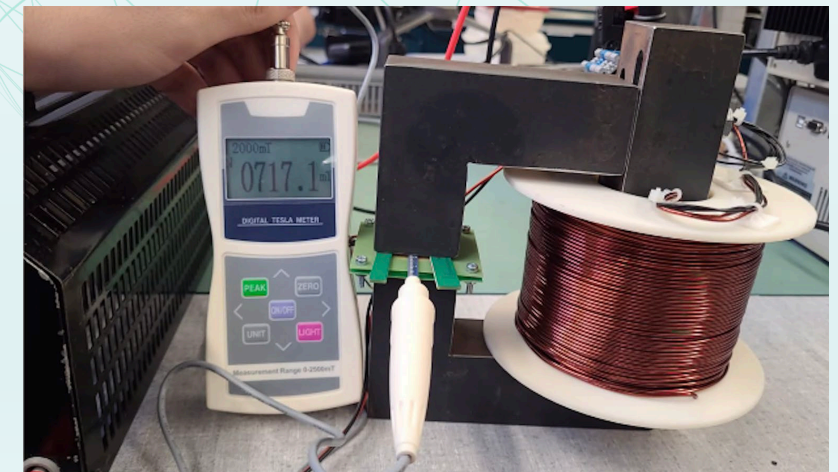
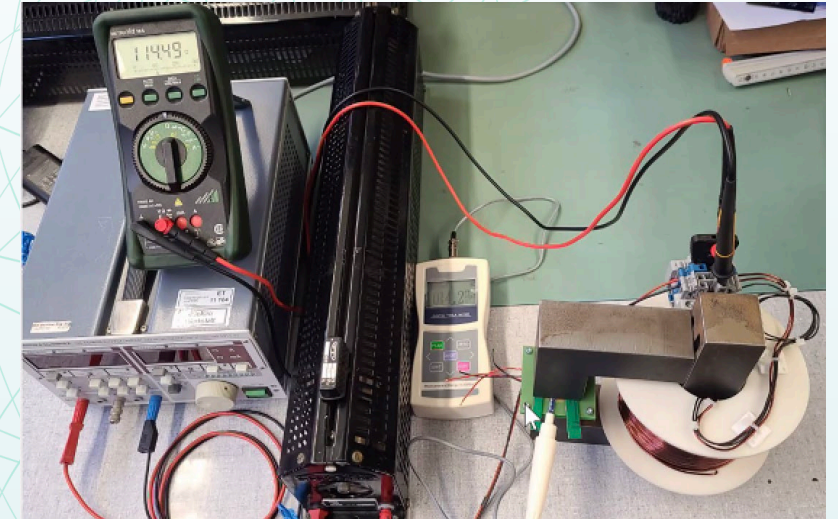
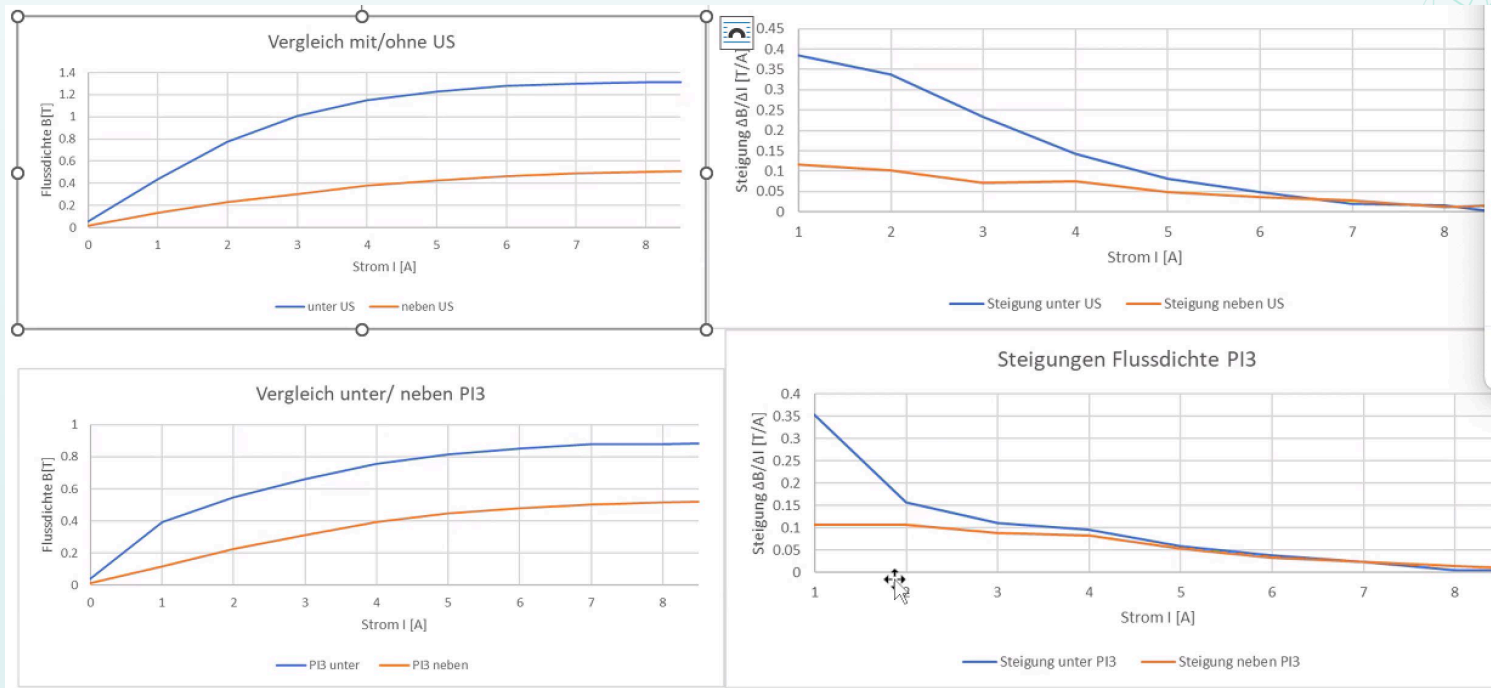
- Introductions
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- **Special Projects**
 - Electrical parameters of magnetic materials
 - Proposal approved during PSMA BOD meeting on November 17
 - ***Any progress updates since the approval of the project?***
 - Core Loss Database
 - Special project proposal to be submitted for BOD at APEC 2024
- PSMA Conference/Exhibit Strategic Schedule



PSMA Magnetics Committee Meeting Agenda – Special Projects

December 18, 2023

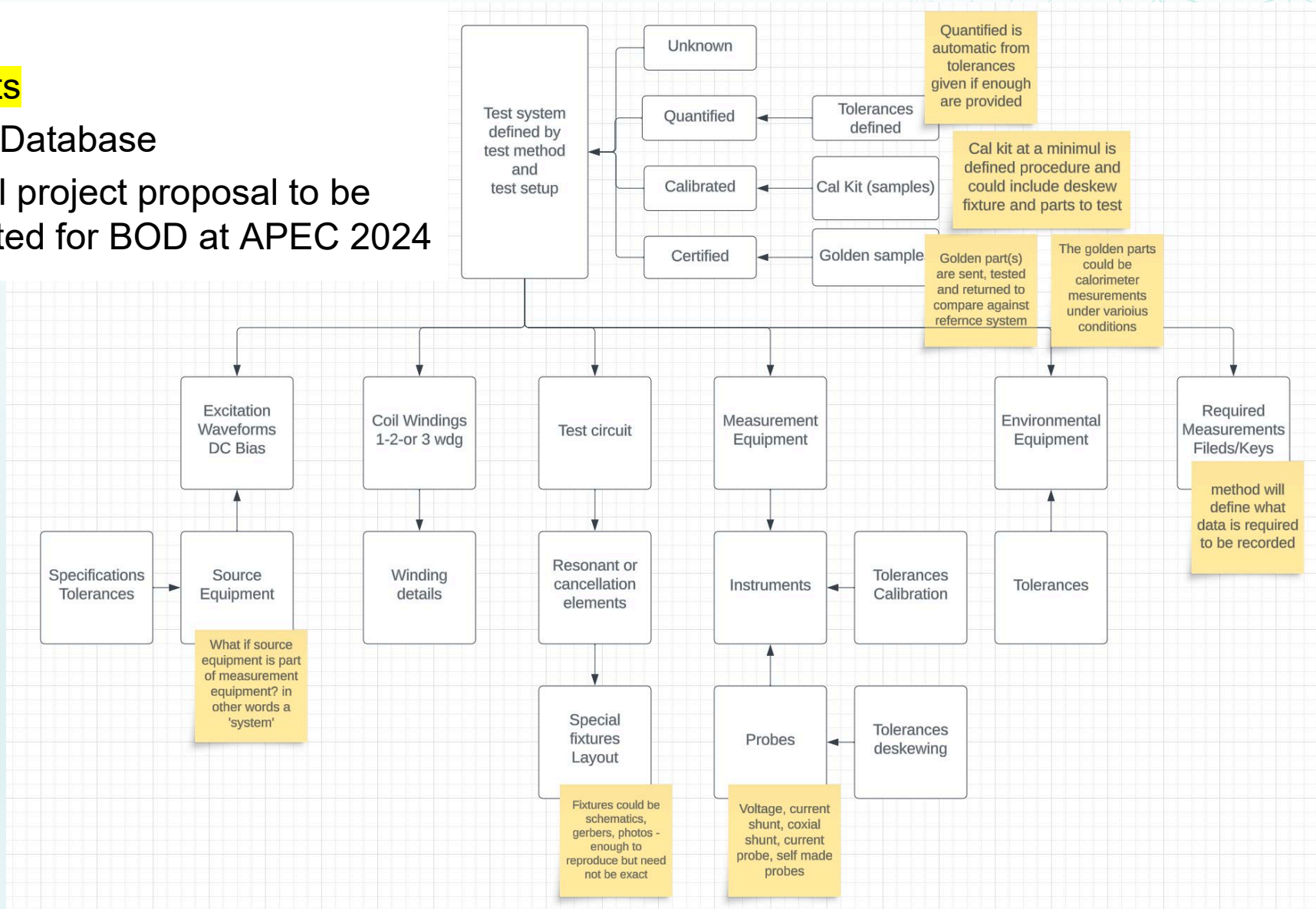
- **Special Projects**
 - Electrical parameters of magnetic materials



PSMA Magnetics Committee Meeting Agenda – Special Projects

December 18, 2023

- **Special Projects**
 - Core Loss Database
 - Special project proposal to be submitted for BOD at APEC 2024



PSMA Magnetics Committee Meeting Agenda

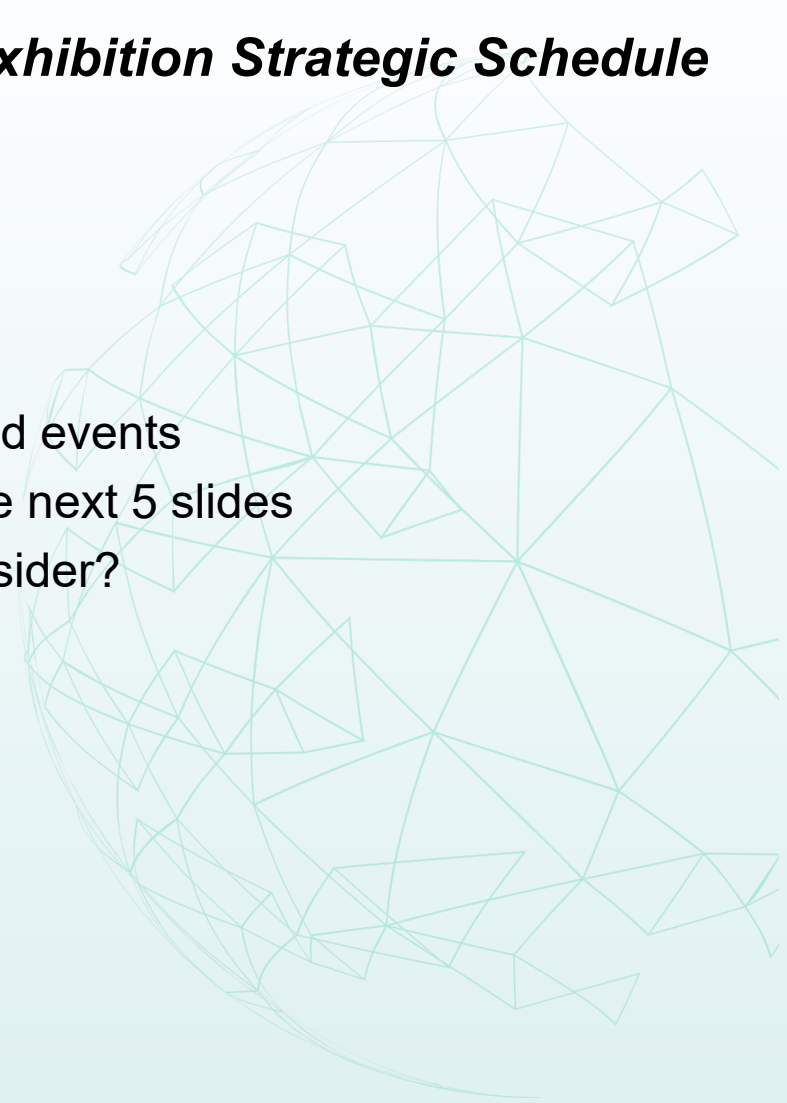
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- **PSMA Conference/Exhibit Strategic Schedule – Non-PSMA Sponsored Events**



***PSMA Magnetism Committee – PSMA Conference/Exhibition Strategic Schedule
Non-PSMA Sponsored Events
December 18, 2023***

- PSMA BOD has requested feedback regarding
 - PSMA presence at traditionally non-PSMA sponsored events
 - Is anyone familiar with any of the events listed on the next 5 slides
 - Are there other non-PSMA sponsored events to consider?



PSMA Magnetics Committee – PSMA Conference/Exhibition Strategic Schedule

Non-PSMA Sponsored Events

December 18, 2023



<u>Key Industry</u>							
Priority	Event Name		2024 Date/Location	Booth Cost	Local Support	Links	Projected Cost
	Smart Mobility	Fred		10x10			
***	ITEC		June 19-21 Rosemont, IL	\$2,650.00	Probably	https://itec-conf.com/exhibition/	Heavily Automotive - more conference Exhibition not as strong as APEC
	SAE & NASA: Energy & Mobility Conference and Expo		2023 Only				
	SAE (was Convergence) Int. Mobility, Advanced - WCX		April 16-18 Detroit, MI	TBD	Probably	https://wcx.sae.org/	Becky Courson Event Sales Specialist 724.772.4001
***	Battery & EV Expo		October 7-10 Detroit, MI	TBD	Probably	https://www.thebatteryshow.com	19k Attendees, 815 suppliers, Booth Info - 888-463-7805
	Advanced Automotive Battery Conference 2023		December 11-14 San Diego, CA			https://www.advancedautobat.com/	Sherry Johnson Senior Business Development Manager 781-972-1359 sjohnson@cambridgeenergetech.com
Maybe 2025	Alternative Clean Transportation		May 20-23 Las Vegas	Sold out			12,000+ / Clean Transportation Stakeholders 2,700+ / Leading Fleet Operators 300+ / Sponsors, Exhibitors & Industry Partners 150+ / Expert Speakers 250+ / Advanced Vehicles On Display
**	Energy & Propulsion Conference & Exhibition		November 12-14 Columbus, OH	\$3,500.00		https://www.sae.org/attend/energy-propulsion-conference/exhibit-sponsor	8x8 Table top

PSMA Magnetics Committee – PSMA Conference/Exhibition Strategic Schedule

Non-PSMA Sponsored Events

December 18, 2023



Key Industry								
Priority	Event Name		2024 Date/Location	Booth Cost	Local Support	Links	Projected Cost	Notes (Attendees, Booths, Relevance)
Renewable Energy		Renee						
**	InterSolar North America		Jan 17 - 19, San Diego, CA	requested info		https://www.intersolar.us/ https://www.intersolar.us/2023-attending-companies/		8K attendees, 500+ exhibitors: Solar and energy storage companies exhibit and attend
	InterSolar Europe		Jun 19 - 21, Munich	Min 4K EURO		https://www.intersolar.de/home https://www.intersolar.de/exhibitorlist	Min 10K EURO	115K attendees, 1380 exhibitors: Photovoltaics (PV) and solar thermal (ST) providers
	RE+ (Solar Power International)		Sep 09 - 12, Anaheim, CA	not posted yet		https://www.re-plus.com/	TBD	40K attendees, 1350 exhibitors. Energy storage, PVs, EV&infrastructure, grid modernization
	Clean Power Conference & Exhibition		May 06 - 09, Minneapolis, MN	\$51/square foot		https://cleanpower.org/expo/ https://cleanpower.org/expo/sponsors/ https://s23.a2zinc.net/clients/awea/CP2024/Public/eventmap.aspx?shmode=E	~ \$10K - \$15K	8300+ attendees 480+ exhibitors renewable energy suppliers
***	The Energy Expo		Aug 21 - 22, Miami, FL	\$3K Min		https://www.theenergyexpo.com/	~\$5K - \$8K	2000+ attendees, 150 exhibitors; solar, energy storage, EV charging, clean energy, smart tech
	Energy Storage North America		Nov 7 - 8, Houston, TX	requested info		https://events.reutersevents.com/renewable-energy/energy-storage-usa https://events.reutersevents.com/renewable-energy/energy-storage-usa/speakers		

PSMA Magnetics Committee – PSMA Conference/Exhibition Strategic Schedule

Non-PSMA Sponsored Events

December 18, 2023



Key Industry								
Priority	Event Name		2024 Date/Location	Booth Cost	Local Support	Links	Projected Cost	Notes (Attendees, Booths, Relevance)
Internet of Things		Mike/Fred						
***	Embedded World		9-11 Apr, Nuremberg, Germany	€340-420/m2, min 9m2		https://www.embedded-world.de/en		Well known in europe, 27K visitors, 950 exhibitors
	IOT Week		TBD	Postponed		https://iotweek.org/		
***	Sensor & Test		11-13 June, Nuremberg, Germany			https://www.sensor-test.de/en		340 exhibitors 2023. ETTTC 2024 - European Test and Telemetry Conference, will be held at same time.
	Smart IOT							
	Measurement Test		20-23 May, Glasgow, UK			https://i2mtc2024.ieee-ims.org/		IEEE affiliated, aro 500 attendees, 25% industry, too small?
*	IOT World Congeress		21-23 May, Barcelona, Spain			https://www.iotsworldcongress.com/		12K visitors, 400 exhibitors expected
*	Photonics West		27 Feb-1 March, SFO	(not advertised, already closed?)		https://spie.org/conferences-and-exhibitions/photonics-west/exhibitions/for-exhibitors/become-a-sponsor		20K attendess, aro 1400 exhibitors

PSMA Magnetics Committee – PSMA Conference/Exhibition Strategic Schedule

Non-PSMA Sponsored Events

December 18, 2023

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	Power	Renee/David						
	IEEE Long Island Power Symposium		Nov 7, Long Island	< \$1K	Renee	https://www.ieee.li/pes/		493 attendees, 60 exhibitors; power electronics engineers (a lot of companies send their local sales rep instead of company rep)
	ECCE		Oct 20 - 24, Phoenix	Min \$2.7K	Fred	https://www.ieee-ecce.org/2024/	~\$5K - \$8K	2K+ attendees, ~60 exhibits; power electronics - Academic Focussed
	PCIM Europe		Jun 11 - 13, Nuremberg	Min 285Euro/sqm		https://pcim.mesago.com/nuernberg/en.html	\$20K - \$30K	16K+ attendees, 500+ exhibitors; power electronics - Too Big
	Electronica Power MEMS							Academics - Many folks from Asia
	Productronica		11/18-11/21, 2025 Munich	will be released Fall '24		https://productronica.com/en/trade-fair/		Held every other year in Munich to complement electronica - factory/industry related (suppliers to semi companies, semi test equipment)
*	ECPE Conference (CIPS)		Mar 12 -14, Dusseldorf	requested info		https://www.cips.eu/en		Conference on Integrated Power Electronics Systems, ~150 attendees, 10 exhibitors (similar to WiPDA)
**	EPE2023.com		Mar 31 - Apr 4, 2025 Paris	3200 Euro for 6m²		https://epe2025.com/ https://epe2023.com/	~\$8K - \$12K	~900 attendees, focus topics '23 renewable energy, energy storage, Evs, AI, emerging power electronics
	PCIM Asia		Aug 28 - 30, Shenzhen	\$15K		https://pcimasia-expo.cn.messefrankfurt.com/en	\$30K - \$40K	15k+ attendees, 200+ exhibitors, power electronics and motion control
**	ISCAS		May - Singapore			www.2024.ieee-iscas.org		

Coil Winding Show – not recommended

TTA – not recommended

International Conference on Synthesis, Modeling, Analysis and Simulation Methods, and Applications to Circuit Design - ??

Bodo's Wideband power conference - ??

PSMA Magnetics Committee – PSMA Conference/Exhibition Strategic Schedule

Non-PSMA Sponsored Events

December 18, 2023



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Electronics		David/(some Mike)						
*	ISSCC		February 20-24, San Francisco, CA		David	https://www.isscc.org/		High profile confernece for silicon developers. See if a PSMA member will be attending and get strategic feedback
	Hannover Messe		April 22-26, Hannover, Germany	€293/m ² + fees		https://www.hannovermesse.de/en/hannover-messe-2024/	~\$5-10K	~130K visitors. ~4K exhibitors. Big in Europe. Perhaps too big for us
	CES							Too big and diverse, we would be lost
*	APEX (IPC)		April 6-11, Anaheim, CA			https://www.ipcapexexpo.org/		Does IPC have a booth? Possible guest at booth or share? Fred to ask IPC
	Electronic Circuits World Convention		same as IPC APEX above			https://www.ipcapexexpo.org/		IPC APEX EXPO hosts the Electronic Circuits World Convention 16 (ECWC16).
*	Sensors Converge		June 24-26, Santa Clara, CA	estimating \$56	David	https://www.sensorsconverge.com/sensorsconvergecom/show-overview	~\$10K	5K+ attendees. 275+ exhibitors - Ask Brian Z (he has held an energy harvesting workshop there)
***	SEMICON West		July 9-11, San Francisco, CA	\$5550 or \$170	David	https://expo.semi.org/west2023/public/Enter.aspx	~\$5-10K	18K+ attendees. 700+ exhibitors. Location alternates between SF (even years) and Phoenix (odd years) - Possibly too big?

PSMA Magnetics Committee Meeting December 18, 2023

- Attendance (8)
 - John Horzepa
 - Joe Horzepa
 - Mike Arasim
 - Doug Eaton
 - Ed Herbert
 - Lukas Mueller
 - Alfonso Martinez
 - George Slama



Thank You

