

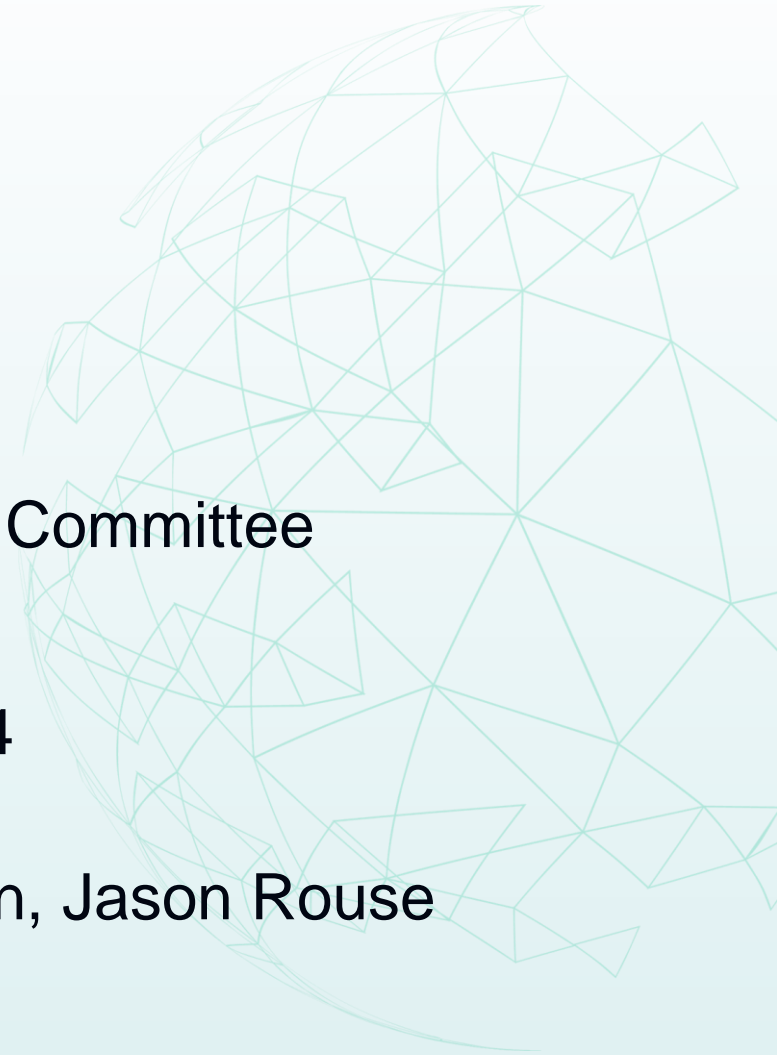


The Multinational Power Electronics Association

PSMA
Packaging/Manufacturing Committee

April 16th, 2024

John Bultitude, Brian Narveson, Jason Rouse
Co-chairman



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Meeting Agenda

- **3D-PEIM 2025 Update**
 - **3D-PEIM Organizing Committee – Update**
 - **3D-PEIM Technical Committee Update**
- **IWIPP 2025 Update**
- **Pwr Soc 2025 Update**
- **Power Technology Report on Embedded and Integrated Magnetics- Update**
- **APEC 2024 Industry Session Summary**
- **APEC 2025**
 - **Focus Topic Brainstorm for Packaging and Manufacturing**

3D-PEIM 2025



3D-PEIM is held every 2 years to bring together technologists interested in merging of power packaging, circuits, components and manufacturing to create high performance power solutions using 3D packaging technology and manufacturing techniques.

3D-PEIM

- **Dr. Faisal Khan Chief Researcher/Scientist NREL – General Chairman**
- **July 8-10, 2025 Sheraton West Denver**
- In-person Conference
- Connect with world's top Power Packaging and Manufacturing experts
- PSMA sole Financial Sponsor, IEEE EPS Technical Sponsor

3D-PEIM 2025 Technical Co-chairs Chairs

Sreekant Narumanchi, Ph.D.,

ASME Fellow

Group Manager, Advanced Power Electronics and
Electric Machines Group

Center for Integrated Mobility Sciences

National Renewable Energy Laboratory, MS 1633

Email: sreekant.narumanchi@nrel.gov

Jason Rouse Ph.D.,

Manager Strategic Growth & Ventures

Taiyo America Inc.

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- **Currently we are Recruiting for the Technical Committee to help Organize the Program**

IWIPP 2025

- IWIPP International Workshop on Integrated Power Packaging is a biennial IEEE event dedicated to advancing the state of the art in power semiconductor packaging, which is widely recognized as one of the critical factors influencing the performance and reliability of today's power electronics
- **IWIPP April 8-10, 2025**
- **Dr. Andy Lemon – General Chairman**
- In-person Conference
- University of Alabama, **Tuscaloosa, Alabama**
- Connect with world's top power, device, integrations and system researchers
- PSMA Board Approved Sponsorship at January 2024 Meeting



IWIPP is Sponsored By:



PwrSoC 2025

- The Packaging Committee supports PwrSoC
- Steering Committee approved a proposal from Prof. Jaeha Kim, Seoul National University.
- Exact Date TBD Sept/Oct 2025

Sponsors



Power Technology Report on Embedded and Integrated Magnetics

- Purpose
 - To provide and up to date reference for member companies on the present state of integrated and embedded magnetics.
 - The report will follow the format of the previous 3 Technology Reports
 - The report will deep dive into the explosion of integrated and embedded PCB magnetics
 - The report would look at
 - What's available today and the applications they are used in.
 - What is in the pipeline for the next 2-3 years.
 - Potential roadmap for the future.
 - What the main roadblocks are.
 - Supported by the Packaging and Magnetics Committee
 - Brian Narveson – Subcommittee Chair – Pkg Committee Co-Chair
 - John Bultitude – Yageo – Pkg Committee Co-chair
 - Cian O Manthuna –Tyndall – Pkg Committee
 - Matt Wilkowski – ENA Chip – Pkg and Magnetics Committee
 - George Salma – Würth – Magnetics Committee
 - Justin Henspeter – IBM – Packaging Committee
 - Dr. PM Raj – Florida International University – Packaging Committee
 - **RFP Reviewed and Complete will be sent out this week.**
 - Target Publication APEC 2025
 - Estimated Cost \$125K-\$150K

APEC 2024 Industry Session - Wednesday February 28

IS10 Advances in 3D-Packaging Technology for Power Electronics

Focus:

The PSMA Packaging Committee is organizing and proposing an Industry Session for APEC 2024 that is focused on advances in 3D-Packaging Technology for power electronics, such as embedding, with a range of different applications of AI higher power systems. More efficient power electronics will be described. The latest developments in onshoring of packaging will also be presented. This session will bring together leading academic and industrial researchers in this area.

- **APEC 2024 was well attended**
- **Presentation attendees in range 30-80**

Attendance in RED

Start	Finish	ID	Presentation Title	Presenter	Title/Affiliation
8:30 AM	8:55 AM	IS 10.1	Common Mode Noise and Minimizing Emissions through Packaging Technology	Douglas C. Hopkins	Professor in Electrical and Computer Engineering, Director of the Laboratory for Packaging Research in Electronic Energy Systems (PREES), NC State, USA
8:55 AM	9:20 AM	IS 10.2	Packaging for IoT Device Energy Harvesting Solutions – Roadmap and Considerations	Mike Hayes / Brian Zahnstecher	Head of Group ICT for Energy Efficiency, Tyndall National Institute, County Cork, Ireland / Founder & Principal, PowerRox, Niantic, CT, USA
9:20 AM	9:45 AM	IS 10.3	Efficiency improvements for power conversion units by means of PCB embedding technology for fast switching devices like SiC and GaN	Thomas Gottwald	Vice President Technology Schweizer Electronic AG, Germany
9:45 AM	10:10 AM	IS 10.4	Innovation and Collaboration in Power Module Packaging and HVM in the fast-changing world	Thomas Wang	Director of ASE Corporate R&D, ASE, Taiwan
10:10 AM	10:40AM	BREAK			
10:40 AM	11:05 AM	IS 10.5	On-Shoring Power Packaging	Charles Woychik	Enhanced Semiconductor, Inc. formerly Sr. Director Advanced Packaging Platforms at Skywater Technology Foundry, Kissimmee, Florida, USA
11:05 AM	11:30 AM	IS 10.6	Chiplets and Integration in Power Distribution Networks	Siddarth Ravichandran	Chipletz, Austin, TX, USA
11:30 AM	11:55 AM	IS 10.7	AI-Driven Reliability of Solar Power Inverters	Patrick McCluskey	Professor and Director of Undergraduate Studies Dept. of Mechanical Engineering University of Maryland, College Park, MD USA

APEC 2025 Topic Brainstorm

- **At our last meeting we discussed high level topics that would improve attendance at our APEC Session. The following were discussed but need to be refined or added to.**
 - **Speaker from DARPA to present industry challenges**
 - **System house to discuss power packaging challenges**
 - **Packaging alternatives for AI processors or processor boards**
 - **SiC & GaN Power Packaging**
 - **Cooling AI power**
 - **Packaging of power solution for AI requiring 1000A art 1V.**

Thank You

Next Committee Meeting

Tuesday May 14, 9am Central Time



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APEC 2025 Focus Topic Brainstorm

- **Comparison of Packages**
- **Efficiency at High Frequency**
- **Cost Effectiveness**
- **Electromagnetic Simulations**
- **Multiphysics Modeling, Design & Packaging**
- **Advanced Design for Assembly**
- **Digital Twin Tools**
- **Electronic Design Automation**
- **Design Validation Techniques**
- **Physical Changes, Temperature 3D –Failure Mechanisms and how to avoid them**
- **Lower Cost materials & Manufacturing processes**
- **Higher temperatures 175 to 200°C**
- **Process Time and Cost Down**
- **Thermal compounds**

APEC 2025 Focus Topic Brainstorm

- **Double sided cooling**
- **HALT testing – Auto Reliability**
- **Cost Effective Modeling**
- **System Architecture – higher end phase redundancy**
- **Multi-chip processors – multi voltages**
- **Power converters onto processors**
 - **Control each chip**
 - **Lower system cost**
 - **Improved Reliability**
 - **Magnetics buck regulation**
- **Integration high current high frequency GPUs**
- **Power Supply on chip**
- **Larger Scale Vehicle electrification**
- **Address problems at many levels chips/module/system – how does this differ?**

APEC 2025 Focus Topic Brainstorm

- **Panel level packaging of GaN**
 - **Large Area & volume assembly**
 - **Optical System Inspection**
 - **Organic Vs. Glass substrates**
- **AI models**
 - **Train the model**
 - **Reduce time-to-market**
- **Immersion Cooling**
 - **Realize higher power and currents**
 - **AI datacenters**
- **Convergence trends in Power Packaging – Academia—Industry**
- **Power passives as part of tools/database – integrated power problem the packaging community needs to own this**
- **Review ECTC agenda for presenters – TSMC, Samsung, Intel, Vicor....**

APEC 2025 Focus Topic Brainstorm

- **Integration on chip – innovations pushing the technology forward**
- **How to verify manufacturing process after each stage**
- **Implement AI for inspection**
- **Integrated Components**
 - **Figures of Merit (FOM)**
 - **Component Level or System Level**
 - **What is the true FOM for the system**
 - **What is being optimized**
- **Validated database of Multiphysics Models**
- **Multi chip Packaging (Including Power ?)**
- **Use of AI to anticipate power demand?**
- **How to get power sources to include in EDA tools?**
- **How to get power packaging innovations to market faster?**
- **What is the right power architecture for AI boards?**