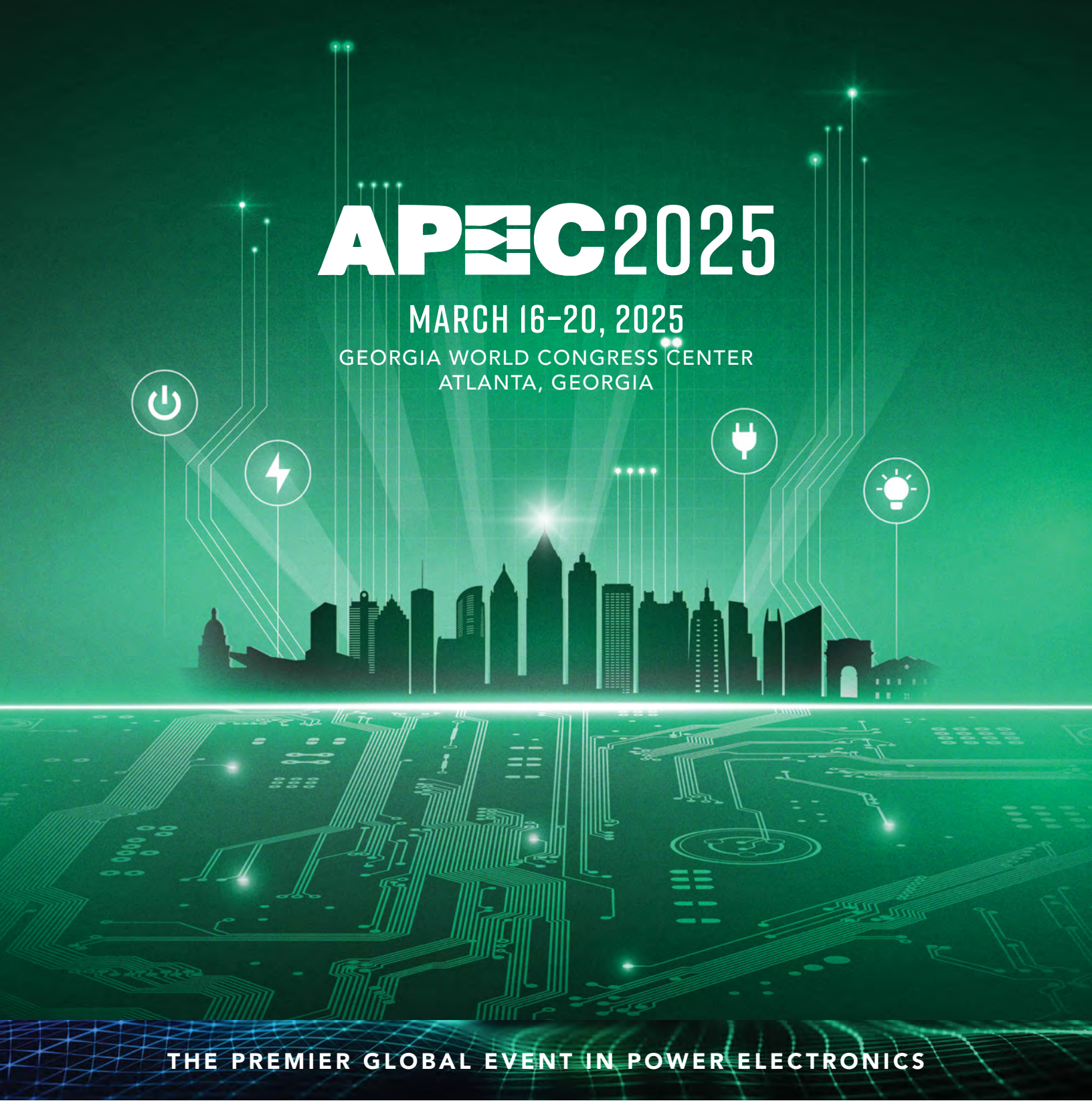


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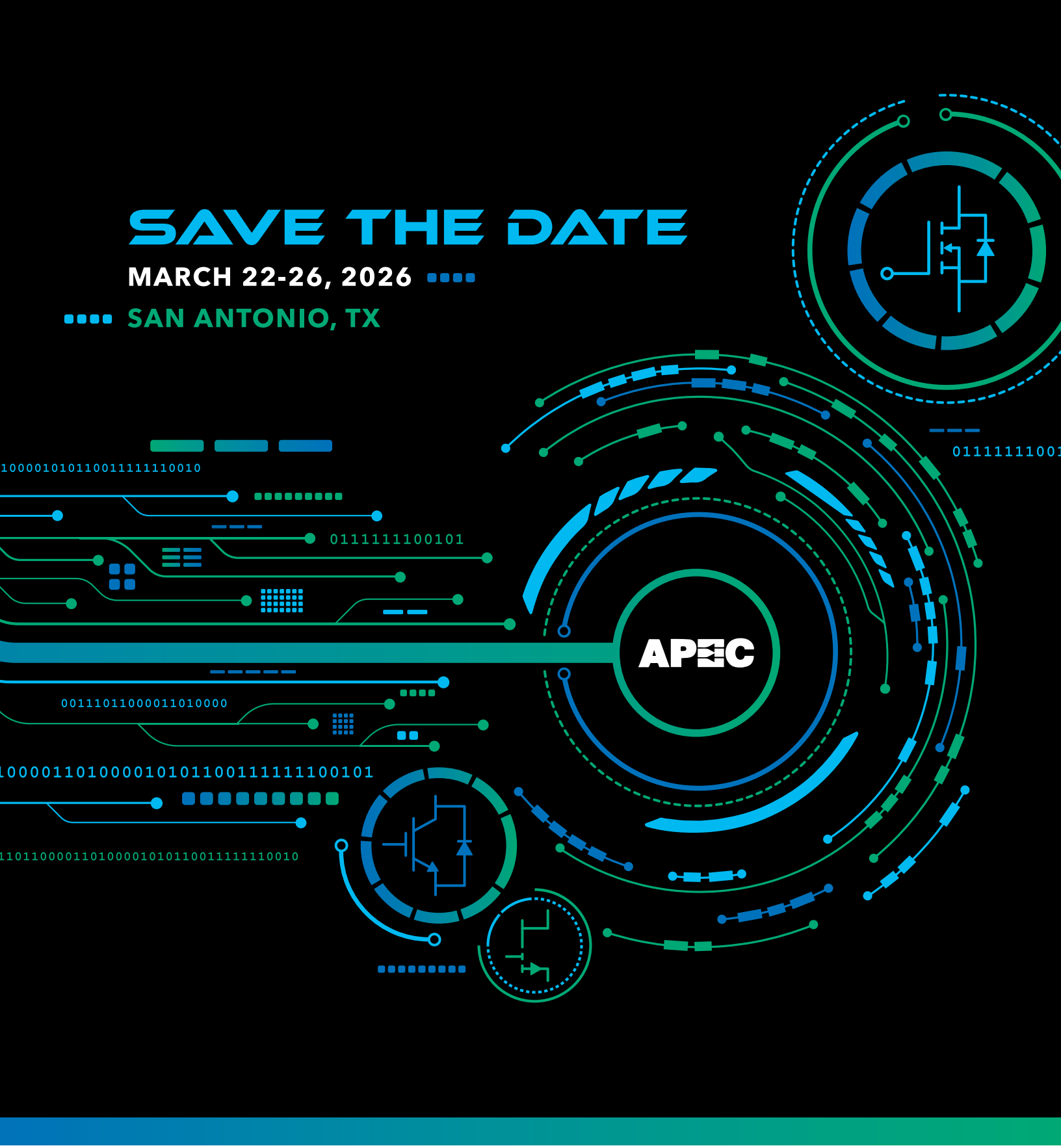
SAVE THE DATE
MARCH 22-26, 2026
SAN ANTONIO, TX
APEC
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# APEC 2026

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## STAY CONNECTED

## MOBILE APP INFORMATION

Download the APEC 2025 mobile app to access the latest event updates and details, including session and speaker information. The app is accessible through Google Play (Android) and Apple Store (iOS devices) by searching 'Eventscribe', downloading, then searching **'APEC 2025'**.

## APEC SOCIAL MEDIA INFORMATION

@APEC-CONF | #APEC2025
@APEC-CONF | #APEC2025
APEC: Applied Power Electronics Conference
APEC: Applied Power Electronics Conference

## WIFI INFORMATION

**WiFi Network: APEC2025**
**WiFi Password: Atlanta25** *(case sensitive)*

**EMAIL** apec@apec-conf.org
**WEBSITE** https://www.apec-conf.org

# PROGRAM KEY

## PLENARY SESSION

The APEC Plenary Session is a long-standing tradition of addressing topics of immediate and long-term interest to the practicing power electronics engineer. The on-trend topics featured during the plenary session are brought to you by invited distinguished professionals followed by an interactive Q&A session.

## TECHNICAL SESSIONS

The Technical Sessions are the heart of the APEC Technical Program. Papers presented in the Technical Sessions have been selected through a rigorous peer review process and cover all areas of interest to the practicing power electronics professional. All digests submitted to APEC are reviewed and scored to the same selection criteria. The digests selected for presentation at the conference may be presented in one of two different formats. All papers presented at APEC in either format of Technical Session are published in the IEEE Xplore digital library.

Papers selected for **Lecture Sessions** are presented in traditional oral presentations. Papers are selected for the Lecture Sessions for their interest to a broad range of APEC attendees.

Papers selected for the **Dialogue Sessions** will be presented in a poster format, offering authors the opportunity for in-depth discussions with conference attendees.

In 2025, a special Dialogue Preview Session will take place on Monday before the plenary session. This session will feature 21 papers recommended by Chairs from 14 APEC Technical Tracks, highlighting high-quality research and the wide range of technical topics covered at APEC.

## INDUSTRY SESSIONS

Presentations in Industry Sessions do not have a written paper. This allows authors, particularly those from industry, to publish their latest work without the burden of preparing a formal manuscript. Industry Session presentations allow for the publishing of more current information from a wide range of topics and areas of interest that appeal not just to design engineers but other power electronics professionals including systems engineers, applications engineers, technical marketing, manufacturing, component suppliers, regulatory engineers, and business-oriented professionals in sales, marketing, and procurement.

## PROFESSIONAL EDUCATION SEMINARS

APEC's Professional Education Seminars are three-hour presentations from the leading experts from industry and academia. Each year these seminars cover a wide range of topics in levels ranging from introductory to expert. A key feature of APEC's Professional Education Seminars is that one seminar registration fee offers access to all the seminars and includes the slides from all seminars. Registrants for the Professional Education Seminars are free to go to any seminar and even get up and roam from seminar to seminar at will.

## DEBATE (RAP) SESSIONS

Every year, the APEC Committee handpicks a handful of hot topics and brings together a panel of distinguished experts to engage in a dynamic exchange of views. The Debate Sessions are structured around pivotal questions designed to spark debate, ensuring a representation of diverse perspectives. Kickstarting the session with introductory remarks from our panelists, we then open the floor to you—our audience of specialists—to weigh in with your insights, challenge the experts, and steer the conversation with your questions. Get ready for an invigorating exchange of ideas that is as informative as it is animated and walk away with a deeper understanding of the latest trends and controversies in power electronics.

## EXHIBITOR PRESENTATIONS

Many APEC Exhibitors take advantage of the opportunity to make presentations in conjunction with the APEC Exposition. The best of these presentations present a current challenge to the power electronics industry, a brief review of how this challenge has been addressed in the past, and then how that company's products or services offer a solution better than previously existing solutions. The APEC Exhibitor Presentations offer a good way to get a more in-depth look at the latest product and services offered by suppliers to the power electronics industry.

# FOREWORD

APEC 2025

## Welcome!

On behalf of the APEC 2025 Organizing Committee, and in memory of Tony O'Gorman, the original General Chair of APEC 2025 who tragically passed away last year, I welcome you to the 40th annual IEEE Applied Power Electronics Conference and Exposition (APEC) at the Georgia World Congress Center in the historic city of Atlanta.

Yes, APEC is forty years young. The first APEC was in April of 1986 at the Fairmont Hotel in New Orleans, Louisiana with 34 technical papers, 6 seminars, a panel discussion on the future of power electronics, 20 exhibitors, and had 250 attendees. Forty years later, APEC has grown to over 6,000 attendees, with over 750 technical presentations, 18 professional education seminars, and a three-day exposition with over 300 exhibitors.

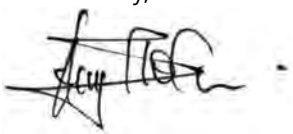
There are some program changes for APEC 2025 I would like to highlight. On Monday, before the Plenary Session, there will now be a new Dialogue Preview Session of selected technical papers from the Thursday Dialogue Sessions. This will be a good opportunity for the attendees to "taste" the 14 different flavors of APEC's power electronic tracks and interact with the authors. In honor of Tony O'Gorman, who will forever be a friend of APEC, this session for APEC 2025 will be dedicated to him. The opening Plenary Session has also been shortened to four invited speakers. On Thursday, there will no longer be any afternoon sessions.

The rest of the traditional program remains. The 18 professional education seminars starting on Sunday are a "must" for those seeking a better in-depth understanding of a variety of power electronic topics. The Plenary Session on Monday afternoon will cover important power electronics topics by distinguished invited speakers followed by the can't-miss Welcome Reception in the Exhibit Hall. On Tuesday through Thursday, over 750 presentations will be given in lecture and dialogue portions of the Technical Sessions and in the application-oriented Industry Sessions. The 3 Debate Sessions (formerly called Rap Sessions) on Tuesday evening will offer lively and entertaining interactive discussions on current hot topics. There will also be about 50 Exhibitor Presentations showcasing the latest products and technologies from our exhibiting companies. ***The challenge at APEC is not about whether you can find a topic in your area of interest. Rather, it is about choosing which session among many that covers your interests best.***

In addition to the Technical Program, we also have the FIRST Robotic demonstration and the MicroMouse competition on Monday, the Student Job Fair on Tuesday afternoon which is free of charge to attend for registered students, the Guest/Spouse program, and a special Wednesday Night Social event commemorating the 40th Anniversary of APEC. I encourage you to use the improved mobile app which does an excellent job of allowing you to plan your total APEC experience by previewing the content, customizing your calendar and receiving notifications.

APEC is a conference organized by power electronics professionals like us, for the global power electronics community. I am grateful to our exhibitors, partners, and our three sponsors (PSMA, IEEE PELS, and IEEE IAS). There are hundreds of volunteers who make this the premier event that it is. I thank the dedication, passion, knowledge, and guidance of the Organizing and Steering Committees, the Technical Program's Track Chairs, Session Chairs, our army of reviewers, and the authors and presenters. Finally, I thank the tireless support of our professional conference management company Meeting Management Services (MMS) in our second year of our partnership together.

Sincerely,



**Aung Thet Tu**
General Chair
2025 IEEE Applied Power Electronics Conference and Exposition

# APEC 2025 CONFERENCE COMMITTEE & MANAGEMENT

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Representing IAS

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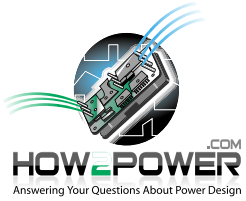










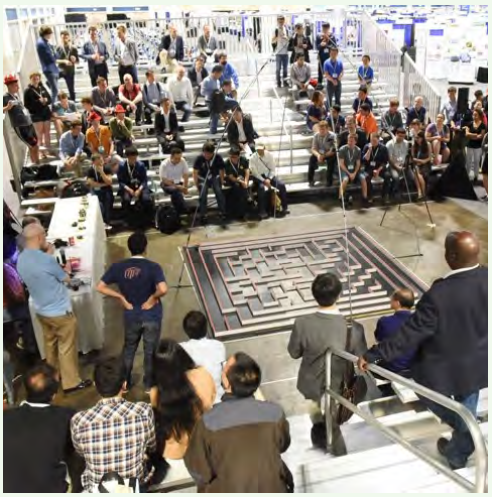


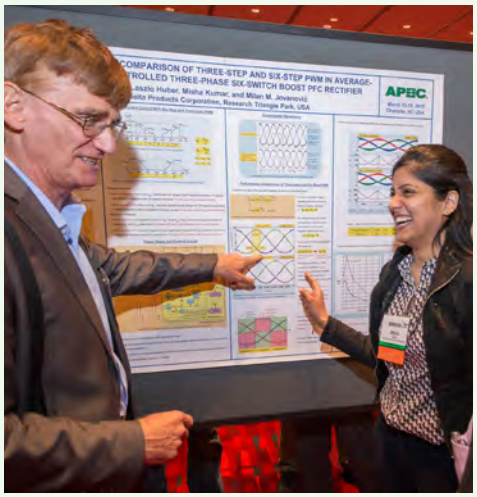
# APEC ANNIVERSARY


In 1985, a group of eight volunteers came together to formulate a proposal to the Power Electronics Council, the precursor to the IEEE Power Electronics Society (PELS), to establish what became the Applied Power Electronics Conference (APEC). Now, 40 years later, APEC thrives as the premier global event in power electronics, and we're celebrating all week long at APEC 2025. Keep an eye out for celebrations of APEC throughout the conference:

- Special 40th anniversary SWAG in the Expo Hall
- Commemorative wall display of APEC over the last 40 years
- Exclusive raffle prizes at the Wednesday Night Social

*and more!*





# CONFERENCE-AT-A-GLANCE

| | Saturday, March 15 | Sunday, March 16 | Monday, March 17 | Tuesday, March 18 | Wednesday, March 19 | Thursday, March 20 |
|---|---|---|---|---|---|---|
| Plenary Session | | | ✓ | | | |
| Debate Sessions | | | | ✓ | | |
| Technical Lecture Sessions | | | | ✓ | ✓ | ✓ |
| Technical Dialogue Sessions | | | | | | ✓ |
| Industry Sessions | | | | ✓ | ✓ | ✓ |
| Professional Education Seminars | | ✓ | ✓ | | | |
| Exhibitor Presentations | | | | ✓ | ✓ | |
| Expo Hall Open | | | ✓ | ✓ | ✓ | |
| Sponsor Meetings | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

# SCHEDULE-AT-A-GLANCE

*Note: all events are held in the Georgia World Congress Center (GWCC) Building A unless otherwise mentioned

## SATURDAY, MARCH 15

| | | |
|---|---|---|
| 7:00 AM – 5:00 PM | **PSMA/PELS Magnetics Workshop** | Level Four, Room A411/A412 |
| 4:00 PM – 7:00 PM | **Registration Open** | Level Four, Registration Hall A |

## SUNDAY, MARCH 16

| | | |
|---|---|---|
| 8:00 AM – 5:00 PM | **Registration Open** | Level Four, Registration Hall A |
| 8:00 AM – 9:00 PM | **Professional Education Seminar Speaker Breakfast** | Level Four, A406/A407 |
| 8:00 AM – 4:30 PM | **Speaker Ready Room Open** | Level Four, A406/A407 |
| 9:30 AM – 1:00 PM | **Professional Education Seminars, S01 – S06** | Various – *See pages 31-33 for specific locations* |
| 1:00 PM – 2:30 PM | **Lunch on Your Own** | |
| 2:30 PM – 6:00 PM | **Professional Education Seminars, S07 – S12** | Various – *See pages 33-35 for specific locations* |

## MONDAY, MARCH 17

| | | |
|---|---|---|
| 7:00 AM – 7:00 PM | **Registration Open** | Level Four, Registration Hall A |
| 7:00 AM – 8:00 AM | **Professional Education Seminar Speaker Breakfast** | Level Four, A406/A407 |
| 7:00 AM – 1:30 PM | **Speaker Ready Room Open** | Level Four, A406/A407 |
| 8:00 AM – 3:00 PM | **Spouse and Guest Hospitality Room Open** | Omni Hotel, Level M2, International A |
| 8:30 AM – 12:00 PM | **Professional Education Seminars, S13 – S18** | Various – *See pages 36-37 for specific locations* |
| 9:00 AM – 10:30 AM | **Spouse and Guest Welcoming Breakfast/ Meet and Greet** | Omni Hotel, Level M2, International A |
| 12:00 PM – 1:30 PM | **Lunch on Your Own** | |
| 12:00 PM – 1:30 PM | **APEC 2025 Dialogue Preview Session *(Dedicated to Tony O'Gorman)*** | Level Four, Sidney J. Marcus Auditorium Foyer |
| 1:30 PM – 4:30 PM | **Plenary Session** | Level Four, Sidney J. Marcus Auditorium |
| 4:30 PM – 7:30 PM | **Welcome Reception, Expo Hall Open** | Level One, Hall A1/A2 |
| 4:30 PM – 7:30 PM | **FIRST Robotics Demonstration** | Level One, Hall A3 |
| 7:00 PM – 9:00 PM | **MicroMouse Competition** | Level One, Hall A3 |
| 7:45 PM – 9:45 PM | **Young Professionals Networking Reception** | Offsite: Hudson Grille |

# SCHEDULE-AT-A-GLANCE

## TUESDAY, MARCH 18

| | | |
|---|---|---|
| 8:00 AM – 3:00 PM | **Registration Open** | Level Four, Registration Hall A |
| 7:00 AM – 8:00 AM | **Technical and Industry Sessions Speaker Breakfast** ***(Speakers and Session Chairs Only)*** | Omni Hotel, Level M2, International EF |
| 7:00 AM – 4:00 PM | **Speaker Ready Room Open** | Level Four, A406/A407 |
| 8:00 AM – 3:00 PM | **Spouse and Guest Hospitality Room Open** | Omni Hotel, Level M2, International A |
| 8:30 AM – 11:55 AM | **Industry Sessions, IS01 – IS06** | Various – *See pages 50-52 for specific locations* |
| 8:30 AM – 12:00 PM | **Technical Sessions, T01 – T08** | Various – *See pages 43-49 for specific locations* |
| 9:00 AM – 4:30 PM | **Expo Hall Open** | Level One, Hall A1/A2 |
| 10:00 AM – 4:00 PM | **Spouse and Guest Trolly Tour & Coca Cola Museum visit** ***(Pre-Registration Required)*** | Meet at Spouse & Guest Hospitality Room – *Walk over at 9:30 AM* |
| 10:10 AM – 10:40 AM | **Break** | |
| 12:00 PM – 1:30 PM | **Lunch in the Expo Hall** | Level One, Hall A1/A2 |
| 1:30 PM – 4:15 PM | **Exhibitor Presentations** | Various – *See pages 53-60 for specific locations* |
| 1:30 PM – 5:00 PM | **APEC Student Job Fair** | Level One, Hall A3 |
| 2:45 PM – 3:00 PM | **Break** | |
| 4:15 PM | **Expo Hall Raffle Drawing in the APEC HUB** | Level One, Hall A1/A2 |
| 4:30 PM – 6:00 PM | **Debate (RAP) Sessions** | Various – *See pages 61-62 for specific locations* |
| 6:30 PM – 8:30 PM | **Mentorship RoundTables** ***(Pre-Registration Required)*** | Omni Hotel, Level M4, Grand E |

## WEDNESDAY, MARCH 19

| | | |
|---|---|---|
| 8:00 AM – 2:00 PM | **Registration Open** | Level Four, Registration Hall A |
| 7:00 AM – 8:00 AM | **Technical and Industry Sessions Speaker Breakfast** ***(Speakers and Session Chairs Only)*** | Omni Hotel, Level M2, International EF |
| 7:00 AM – 4:00 PM | **Speaker Ready Room Open** | Level Four, A406/A407 |
| 8:00 AM – 9:00 AM | **Women In Engineering (WIE) Breakfast** ***(Pre-Registration Required)*** | Omni Hotel, Level M4, Grand E |

## WEDNESDAY, MARCH 19 *(continued)*

| | | |
|---|---|---|
| 8:00 AM – 3:00 PM | **Spouse and Guest Hospitality Room Open** | Omni Hotel, Level M2, International A |
| 8:30 AM – 11:55 AM | **Industry Sessions, IS07 – IS12** | Various – *See pages 76-78 for specific locations* |
| 8:30 AM – 12:00 PM | **Technical Sessions, T09 – T16** | Various – *See pages 63-69 for specific locations* |
| 9:00 AM – 2:30 PM | **Expo Hall Open** | Level One, Hall A1/A2 |
| 10:10 AM – 10:40 AM | **Break** | |
| 11:45 AM – 1:30 PM | **Lunch in the Expo Hall** | Level One, Hall A1/A2 |
| 12:00 PM – 1:15 PM | **Exhibitor Presentations** | Various – *See pages 82-85 for specific locations* |
| 1:15 PM | **Expo Hall Raffle Drawing in the APEC HUB** | Level One, Hall A1/A2 |
| 1:30 PM – 4:55 PM | **Industry Sessions, IS13 – IS18** | Various – *See pages 79-81 for specific locations* |
| 1:30 PM – 5:00 PM | **Technical Sessions, T17 – T24** | Various – *See pages 69-75 for specific locations* |
| 3:10 PM – 3:30 PM | **Break** | |
| 6:30 PM – 10:00 PM | **Wednesday Night Social Event** ***(Ticket Required)*** | Georgia Aquarium, Oceans Ballroom |

## THURSDAY, MARCH 20

| | | |
|---|---|---|
| 8:00 AM – 12:00 PM | **Registration Open** | Level Four, Registration Hall |
| 7:00 AM – 8:00 AM | **Dialogue, Technical and Industry Sessions Speaker Breakfast** ***(Speakers and Session Chairs Only)*** | Omni Hotel, Level M2, International EF |
| 7:00 AM – 12:00 PM | **Speaker Ready Room Open** | Level Four, A406/A407 |
| 8:00 AM – 1:30 PM | **Spouse and Guest Hospitality Room Open** | Omni Hotel, Level M2, International A |
| 8:00 AM – 11:50 AM | **Technical Sessions, T25 – T40** | Various – *See pages 86-93 for specific locations* |
| 8:00 AM – 11:50 AM | **Industry Sessions, IS19 – IS28** | Various – *See pages 94-97 for specific locations* |
| 9:40 AM – 10:10 AM | **Break** | |
| 11:45 AM – 1:30 PM | **Dialogue Sessions & Lunch** | Level One, Hall A3 |

# IN MEMORIAM

## Tony O'Gorman
(1962-2024)


In May 2024, Tony passed away after an extended fight with cancer and the APEC community lost a good friend and our APEC 2025 Conference Chair.

After graduating from University College Cork in Ireland with a Bachelor of Engineering, Tony moved to Minnesota, earning a Master of Science in Electrical Engineering with a focus on Power Electronics. He later returned to "the U" and earned his Ph.D. combining his passions of power electronics and digital control of electric machines. While in Minnesota, he met and married his wife, Diane. Both of their children pursued engineering careers and their daughter, Bridget, also serves on the APEC Organizing Committee.

Tony's career in Power Electronics took him from Onan Corporation (later acquired by Cummins) to Motorola in Illinois, before becoming a Distinguished Member of Technical Staff at Continental Automotive Systems. Most recently, Tony was Owner and Principal at PESC Inc.

He complemented his professional life with a love for running, cycling, brewing his own beer, humor and his native Cork.

Tony had a long involvement with APEC. In addition to publishing at the conference, he served as Industry Session Co-Chair from 2013 to 2022. During his time as Industry Session Co-Chair, this component of the conference grew considerably and now attracts audiences as large as the original Technical Sessions. He then joined the Conference Chair track representing IEEE IAS as Assistant Program Chair in 2023, Program Chair in 2024 and briefly took the reins as 2025 General Chair before his health took a rapid turn for the worse.

Tony's sense of humor will be a lasting memory. He told great stories and many jokes, all reinforced by a keen sense of observation. While the "occasional" one bombed, that was fine. He had many more in reserve.

Organizing a conference as large as APEC involves many – often long – meetings. Tony's participation made many of these meetings more entertaining than your average engineering meeting. That same sense of humor could occasionally sidetrack agendas. Prior to one of his last APEC Committee meetings, the steering committee chair published an agenda with the note "we should be able to wrap this up in an hour if Tony behaves."

One of Tony's plans for 2025 was to elevate the status of the Dialogue Sessions and we will honor his legacy by holding a special Dialogue Preview Session on Monday, March 17 which coincidentally is Saint Patrick's Day. We miss Tony very much and we will honor his memory and legacy by making APEC 2025 a huge success.

***Ar dheis Dé go raibh a anam.***

# GENERAL INFORMATION

## COAT CHECK SERVICE

Provided at no cost for the attendees, coat-check services will be available adjacent to the Registration area from Sunday to Thursday. The attendees will be able to check coats, bags, or posters (for Dialogue Sessions).

### Hours

Sunday, March 16 | 9:00 AM – 6:30 PM
Monday, March 17 | 8:00 AM – 8:00 PM
Tuesday, March 18 | 8:00 AM – 6:00 PM
Wednesday, March 19 | 8:00 AM – 6:00 PM
Thursday, March 20 | 8:00 AM – 2:00 PM

## LUNCH INFORMATION

Lunch will be available at the following dates, times and locations:

Tuesday, March 18 | 12:00 PM – 1:30 PM
EXPO HALL, LEVEL ONE, HALL A1/A2

Wednesday, March 19 | 11:45 AM – 1:30 PM
EXPO HALL, LEVEL ONE, HALL A1/A2

Thursday, March 20 | 11:30 AM – 1:30 PM
DIALOGUE SESSION, LEVEL ONE, HALL A3

## ACCESSIBILITY

The Georgia World Congress Center and APEC strive to provide an accessible event for all. The convention center is designed with wheelchair ramps, automatic doors, passenger elevators and handicap accessible restroom facilities. All passenger elevators are clearly marked. Please visit the information desk for additional accessibility questions and information.

## CONFERENCE REGISTRATION

LEVEL FOUR, REGISTRATION HALL A, BUILDING A

All attendees must be registered for the conference. For registration or general conference questions, please visit APEC Registration.

| | Technical Sessions | Industry Sessions | Professional Education Seminars | Plenary Sessions | Expo Hall | Wednesday Night Social | Debate Sessions | Exhibitor Presentations |
|---|---|---|---|---|---|---|---|---|
| **Full Conference** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| **Technical or Industry Sessions Only** | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| **Professional Education Seminars Only** | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| **General Attendee** | | | | ✓ | ✓ | | ✓ | ✓ |
| **Spouse/Guest Pass** | | | | ✓ | ✓ | | ✓ | ✓ |
| **Press Pass** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

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Scan the QR code to see what's around!

### REGISTRATION HOURS

Saturday, March 15 | 4:00 PM – 7:00 PM
Sunday, March 16 | 8:00 AM – 5:00 PM
Monday, March 17 | 7:00 AM – 7:00 PM
Tuesday, March 18 | 8:00 AM – 3:00 PM
Wednesday, March 19 | 8:00 AM – 2:00 PM
Thursday, March 20 | 8:00 AM – 12:00 PM

# EXHIBIT HALL INFORMATION

EXPO HALL, LEVEL ONE, HALL A1/A2

## Expo Hall Hours

Monday, March 17 | 4:30 PM – 7:30 PM

Tuesday, March 18 | 9:00 AM – 4:30 PM

Wednesday, March 19 | 9:00 AM – 2:30 PM

## Expo Hall Raffle

Attendees are invited to participate in our APEC Raffle, located inside the APEC HUB. Multiple prizes will be raffled off on Tuesday, March 18 at 4:15 PM and on Wednesday, March 19 at 1:15 PM. Raffle tickets are attached to your registration badge and can be dropped off at the APEC HUB. ***Attendees must be present to win.***

## Expo Hall Admission Requirements

Entry is granted to registered and badged attendees. With a required waiver, minors will be able to visit the exhibit floor.

## Expo Hall SWAG

All attendees with a Full Conference registration are invited to select a SWAG item of their choice from inside the APEC HUB. Please visit the SWAG stand inside the APEC HUB and cash in the voucher attached to your registration badge. ***Attendees must be present in the Expo Hall to collect their SWAG item.***

# IMPORTANT RULES, NOTICES, AND CONFERENCE POLICIES

## Badges Required for Admission

Badges are required for admission to all APEC events and activities. Badges are obtained by registering with the conference. APEC reserves the right to deny admission to any APEC event or activity to any person not showing an appropriate badge for that activity or event.

## Recording and Photography

***Attendee Recording/Photography:*** Video and audio recording may be conducted in the Expo Hall area, and public areas of APEC, but nowhere else except with written permission from the Conference Chair. Still photography at APEC is permitted, but with limitations. The general principle is that people may be photographed but photographing presentations and other content is prohibited by all attendees except for the professional APEC photographer. For more details, please see Show Management.

***APEC Photography for Marketing Purposes:*** By registering for APEC 2025, you agree that any photos taken of you while at the conference by our professional photographer may be used by APEC in the future.

## Showcasing/Suitcasing Policy

Please note that while all meeting attendees are invited to the showcase, any attendee who is observed to be soliciting business in the aisles or other public spaces, in another company's booth, or in violation of any portion of the Exhibition Policy, will be asked to leave immediately. Additional penalties may be applied. Please report any violations you may observe to Show Management. Show Management recognizes that suitcasing may also take the form of commercial activity conducted from a hotel guest room or hospitality suite; a restaurant, club, or any other public place of assembly. For the purposes of this policy, suitcasing violations may occur at venues other than the Expo Hall floor and at other events. Show Management must be informed of any hospitality suites, and expressed consent must be received prior to the event.

## Recruitment Policy

IEEE Policy #10 .1 .25 requires a publicly stated policy concerning recruiting at IEEE sponsored conferences. Consequently, recruiters and recruiting advertisements will not be permitted in the APEC hotel space,

meeting facilities or Exposition Hall. Also, ads or postings seeking positions are not permitted.

APEC reserves the right to remove without notice any materials in violation of this policy.

APEC does allow for the facilitation of a student job fair that is organized by the conference. Only students registered for the conference may participate. Only companies that have registered for the student job fair and paid any required participation fees may recruit at the job fair.

## Distribution of Commercial Material at APEC

***Rules for Non-Exhibitors:*** Distribution of commercial material in the APEC 2025 venue space(s) (including directly to the hotel rooms of APEC participants), meeting space and Expo Hall by people or organizations not participating in the Exposition is prohibited. APEC reserves the right to remove without notice any materials not in compliance with this policy.

***Rules for Exhibitors:*** Exhibitors may only distribute commercial materials in their booth, at Exhibitor Seminars they are conducting and at press conferences they are holding. APEC reserves the right to remove without notice any materials not in compliance with this policy.

## Privacy Policy

***Information Provided During Registration:*** Contact information, which includes your name, affiliation, and mailing address, may be provided upon request to any partners and/or supporting publication participating in the APEC 2025 Exposition. In addition, APEC may use the information you provide to contact you with information about APEC 2025 or any future APEC events. Upon your selection to opt-in during registration, APEC will send you membership information on behalf of our sponsors (PSMA, IEEE IAS, IEEE PELS). Your information will not be shared directly with them. No other use will be made of the information you provide. Your information will not be sold, distributed, leased or provided to any other person or organization except as described above.

***Information Provided Other than Through Registration:*** People who provide their names to APEC through the APEC website, direct contact, digest submission, volunteering to review, or in any way other than registering for the conference, will not have their names and contact information distributed to anyone or any organization, including APEC's sponsors. APEC will use the contact information only for transmitting information related to APEC. Conference registrants' names and contact information, including name, affiliation, and mailing address will be provided to exhibitors and media partners. Emails will only be provided to exhibitors through the Lead Retrieval systems used on the Expo Hall floor. Registering for APEC gives permission for your name and contact information to be provided to exhibitors and media partners and for exhibitors and media partners to contact you during or after the conference. APEC will not otherwise distribute names and contact information received through the registration process.

# MATERIALS PURCHASE

## Purchasing through the IEEE

Post conference APEC Proceedings may be purchased through the IEEE.

## IEEE Single Copy Sales

> 445 Hoes Lane, Piscataway, New Jersey 08854, USA

> PHONE: (800) 678-4333 (USA & Canada) or (732) 981-0060

> WEBSITE: https://ieeexplore.ieee.org/xpl/conhome/1000047/all-proceedings

## SPEAKER READY ROOM

LEVEL FOUR, A406/A407

The Speaker Ready Room, located in Room A406/A407, is to be utilized by all speakers to prepare for their presentations. PLEASE NOTE: If you changed your presentation after the deadline, you must bring your newest presentation to the Speaker Ready Room as soon as you arrive to switch it out. You can also do this directly after the instructional PowerPoint is presented during the Speaker Breakfast.

> Sunday, March 16 | 8:00 AM – 3:00 PM

> Monday, March 17 | 7:00 AM – 1:30 PM

> Tuesday, March 18 | 7:00 AM – 4:00 PM

> Wednesday, March 19 | 7:00 AM – 4:00 PM

> Thursday, March 20 | 7:00 AM – 12:00 PM

### PSMA Passport to Prizes is on the Mobile App!

### BON VOYAGE!

Visit participating PSMA member company booths, scan the QR code, answer the question and see your name rise to the top! You will find QR Codes to scan dotted around the Expo Hall. Participants who visit PSMA booths by Wednesday, March 19 at 12:00 PM will automatically be entered into the prize drawing.

Winners will be randomly selected from all eligible participants and announced through the mobile app Wednesday, March 19 at 12:45 PM. Prizes must be claimed by 1:15 PM or a runner up will be selected. Prize pick up is at the PSMA Booth in the APEC Hub.

All attendees (except exhibitors) can play to win one of 4 great prizes.

More information on the prizes and the Passport game is available at the PSMA Booth and in the APEC app.

## SPEAKER BREAKFAST

Sunday/Monday
LEVEL FOUR, A406/A4077

Tuesday/Wednesday/Thursday
OMNI HOTEL, LEVEL M4, INTERNATIONAL EF

All Professional Education Seminar, Technical, and Industry Session Speakers must attend the Speaker Breakfast, on the morning of their presentation to receive instructions from their Session Chairs.

Remember, if you changed your presentation, you must visit the Speaker Ready Room immediately after the Speaker Breakfast.

Please note: Exhibitor Presentation speakers are not required to attend any speaker breakfasts.

### Professional Education Seminar Speaker Breakfast

***Breakfast Location: Level Four, Room A406/A407***

> Sunday, March 16 | 8:00 AM

> Monday, March 17 | 7:00 AM

### Technical Session Lecture and Industry Session Speaker Breakfast

***Breakfast Location: Omni Hotel, Level M2, International A***

> Tuesday, March 18 | 7:00 AM

> Wednesday, March 19 | 7:00 AM

> Thursday, March 20 | 7:00 AM

### Technical Session Dialogue Speaker Breakfast

***Breakfast Location: Omni Hotel, Level M2, International A***

> Thursday, March 20 | 7:00 AM

# SPOUSE AND GUEST HOSPITALITY PROGRAMMING

The APEC 2025 Spouse and Guest Co-Chairs are excited for APEC to return to Atlanta, Georgia. The week will start off with a Monday morning welcome breakfast and meet and greet. Reconnect with old friends or make new ones as you make your plans for the week. Continue with a full day of excitement on Tuesday with a trolley tour of Atlanta, followed by a visit to the World of Coca Cola!

## Spouse and Guest Hospitality Room

THE OMNI HOTEL, LEVEL M2, INTERNATIONAL A

The spouses and guests of registered APEC attendees are invited to the APEC Spouse and Guest Hospitality room to meet up with old and new friends, make plans, catch up with each other, or just hang out and relax. A light breakfast with coffee and tea will be served each day when the room opens.

**Open Times** *(subject to change)*

> Monday, March 17 | 8:00 AM – 3:00 PM

> Tuesday, March 18 | 8:00 AM – 3:00 PM

> Wednesday, March 19 | 8:00 AM – 3:00 PM

> Thursday, March 20 | 8:00 AM – 1:30 PM

## Spouse Breakfast

THE OMNI HOTEL, LEVEL M2, INTERNATIONAL A

**Hours**

> Monday, March 17 | 9:00 AM – 10:30 AM
***(featuring guest speakers from the Atlanta Convention Visitors Bureau)***

> Tuesday, March 18 | 8:00 AM – 9:30 AM

> Wednesday, March 19 | 9:00 AM – 10:30 AM

> Thursday, March 20 | 8:00 AM – 9:30 AM

## Monday Morning Meet and Greet

Monday, March 17 | 9:00 AM – 10:30 AM
THE OMNI HOTEL, LEVEL M2, INTERNATIONAL A

The APEC Spouse and Guest Co-Chairs encourage you to join us to kick off the week's spouse and guest activities. A speaker from the Atlanta convention and visitor's bureau will give an introduction to Atlanta and share nearby attractions and activities. This is a great opportunity to get oriented to the city of Atlanta, plan your week, and get your questions about the area answered.


## Tuesday Tours

Tuesday, March 18 | 10:00 AM – 4:00 PM

**Meeting time: 9:30 AM inside the Spouse and Guest Hospitality Room**

The Spouse and Guest Co-Chairs have put together an exciting day of events on Tuesday, March 18. Start the day with a fun and relaxing sightseeing tour of Atlanta on a vintage trolley! Visit some of the iconic sites of the city, before continuing the day with an exciting afternoon at the Coca Cola Museum. ***Please note that both excursions are within walking distance of the Omni Hotel, so transportation is not anticipated to be provided. Pre-registration required.***

## STUDENT MENTORSHIP ROOM

***Courtesy of PSMA***

LEVEL FOUR, ROOM A408

The Student Mentorship Room is a gathering place for student mentees and their mentors to meet each other and fellow mentees/mentors in person. Open to the current APEC 2025 class and previous APEC classes. Please sign in to be part of the inaugural event. Learn about various generic career options as each company will have their own specific requirements.

Student mentees were invited to join the student mentorship program prior to APEC depending on the number of mentors available. For questions or to participate as a mentor in future APECs, please email **mentors@psma.com**.

This mentorship program supports the IEEE PELS Mentorship Roundtables, but it is a separate program designed for APEC student mentees.

### Hours

> Monday, March 17 | 8:00 AM – 5:00 PM

> Tuesday, March 18 | 8:00 AM – 6:00 PM

> Wednesday, March 19 | 8:00 AM – 6:00 PM

> Thursday, March 20 | 8:00 AM – 1:30 PM

# SPECIAL EVENTS

## MONDAY, MARCH 17

### DIALOGUE PREVIEW SESSION


Monday, March 17 | 12:00 PM – 1:30 PM
LEVEL FOUR, SIDNEY J. MARCUS AUDITORIUM FOYER

***Get Ready for Thursday's Big Conversations – It All Starts Here!***

Join us for a special poster session that's all about building excitement for the incredible dialogue sessions happening on Thursday! We've handpicked a selection of posters that showcase a diverse mix of topics and industry interests, all designed to spark lively discussions and fresh ideas. This is your chance to dive into thought-provoking conversations that will leave you buzzing with anticipation for the main event. Don't miss out on this vibrant preview, where dynamic exchanges set the stage for an unforgettable day of ideas and innovation!

### FIRST® ROBOTICS EVENT

Monday, March 17 | 4:30 PM – 7:30 PM
LEVEL ONE, HALL A3

FIRST® (For Inspiration and Recognition of Science and Technology) is a global not-for-profit organization that prepares young people for the future through a suite of inclusive, team-based robotics programs for ages 4-18 (PreK-12) that can be facilitated in school or in structured afterschool programs. Boosted by a global support system, teams operate under a signature set of FIRST® Core Values to conduct research, fundraise, design, build, and showcase their achievements during annual challenges. With over $80 million in scholarships available to our students, the mission of FIRST® is to inspire young people to be science and technology leaders and innovators, by engaging them in exciting mentor-based programs that build science, engineering, and technology skills, that inspire innovation, and that foster well-rounded life capabilities including self-confidence, communication, and leadership.

### MICROMOUSE CONTEST

Monday, March 17 | 7:00 PM – 9:00 PM
LEVEL ONE, HALL A3

Enter the annual APEC MicroMouse contest or join us as a spectator for this exciting event. Participants design, build, and program robotic mice and compete to see who can navigate their way through the maze in the shortest time. The rules for the contest use a scoring system with a penalty for the time taken to map and run the maze, and a bonus for not touching the mouse. They are similar to those used at the IEEE World Final held in London in 1987 except that the touch penalty has been reduced from 10 seconds to 2 seconds. The time for each contestant has also been reduced from 15 to 7 minutes. Within this time limit, the MicroMouse may make up to five runs. Only one mouse per handler will be allowed this year.

Trophies and cash prizes will be awarded in the following categories based on score:

> **1st Place | $500**
> **2nd Place | $250**
> **3rd Place | $125**

Trophies and cash prizes will be awarded to students in the following categories:

> **Best Student** *(based on score)* | **$500**
> **Fastest Run** *(based on run time)* | **$150**

### YOUNG PROFESSIONALS NETWORKING RECEPTION: *Eat, Drink, and Talk with the Pros*

Monday, March 17 | 7:45 PM – 9:45 PM
LOCATION OFFSITE: HUDSON GRILLE,
942 PEACHTREE ST NE, ATLANTA GA 30309

The Young Professionals (YP) Networking Reception is an opportunity to network with both other young professionals as well as highly-experienced professionals from both industry and academia. In this casual setting, YPs will have the opportunity to build connections with their peers, while chatting with, and getting valuable career advice from, established and well-regarded power electronics professionals, all with the added bonus of enjoying drinks and food provided included with attendance.

*There is no fee but pre-registration is required.*

# TUESDAY, MARCH 18

## STUDENT JOB FAIR

**Tuesday, March 18 | 1:30 PM – 5:00 PM**
LEVEL ONE, HALL A3

APEC is honored to present our third student job fair at APEC 2025. Both graduating undergraduate and graduate students will have the opportunity to network with participating companies who are seeking new employees! Please note that one must be registered for the student job fair to participate.


## PELS MENTORSHIP ROUNDTABLES

**Tuesday, March 18 | 6:30 PM – 8:30 PM**
OMNI HOTEL, LEVEL M4, GRAND E

Since 2017, the PELS Mentorship Roundtable event has been facilitating access to distinguished leaders in power electronics research and industry. Covering non-technical topics essential for professional growth, the Roundtable is an intimate setting comprised of the mentor who leads the topical discussion and a small group of mentees. The Roundtable event is open to all engineers at any stage of their career.

## FREE PROFESSIONAL HEADSHOTS

***Provided by PSMA***

**Tuesday, March 18 | 1:00 PM – 3:00 PM**
LEVEL FOUR, ROOM A409

PSMA is offering free professional headshots. Please pre-register and sign up for a time at the PSMA Booth in the APEC Hub inside the Expo Hall, or through the post on PSMA's LinkedIn.

# WEDNESDAY, MARCH 19

## PELS WOMEN IN ENGINEERING (WIE) BREAKFAST:

### *"Elevated Engineer: Building Unshakable Confidence"*

**Wednesday, March 19 | 7:30 AM – 9:00 AM**

OMNI HOTEL, LEVEL M4, GRAND E

The Elevated Engineer series, hosted by PELS WIE and DEI, will bring professional development training to conference attendees who are looking to not only excel in their technical careers, but also grow their leadership and management skills. This event will explore the power of confidence as a foundational soft skill for engineers, enabling you to showcase your expertise, communicate your value, and advance your career.

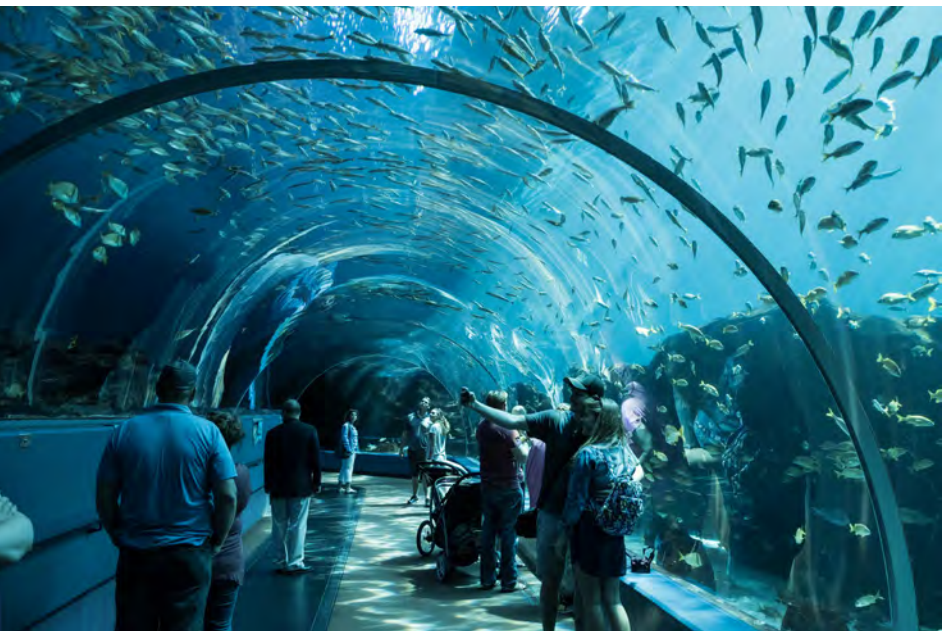
This breakfast event will feature **Jenna Banks**—best-selling author, dynamic keynote speaker, C-Suite event moderator, and host of The Jenna Banks Show, bringing a wealth of knowledge to help you thrive. Whether you're looking to break through career plateaus, land your next big opportunity, or simply feel more empowered in your role, this event will provide the tools and mindset shifts you need to succeed. Register today for this inspiring event. ***This event is open to all. Registration is free but required.***

## WEDNESDAY NIGHT SOCIAL EVENT

**Wednesday, March 19 | 6:30 PM – 10:00 PM**

GEORGIA AQUARIUM, OCEANS BALLROOM

Home to hundreds of species ranging from oceanic to freshwater animals, the Georgia Aquarium is a scientific institution that entertains and educates; features exhibits and programs of the highest standards; and offers engaging and exciting guest experiences that promote the conservation of aquatic biodiversity. APEC attendees and paid guests will have exclusive access to explore the aquarium exhibits at their leisure, complete with fantastic food and music, and the chance to win exclusive 40th Anniversary SWAG!



This social event is included for all full conference attendees, professional education seminar attendees, and technical/industry session attendees with their registration. Attendees can purchase social event tickets for guests at the conference help desk for $150 during registration hours. Tickets are not sold at the door and cannot be replaced or reprinted.

***Transportation will be provided between the Omni Hotel, AC Hotel, and Georgia Aquarium beginning at 6:15 PM.***

# THURSDAY, MARCH 20

## PROFESSIONAL DEVELOPMENT WORKSHOP:

### *Creating a Brave, Collaborative Space*

Thursday, March 20 | 2:00 PM – 4:00 PM

OMNI HOTEL, LEVEL M4, GRAND E

***Hosted by* PELS Diversity, Equity, and Inclusion (DEI)**

Participants will explore the crucial role of how to create a "brave space" focused on cultivating collaboration and supporting teamwork in professional environments – ranging from small 1:1 conversations to large group settings. To help participants build a more inclusive and productive workplace, Dr. Dauv Evans will share practical strategies and offer opportunities to practice tools that professionals can apply immediately to overcome common challenges that can hinder team growth. By the end of this workshop, participants will be equipped with tools to create brave, collaborative spaces where individuals feel empowered to share ideas, take risks, and contribute to the organization's success. This professional development workshop is ideal for leaders of all levels of experience – from those new to leading projects or teams to experienced professionals looking to improve collaboration and creativity among their reports. Register today for this professional development workshop. ***This event is open to all. Registration is free!***


## PSMA 40th Anniversary Special Events for all APEC Attendees

**In celebration of the 40th Anniversary of PSMA, an APEC organizational sponsor, PSMA is hosting special events and activities for all APEC attendees to participate:**

- **APEC Industry Sessions** were originally founded by PSMA as the OEM Initiative's Special Presentation Sessions in APEC 2004 with 17 presentations in 3 sessions. Attend one of this year's 174 presentations across 28 Industry Sessions (including 10 PSMA Sessions)
- **Power Technology Report on Embedded and Integrated Magnetics** is a special project from PSMA's Packaging Committee. Attend Industry Session presentation IS04.4 to learn the results of this detailed study.
- **Magnetic core loss data base ( CoreDataX )** to premier at APEC. The PSMA Magnetics Committee is addressing a long-standing need within the power electronics community to make accurate and consistent core loss data available. Learn more on the methodology and demo of the data base during Industry Session IS24.
- **IPC-9592B Standard Update** – learn status and join the update
  The PSMA reliability committee is leading the effort to recruit members to join the IPC 9-82 committed which will update the IPC-9592B standard. Topics to be addressed in this update include derating criteria, reliability prediction, test methods, firmware testing, etc. Learn more at Industry Session presentation: IS06.7
- **The 13th edition of PSMA's flagship Power Technology Roadmap** will be published in March 2025 in conjunction with APEC 2025. More information can be found at Power Technology Roadmap Forum | PSMA or by e-mailing power@psma.com
- **Free Professional Headshots** in Room 409 (please pre-register at PSMA Booth in Exhibit Hall Hub). Tuesday 1-3pm.
- **Global Energy Efficiency Award** announcement & presentation, in celebration of the 40th anniversary of APEC and PSMA, will be held 6pm Monday at PSMA booth in the APEC Hub on the exhibition floor.

# SPONSOR MEETINGS

## PSMA MEETINGS

### MONDAY, MARCH 17

| | | |
|---|---|---|
| 7:30 AM – 11:30 AM | **PSMA Annual Meeting** | Omni Hotel, Level M2, International BC |
| 12:15 PM – 1:15 PM | **PSMA Board Meeting** | Omni Hotel, Level M2, International BC |
| 06:00 PM | **Energy Efficiency Award** | GWCC, Expo Hall, PSMA booth |

### TUESDAY, MARCH 18

| | | |
|---|---|---|
| 8:30 AM – 11:55 AM | **IS02: Global Electrification Continues to Grow, the Need for New Passives and Design Methods for Power Applications Has to Match** | GWCC, Level Four, A411 |
| 8:30 AM – 11:55 AM | **IS04: 3D-Power Packaging for AI and Vehicles** | GWCC, Level Four, A402 |
| 8:30 AM – 11:55 AM | **IS06: Reliability Redefined: Optimizing the Design-to-Production Transition for Superior Product Performance** | GWCC, Level Four, A404/A405 |
| 10:00 AM – 12:00 PM | **Power Technology Roadmap (PTR) Committee** | Omni Hotel, Level M2, International B |
| 12:00 PM – 2:00 PM | **Magnetics Committee** | Omni Hotel, Level M2, International B |
| 12:00 PM – 2:00 PM | **Semiconductor Committee** | Omni Hotel, Level M2, International C |
| 2:00 PM – 4:00 PM | **Energy Storage/Energy Management/ Energy Harvesting Committees** | Omni Hotel, Level M2, International B |

# PSMA MEETINGS

## WEDNESDAY, MARCH 19

| | | |
|---|---|---|
| 8:00 AM – 10:00 AM | **Student Attendance Support** | Omni Hotel, Level M2, International B |
| 8:30 AM – 11:55 AM | **IS07: The Transformer in the Solid-State Transformer** | GWCC, Level Four, A412 |
| 8:30 AM – 11:55 AM | **IS12: New Era of Power Technologies, Devices, Topologies and Applications** | GWCC, Level Four, A404/A405 |
| 10:00 AM – 12:00 PM | **Transportation Committee** | Omni Hotel, Level M2, International B |
| 10:00 AM – 12:00 pM | **Industry Education Committee** | Omni Hotel, Level M2, International C |
| 12:00 PM – 2:00 PM | **Reliability Committee** | Omni Hotel, Level M2, International B |
| 12:00 PM – 2:00 PM | **Packaging Committee** | Omni Hotel, Level M2, International C |
| 1:30 PM – 4:55 PM | **IS14: Advancing Power Solutions: Integrating Wide Bandgap Technologies for Next-Generation Applications** | GWCC, Level Four, A411 |
| 1:30 PM – 4:55 PM | **IS18: Advanced Power Electronics & System Designs to Accelerate Transportation Electrification** | GWCC, Level Four, A404/A405 |
| 2:00 PM – 4:00 PM | **Marketing Committee** | Omni Hotel, Level M2, International B |
| 2:00 PM – 4:00 PM | **Capacitor Committee** | Omni Hotel, Level M2, International C |

## THURSDAY, MARCH 20

| | | |
|---|---|---|
| 8:00 AM – 11:50 AM | **IS19: Advancing Power Semiconductors Through AI & Digital Tools** | GWCC, Level Four, A412 |
| 8:00 AM – 11:50 AM | **IS21: Energy Management, Storage, and Electrification from Microwatts to Megawatts** | GWCC, Level Four, A410 |
| 8:00 AM – 9:40 AM | **IS24: Core Loss – Making the Data Reliable and Relevant** | GWCC, Level Four, A404/A405 |

# IEEE PELS MEETINGS

## SUNDAY, MARCH 16

| | | |
|---|---|---|
| 8:00 AM – 5:00 PM | **International Future Energy Challenge (IFEC) Information Session** | Omni Hotel, Level M4, Grand E |
| 8:00 AM – 6:00 PM | **IEC TC51 Meeting** | Omni Hotel, Level M4, Grand C |
| 8:00 AM – 1:30 PM | **EIC Annual Planning Meeting** | Omni Hotel, Level M4, Grand B |
| 1:30 PM – 2:30 PM | **ITRD Meeting** | Omni Hotel, Level M4, Grand A |
| 2:00 PM – 5:00 PM | **Digital Media Recording Room** | Omni Hotel, Level M4, Grand B |
| 3:00 PM – 4:00 PM | **Roadmap Leaders Meeting** | Omni Hotel, Level M4, Grand A |

## MONDAY, MARCH 17

| | | |
|---|---|---|
| 7:00 AM – 1:00 PM | **IEC TC 51 Meeting** | Omni Hotel, Level M4, Grand C |
| 8:00 AM – 9:00 AM | **eGrid Steering Committee** | Omni Hotel, Level M4, Grand B |
| 8:30 AM – 9:00 AM | **Membership Committee Breakfast** | Omni Hotel, Level M4, Grand A |
| 9:00 AM – 12:00 PM | **PELS VP of Membership Meeting** | Omni Hotel, Level M4, Grand A |
| 9:00 AM – 10:30 AM | **TC 8: Electronic Power Grid Systems** | Omni Hotel, Level M4, Grand B |
| 9:30 AM – 11:00 AM | **TC 1: Control and Modeling of Power Electronics** | Omni Hotel, Level M4, Grand E |
| 10:30 AM – 12:00 PM | **TC 12: Energy Access and Off-Grid Systems** | Omni Hotel, Level M4, Grand B |
| 12:00 PM – 1:00 PM | **Energy Access Committee Meeting** | Omni Hotel, Level M4, Grand B |
| 11:30 AM – 1:00 PM | **TC 3: Electrical Machines, Drives and Automation** | Omni Hotel, Level M4, Grand E |
| 12:00 PM – 1:00 PM | **PELS Chapter Chair Forum Luncheon** | Omni Hotel, Level M4, Grand A |
| 7:45 PM – 9:45 PM | **PELS/IAS/PSMA Young Professionals Reception** | OFFSITE |

# IEEE PELS MEETINGS

## TUESDAY, MARCH 18

| | | |
|---|---|---|
| 8:00 AM – 9:30 AM | **TC 7: Critical Power and Energy Storage Systems** | Omni Hotel, Level M4, Grand B |
| 8:00 AM – 9:00 AM | **ITRG** | Omni Hotel, Level M4, Grand C |
| 9:00 AM – 10:30 AM | **TC 11: Aerospace Power** | Omni Hotel, Level M4, Grand C |
| 9:00 AM – 10:30 AM | **TC 4: Electrified Transportation Systems** | Omni Hotel, Level M4, Grand E |
| 9:30 AM – 11:00 AM | **WIE Committee Meeting** | Omni Hotel, Level M4, Grand A |
| 11:00 AM – 12:30 PM | **TC 9: Wireless Power Transfer Systems** | Omni Hotel, Level M4, Grand A |
| 11:00 AM – 1:00 PM | **Standards Committee Meeting**<br>**Industy Committee Meeting**<br>**VP of Industry and Standards Meeting** | Omni Hotel, Level M4, Grand B |
| 11:00 AM – 12:00 PM | **ECCE Europe Steering Committee** | Omni Hotel, Level M4, Grand C |
| 11:00 AM – 12:00 PM | **TPEL 40th Anniversary Planning Committee** | Omni Hotel, Level M4, Grand E |
| 12:00 PM – 2:30 PM | **VP Global Intersociety Relations**<br>**Education & Digital Media**<br>**Scholarship & Fellowship Committee** | Omni Hotel, Level M4, Grand C |
| 12:00 PM – 3:00 PM | **Digital Media Recording Room** | Omni Hotel, Level M4, Grand E |
| 12:30 PM – 2:00 PM | **TC 2: Power Components, Integration, and Power ICs** | Omni Hotel, Level M4, Grand A |
| 1:00 PM – 2:00 PM | **PEDG Steering Committee** | Omni Hotel, Level M4, Grand B |
| 2:00 PM – 3:30 PM | **TC 6: Emerging Power Electronic Technologies** | Omni Hotel, Level M4, Grand A |
| 2:00 PM – 3:30 PM | **TC 5: Sustainable Energy Systems** | Omni Hotel, Level M4, Grand B |
| 2:30 PM – 3:30 PM | **Nominations Committee** ***(Members Only)*** | Omni Hotel, Level M4, Grand C |
| 3:30 PM – 5:00 PM | **TC 10: Design Methodologies** | Omni Hotel, Level M4, Grand B |
| 3:30 PM – 5:00 PM | **Region 1-3 Chapter Chairs** | Omni Hotel, Level M4, Grand C |
| 6:30 PM – 8:30 PM | **PELS Mentorship Roundtables**<br>***(Registration Required)*** | Omni Hotel, Level M4, Grand E |

# IEEE PELS MEETINGS

## WEDNESDAY, MARCH 19

| | | |
|---|---|---|
| 7:30 AM – 9:00 AM | **PELS WIE Breakfast** | Omni Hotel, Level M4, Grand E |
| 8:00 AM – 9:00 AM | **SPEC Steering Committee** | Omni Hotel, Level M4, Grand A |
| 9:00 AM – 11:00 AM | **PELS VP of Products Committee Meeting** | Omni Hotel, Level M4, Grand A |
| 9:00 AM – 12:00 PM | **PELS VP of Technical Operations Committee Meeting** | Omni Hotel, Level M4, Grand C |
| 10:30 AM – 12:00 PM | **DE&I Committee Meeting** | Omni Hotel, Level M4, Grand B |
| 11:00 PM – 12:00 PM | **Products Awards** | Omni Hotel, Level M4, Grand A |
| 12:00 PM – 2:00 PM | **PELS Magazine Anniversary Lunch** | Omni Hotel, Level M4, Grand E |
| 12:00 PM – 5:00 PM | **PELS VP of Conferences Committee Meeting** | Omni Hotel, Level M4, Grand C |
| 1:00 PM – 2:00 PM | **ITRW** | Omni Hotel, Level M4, Grand B |
| 2:00 PM – 3:00 PM | **2025 MagNet Challenge Launch** | Omni Hotel, Level M4, Grand A |
| 2:30 PM – 4:00 PM | **SouthStar Meeting** | Omni Hotel, Level M4, Grand E |
| 3:00 PM – 4:00 PM | **SOBRAEP & PELS Meeting** | Omni Hotel, Level M4, Grand A |
| 3:00 PM – 4:30 PM | **P3105 Working Group Meeting** | Omni Hotel, Level M4, Grand B |
| 4:00 PM – 5:00 PM | **PELS New AdCom Member Orientation** | Omni Hotel, Level M4, Grand A |
| 4:30 PM – 5:30 PM | **PELS Sustainability AdHoc Committee** | Omni Hotel, Level M4, Grand B |
| 5:00 PM – 6:30 PM | **Subcommittee on Education Restructuring** | Omni Hotel, Level M4, Grand A |

## THURSDAY, MARCH 20

| | | |
|---|---|---|
| 8:00 AM – 9:00 AM | **PELS/PCIM** | Omni Hotel, Level M4, Grand C |
| 9:00 AM – 10:00 AM | **PELS/CPSS** | Omni Hotel, Level M4, Grand C |
| 11:00 AM – 5:30 PM | **PELS Administrative Committee Meeting** | Omni Hotel, Level M4, Grand AB |
| 2:00 PM – 5:00 PM | **ETTC Meeting** | Omni Hotel, Level M4, Grand C |
| 2:00 PM – 4:00 PM | **DEI Tutorial** | Omni Hotel, Level M4, Grand E |
| 7:00 PM – 9:00 PM | **PELS Administrative Committee Dinner** | OFFSITE |

## FRIDAY, MARCH 21

| | | |
|---|---|---|
| 7:00 AM – 12:00 PM | **PELS Administrative Committee Meeting** | GWCC, Building C, Level 2, C208/C210 |

# TECHNICAL TRACK CHAIRS

## THANK YOU *to all our 2025 Technical Track Chairs!*

- Adam Skorek
- Ali Khajehoddin
- Ali Safayet
- Arijit Banerjee
- Ayman Fayed
- Cahit Gezgin
- Dinesh Kumar
- Dong Cao
- Dorin Neacsu
- Ed Herbert
- Erdem Asa
- Fei Gao
- Fei Yang
- George Slama
- Gerry Moschopoulos
- Haoyu Wang
- Harish Krishnamoorthy
- Hengzhao Yang
- Jaber Abu Qahouq
- James Victory
- Jeff Nilles
- Jim Marinos
- Jonathan Kimball
- Karun Potty
- Khurram Afridi
- Liming Liu
- Manuel Arias Perez De Azpeitia
- Matt Wilkowski
- Matt Woongkul Lee
- Mehdi Farasat
- Mehdi Narimani
- Minjie Chen
- Mohammed Agamy
- Olivier Trescases
- Phani Marthi
- Raghav Khanna
- Rasoul Hosseini
- Seungdeog Choi
- Sombuddha Chakraborty
- Tao Yang
- Tiefu Zhao
- Xiaonan Lu
- Xin Zhang
- Yunting Liu
- Ziaur Rahman

# PROFESSIONAL EDUCATION SEMINARS *as of February 4, 2025*

APEC's Professional Education Seminars are three-hour presentations from the leading experts from industry and academia. Each year these seminars cover a wide range of topics in levels ranging from introductory to expert. A key feature of APEC's Professional Education Seminars is that one seminar registration fee offers access to all the seminars and includes the slides from all seminars. Registrants for the Professional Education Seminars are free to go to any seminar and even get up and roam from seminar to seminar at will.

## SESSION 1

9:30 AM – 1:00 PM

### S01: Power Converter Design Basics

LEVEL FOUR, A411

**Fundamentals**

**Pradeep Shenoy, PhD,** *Texas Instruments*

**Brian King,** *Texas Instruments*

This entry level seminar will provide a practical introduction to the design and testing of power converters. After some material covering the basics of power converters, this presentation will go step by step through the design process of two common converter topologies: a buck converter and a flyback converter. Each detailed design example will cover the motivating application, design parameters, component selection, control loop compensation, circuit board layout, and hardware testing/results. The target audience of this crash course seminar is those with little to no power electronics design experience.

## SESSION 2

9:30 AM – 1:00 PM

### S02: Impact of Common-Mode Choke Construction on EMI Filter Suppression

LEVEL THREE, A311/A312

**Magnetics**

**Szymon Pasko, PhD,** *Schaffner EMV AG*

**Abiezer Tejeda,** *Schaffner EMV AG*

This workshop, drawing on measurements and expertise from Schaffner R&D Development Center, presents practical considerations for the design and construction of common-mode choke (CMC) and its impact on EMI filter suppression. Divided into four parts, the workshop offers a comprehensive exploration of CMC design and EMI filtering. The first section introduces EMI filtering concepts, including their necessity, relevant standards, and the role of Power Converters (PE) in noise generation. It covers concepts ranging from Common- and Differential-Mode noise propagation and advanced practical topics on the design of CMC. Part two compares magnetic materials based on measured parameters from various suppliers, examining permeability, temperature dependencies, and saturation in real-world applications cases. The third segment explores CMC design and construction parameters, considering core geometry, construction methods, winding techniques, and potting effects on performance. It provides practical insights into choke design and material selection. The final part addresses how the construction of CMCs impacts the performance of EMI filters in real applications, focusing on saturation and resonance phenomena. It includes methods for identifying saturation, mitigation strategies, and case studies. The workshop concludes with practical tips for optimizing EMI filter design and performance, offering valuable insights for industry professionals and researchers.

## SESSION 3

9:30 AM – 1:00 PM

### S03: Supercapacitor Assisted Power Converters and Protection Systems for Renewable Energy Systems

LEVEL THREE, A302

**Applications**

**Nihal Kularatna, DSc,** *The University of Waikato*

Supercapacitors are traditionally considered as energy storage devices with high power density and medium energy density. However, they can be treated as long time constant devices and that opens a unique new path to design a different family of power converters and protection systems now known as Supercapacitor Assisted (SCA) techniques, based on a new design concept published as SCA-Loss Management (SCALoM) approch. SCA low dropout (SCALDO) converter is an extra low frequency DC-DC converter with built in DC-UPS capability with no EMC issues with similar or better efficiency to traditional switch-modes. It is already implemented in a silicon IC version. This technique which is not a variation of traditional switch capacitor converters can be

extended to EMC-free power converters useful in renewable energy systems. EMC free implementation comes from its extra milli hertz to fractional hertz order energy re-circulation concept, which eliminates dynamic switching losses in transistors and diodes. SCA-surge absorber (SCASA) is a commercialised high-performance surge protector technique adhering to UL 1449 3rd Edition Std for transient surge protection. SCA-LED is a DC LED lighting technique with no battery packs. These patented SCA techniques are currently extended into powering whitegoods from renewables without batteries and also has become the basis of a unique new DC circuit breaker technique. First half of seminar will present a summary of new SCALoM concept and how it is extended to the implementation of a new family of DC-DC converters, surge protectors, LED lighting converters and converters for DC whitegoods. This will include the design of 12-5 V, 5-3.3 V converters and high power 48V converters and the essentials behind an IC version of SCALDO. Second half will show how supercapacitor can be effectively used as the basis of transient surge protectors and DC Circuit breakers. Presentation will also include an overview of current commercial supercapacitor families available in four different sub-sets manufactured by over 75 int'l manufacturers, and how these could open an entirely new world of power converters and protection systems for renewable energy systems, DC microgrids and DC homes for better energy efficiency and with extra long life due to battery minimization and elimination.

## SESSION 4

9:30 AM – 1:00 PM

### S04: Circuit-Based Dynamic Phasor for AC Systems and Gyrator Models for IPT Design

LEVEL THREE, A315/A316

**Simulation & Modeling**

**Chun Taek Rim,** *GIST*

Recent advances in modelling techniques in power electronics, focusing on circuit-based models, are covered. Circuit-based dynamic phasor models for AC converters & grids and gyrator models for inductive power transfer (IPT) systems are extensively explained. First, power electronics models are reviewed. Conventional models such as state-space averaging, discrete state model, existence function model, DQ transformation, and dynamic phasor model are shortly reviewed with their limitations. Second, the general unified circuit-based dynamic phasor for AC power systems is extensively explained. The switched transformer model is adopted as a general equivalent circuit of converter. The circuit-based single & multi-phase AC models and quantum transformation model are explained. Then, the unified-general dynamic phasor model is provided with fruitful application examples. Third, the recently developed gyrator models for IPT systems are explained. The circuit-based static gyrator model is followed by the dynamic gyrator model for static and dynamic analyses of IPT systems, which is crucial for control of IPT. High order IPT systems are completely analysed with great ease. Lastly, the magnetic mirror model for IPT design is explained. Its application to open core plates and parallel core plates is shown. Through the proposed models, the power systems become regarded as conventional circuits.

## SESSION 5

9:30 AM – 1:00 PM

### S05: Ai in Power Electronics Design: Present and Future

LEVEL FOUR, A412

**Design**

**Xinze Li,** *University of Arkansas*

**Alan Mantooth,** *University of Arkansas*

**Frede Blaabjerg,** *Aalborg University*

Artificial Intelligence (AI) has become a promising force driving advancements in power electronics (PE) design, which covers but not limits to the optimization of discrete devices like capacitors and magnetic components, power semiconductors, hardware prototype, EMI filter, thermal management, modulation and control, etc. This seminar explores AI applications' evolution in the PE design, including foundations, latest research progress, and future directions, with an emphasis on discussing cutting-edge advancements in depth. Beginning with an introduction to AI applications in PE including basic concepts, the session will progress to more focused discussions on AI-empowered PE design. Key challenges in existing AI algorithms, such as data scarcity, model explainability, and application transferability, will be elaborated. Afterwards, the seminar will delve into the latest innovations, physics-in-architecture neural network (PANN), which is a lightweight, explainable, and flexible AI tailored for PE design with live code demonstrations to deploy PANN for Dual-Active-Bridge converter design. Furthermore, PE-GPT, a revolutionary design tool that leverages PE-specific generative AI agents for linguistically-guided autonomous design will be presented with interactive on-site code experiments. Finally, the session will discuss forward-looking future research, with autonomous and ethical AI systems for a new PE design paradigm. This seminar is tailored for diverse groups of audiences, offering comprehensive overview about AI in PE and its design for newcomers, advanced methods and concepts for experts, and hands-on interactive code sessions to drive innovation in personal projects. This seminar aims to inspire more researchers and industry professionals to leverage AI to further drive the advacements of the industry.

## SESSION 6

9:30 AM – 1:00 PM

### S06: Electric Moon: Powering the Moon with GaN-Based Isolated Multilevel Converters

LEVEL THREE, A313/A314

**Converters**

**Jin Wang,** *The Ohio State University*

This seminar offers an in-depth exploration of the role of power electronics in space applications, focusing on the pioneering work of the Electric Moon team. Comprising students from Ohio State University and researchers from Venturi North America, the team participated in NASA's Watts on the Moon (WOTM) Challenge, a competition aimed at developing innovative energy solutions for lunar missions. The seminar will be organized chronologically, beginning with an introduction to the WOTM challenge, where participants are tasked with creating systems to generate, store, and distribute energy on the Moon. Following this, the seminar will delve into the specific approaches proposed by the Electric Moon team. This includes a detailed discussion of their system architecture, circuit topology, device selection, and evaluation processes, as well as the initial prototyping of a 1.5-kV, 1.5-kW isolated modular multilevel DC/DC converter, which was publicly demonstrated in the first year of the challenge. As the presentation progresses, the focus will shift to the challenges faced during the second year of the competition. These challenges involved redesigning circuits and transformers to withstand extreme operating environments, developing and implementing a robust battery design, and conducting comprehensive system prototyping and final tests. The seminar will conclude with a summary of the lessons learned by the team throughout their journey. This seminar is ideal for graduate students and research engineers who have a foundational understanding of power electronics. It promises to provide valuable insights into the practical aspects of power electronics in one of the most demanding environments imaginable.

## SESSION 7

2:30 PM – 6:00 PM

### S07: GaN 101: An Introduction to Gallium Gitride Transistors, How They're Made, and How to Use Them

LEVEL FOUR, A411

**Fundamentals**

**Edward A. Jones, PhD,** *Infineon Technologies Austria AG*

**Nicholas Dellas,** *Infineon Technologies Austria AG*

This seminar will provide a comprehensive introduction to gallium nitride power transistors and how to effectively design with them. Migrating power electronics designs from conventional transistors to new wide bandgap devices can pose many challenges. This is exaggerated even further with GaN, because the HEMT is a fundamentally different type of transistor from a MOSFET. A firm background in the comparative device physics between Si/SiC MOSFETs and GaN HEMTs helps to make sense of the new recommended design approach. Part I of this seminar will cover the device background, walking through a typical GaN datasheet and explaining it in the context of how the device works. Part II will build on this background with a step-by-step system design approach for GaN, including PCB layout, gate driving, and paralleling. The seminar will conclude with a quick look at some interesting new directions such as bidirectional GaN transistors and monolithic integration, as well as some key applications where GaN adds the highest value.

## SESSION 8

2:30 PM – 6:00 PM

### S08: Magnetic Scaling and Constraints

LEVEL THREE, A313/A314

**Magnetics**

**Alex Hanson,** *University of Texas at Austin*

**Elaine Ng,** *University of Texas at Austin*

**Alyssa Brown,** *University of Texas at Austin*

The design of power magnetics encompasses a dizzying range of frequencies, power levels, impedances, materials, and physical constraints. It would be useful to have a sense of how magnetic performance scales across this vast landscape and which constraints matter most. Nevertheless, while engineers may understand magnetics design, they generally learn how to handle wildly different application areas only by experience. In this seminar, we will review fundamental physical laws for magnetic components and learn how those laws inform design

across both size and frequency. Attendees will learn how much permeability is necessary, whether saturation or core loss limits a design, and when air-core magnetics should be used. They will also learn why it's so hard to make magnetics small, situations where magnetics scale more favorably, and whether one big component is better than many small components. We will not focus on detailed design decisions; rather, we will emphasize broad, coarse conclusions that will help attendees ask the right questions before starting a design and give them some intuition for what the right answers will be. This seminar is suitable for all attendees with introductory classroom exposure to magnetic component design.

## SESSION 9

2:30 PM – 6:00 PM

### S09: Near Field PROBES: Useful Tools in Power Electronics

LEVEL THREE, A315/A316

**Applications**

**Arturo Mediano, PhD,** *University of Zaragoza*

Power electronics professionals are often highly interested in the fundamentals of EMI, as they frequently encounter (or suffer from) its effects in their labs (EMI and RF black magic) or in production environments (EMC). Many of them face the need to solve these problems quickly, under pressure, and often through trial and error. In this process, near-field probes are invaluable tools. The key concepts and practical examples presented in this seminar will be highly beneficial for engineers and technicians who may not be EMI/EMC specialists but are involved in the design, manufacturing, and troubleshooting of power electronic products. Topics such as identifying EMI sources, evaluating fixes, testing components, PCB layout, shielding of cables and enclosures, and non-invasive signal measurement will be covered from an experimental perspective. Taking this seminar provides an opportunity to review EMI/EMC and high frequency concepts relevant to power electronics and to learn, through a practical approach, how to use near-field probes to solve design issues and noncompliance in power electronic systems. The seminar will be presented with the following considerations: – Attendees are power electronics professionals who are typically very interested in lab work and EMI/RF experimentation, though they are usually not EMI/EMC or RF specialists. – Practical, real-world examples are generally well received, so they will be incorporated into the presentation. – The tutorial will avoid complex mathematical treatments of EMI/RF, focusing instead on a practical perspective for more effective learning outcomes.

## SESSION 10

2:30 PM – 6:00 PM

### S10: Master Class on Designing, Simulating, and Measuring a 2000 Amp Power Rail

LEVEL THREE, A302

**Simulation & Modeling**

**Heidi Barnes,** *Keysight Technologies*

**Steven M. Sandler,** *Picotest*

**Ben Dannan,** *Signal Edge Solutions*

This tutorial will provide a master class on designing, simulating, and measuring a scalable, 2000-Amp core power rail. The technological growth in data centers, AI, and custom ASICs has pushed the core power rail current to 2000 Amps and beyond. Designing such a power rail is a complex task involving architectural design choices, advanced end-to-end system simulations, and measurement validation challenges. This tutorial will leverage the DesignCon 2024 best paper titled "Design, Simulation, and Validation of a 2000-Amp Core Power Rail" to show a real working example of how it is done. Topics to be covered include: • How to design the PCB stack-up for 2000A? -What are the copper thickness considerations? -How many layers of copper are needed for a 2000A PDN? • What is the BGA ball-out structure necessary for the PDN? • DC voltage drop and Electrothermal considerations for a 2000A PDN • How to properly determine a sense point for a 2000A PDN • Modeling small signal and large signal responses for a 2000A VRM and PDN design • Introduction to Harmonic balance simulation and its importance for large signal modeling • How to model the load line response for 2000A PDN design • Building end-to-end digital twin simulations • Discussion focused on measuring small signal versus large signal. -What does the large signal phenomena look like? • Why use a step-loader for validation – How hard is this? • PDN measurement demonstration to validate and test a 2000A PDN design. • Why do we care about CMRR for PDN impedance measurements? • How do you measure a 40uOhm PDN? Participants will leave with an understanding of the advanced modeling and measurement techniques required to support the growing need for 2000A and higher PDN designs.

## SESSION I1

2:30 PM – 6:00 PM

### S11: Power Supplies Design for Data Center Power System Stability and Reliability

LEVEL FOUR, A412

**Design**

**Jian Sun,** *Rensselaer Polytechnic Institute*

Data center power system design has traditionally emphasized efficiency and reliability. With rapid growth in both scale and number of data centers, stability is becoming an important concern for power systems inside data centers as well as the grid they connect to. With virtually every watt of electricity processed by power converters at least 2-3 times, data centers have a very high concentration of power electronics, creating the potential for new types of instability that have challenged the development of renewable energy and power grids in recent years. Depending on the nature and extent, an instability event may shut down an entire data center or parts of it due to protective actions or damages to power supplies and other components, making reliability assessment based on normal hardware failure meaningless. This seminar introduces the concept of data center power system stability, reviews possible behavior and consequences of instability, and presents practical methods to analyze and mitigate the problem. Impedance-based frequency-domain models are developed for power supplies and overall data center power systems and used to study system stability. Practical methods to solve typical instability problems and to guarantee stability through the design of power supplies and other components are also presented. The topics are treated in-depth for an intermediate/advanced audience.

## SESSION I2

2:30 PM – 6:00 PM

### S12: Voltage Source Converter HVDC Transmission Systems—Evolutions, Fundamentals, Control, Modelling and Behaviour

LEVEL THREE, A311/A312

**Converters**

**Grain Philip Adam, PhD,** *NEOM Energy and Water (ENOWA)*

The present global pursuit of power grid decarbonization is heavily relying on increased exploitation of renewable generations such as solar and wind, and voltage source converter based HVDC transmission systems to evacuate the generated renewable power to the consumption centers. It causes the industry to experience exponential rise in demand for electrical engineers with knowledge of both power electronics and power systems. In this line, this tutorial aims to bridge that knowledge gap by introducing the target audience to various types of voltage source converter HVDC transmission systems, which cover device and system aspects, for examples, voltage source converter topologies (two-level converter, three-level neutral-point clamped converter, and modular and hybrid multilevel converters) and their operating principles, modulation techniques, control principles and strategies, and system behaviour under normal and abnormal conditions, including merits and limitations. In addition to explanations of the fundamental theoretical concepts and relevant equations that governed the operation of VSCs, prerequisites for VSC controlled operation; manipulation of phase and magnitude of modulating signals to control active and reactive power and to extend converter ac voltage control range; manipulation of positive and negative phase sequence to achieve tangible control objectives at system level, converter P-Q and Q-V capability curves and limiting factors, etc., will be covered and supported by simulations. Also, ac and dc fault ride-through (low-voltage and high-voltage) and their impact on converter design and control considerations and practical countermeasures will be discussed. Small part of the tutorial will be dedicated to discussion of the drivers for grid forming converters, key fundamental differences between grid forming and grid following controls , and potential implications of grid forming control on design considerations of VSCs and behaviors at system level. To support research students and simulation engineers, various modelling methods of the voltage source converters will be discussed and supported by simulations and their merits and demerits; for examples, EMT (detailed switched, Thevenin and Norton equivalent based on Dommel implicit integration with two-state switched resistors, switching function, averaged) and RMS.

## SESSION 13

8:30 AM – 12:00 PM

### S13: Fundamentals of Magnetics

LEVEL THREE, A315/A316

**Fundamentals**

**Alfonso Martínez,** *Würth Elektronik*

Magnetic components are ubiquitous in any power supply, from power transformation to filtering. The improvement in semiconductor technology of the last decades have provoked an increase in the switching frequency of the power devices, which have made the design of magnetic component the bottleneck of many products, as the classic methods of designing do not take into account the electromagnetic effects that have always been there, but could be ignored at lower frequencies. This seminar presents the fundamentals of the physics used in magnetics, focusing on an energy point of view: By understanding how and where the energy flows in magnetic devices, we can better model and predict the higher frequencies effects and take advantage of them to design our converters. The first block presents those fundamentals, explaining the physical concepts and the characteristics of the ferromagnetic materials that make them happen, and where the energy flows and is stored in an inductive component. The second block describes the parts of a real world magnetic and what are they used for. The third block describes the high level effects happening in these components and how we can predict their value.

## SESSION 14

8:30 AM – 12:00 PM

### S14: Controllable and Variable Magnetic Components in Power Electronics

LEVEL THREE, A302

**Magnetics**

**Wilmar Martinez, PhD,** *KU Leuven – EnergyVille*

**Jens Friebe,** *University of Kassel*

**Marco Liserre,** *Christian-Albrechts-Universität zu Kiel*

Controllable magnetic components, such as variable inductors and transformers, offer new opportunities for power electronics. These devices allow for dynamic control of inductances (magnetising and leakage) and transformation ratios, enabling more efficient operation and greater adaptability in power conversion systems. Recent advances focus on integrating these components into topologies like dual active bridge converters and resonant converters, enhancing power density and efficiency by reducing current stress and improving voltage regulation. However, challenges remain in achieving consistent performance across operating conditions and simplifying control mechanisms. This field continues to evolve, promising higher performance for future power systems. In this tutorial, attendees will follow the journey from the creation of the first magnetic amplifiers to the modern variable magnetics, their applications and their future.

## SESSION 15

8:30 AM – 12:00 PM

### S15: An Introduction to Batteries and Vehicle Dynamics for Electric Vehicles

LEVEL THREE, A311/A312

**Applications**

**John Hayes, MSEE, MBA, PhD,** *UCC*

The 2018 book Electric Powertrain: Energy Systems, Power Electronics and Drives for Hybrid, Electric and Fuel Cell Vehicles is a structured holistic textbook for the teaching of the fundamental theories and applications of energy sources, power electronics, and electric machines and drives to engineering students. This four-part practical guide also acts as an industry reference. The lead author is currently writing the second edition and is introducing new material on batteries, their electrochemistry and their integration into EV battery packs. Thus, the main body of work in this seminar will be the presentation on batteries from electrochemistry to battery packs and more. This material is essential for the power electronics engineer and academic as the advances in electrochemistry are transforming the world of power electronics across all areas of mobile and stationary power. New material is also introduced on heavy-duty vehicles, racecars (Formula E) and front/rear/all-wheel-drive cars, all technical topics of great interest to the power electronics and drives engineer and academic. All conference participants, from teaching academics to power electronics engineers to marketing professionals, will have an interest in this seminar given the breadth and importance of the topics from electrochemistry to vehicles to machines.

## SESSION 16

8:30 AM – 12:00 PM

### S16: Determining Switching and Conduction Loss in Si, SiC, and GaN

LEVEL FOUR, A411

**Simulation & Modeling**

**Eric Persson,** *Infineon Technologies Americas Corp*

**Mladen Ivankovic,** *Infineon Technologies*

One of the key challenges facing power electronic engineers is how to determine what the losses will be in their converter circuit, in order to compare and assess various

topology and control options, without having to actually build and test all of them. This topic is increasingly relevant as conversion efficiency continues to rise into the mid and even upper 90% range. Rough calculations are no longer good enough, as every watt needs to be accounted for and understood. This seminar focuses on the switching power transistors, particularly the high-voltage devices in the 400 – 1200 V range used in many applications today. Designers expect that they can enter a schematic into a simulation environment, and get an accurate result easily. But the reality is typically not so simple, and the results are often inaccurate. We will cover the fundamentals of switching loss, the detailed switching and conduction loss mechanisms specific to newer wide-bandgap devices, how the manufacturers measure loss and what is included on datasheets, what loss mechanisms are included in various device models, how they are accounted for, and finally how well do modeled losses compare to real-world circuit measurements. We will conclude with a summary and recommendations on best-practices for getting the most useful results.

## SESSION 17

8:30 AM – 12:00 PM

### S17: Towards Reliable Power Electronics: A Practical Outlook on Design-for-Reliability, Testing, and Condition Monitoring

LEVEL THREE, A313/A314

**Design**

**Ionut Vernica,** *Plexim GmbH*

**Yi Zhang,** *Aalborg University*

**Huai Wang,** *Aalborg University*

The aim of this seminar is to provide a practical overview on the different reliability assessment strategies and tools that can be used throughout the different lifecycle stages of power electronic components. Topics such as, reliability modeling, failure mechanisms of power devices, reliability testing and standards, and condition monitoring will be covered during the seminar. After briefly introducing the fundamental principles of reliability engineering, the typical reliability evaluation methods (e.g., DFMEA) employed by the power electronics industry will be discussed. Following, a thorough mission-profile-based reliability assessment procedure for power electronic systems will be introduced, and its underlying practical consideration, assumptions, and uncertainties are discussed in detail. To address the evolving failure mechanisms and the growing complexity of lifetime models, different testing methods and standards (e.g., IEC, ECPE, AEC, etc.) are compared, and their limitations are highlighted. Finally, the seminar will cover advanced methods which are transforming the reliability management of power electronics (e.g., condition monitoring and artificial intelligence). The topics addressed in this seminar cover state-of-the-art research outcomes, from a practical point-of-view, and are directed towards both entry-level and senior-level researchers or engineers, interested in the reliability analysis, modeling, and testing, of power electronic components and systems.

## SESSION 18

8:30 AM – 12:00 PM

### S18: Mastering the Art of High-Frequency Multiphase LLC Converters

LEVEL FOUR, A412

**Converters**

**Miroslav Vasic, PhD,** *Universidad Politecnica de Madrid*

**Daniel Ríos Linares,** *ETSII / Universidad Politécnica de Madrid*

The seminar explores high-frequency resonant power conversion, focusing on LLC converters, which meet the demands for miniaturized, efficient converters in modern power electronics. This three-hour tutorial offers a comprehensive understanding of LLC converters, emphasizing the most important details (magnetic optimization, device selection, PCB layout and thermal management) for their efficient design and practical implementation. The first section covers the fundamental principles of single-phase LLC converters, their advantages and disadvantages in comparison with traditional PWM topologies, and advanced design procedures to maximize their potential. Attendees will learn techniques for implementing these converters effectively. A case study of a 1 MHz, 1 kW, 20 kW/l, 270-28 V DC/DC converter used in aircraft applications will illustrate this type of converters, showcasing its performance and practical implementation, and magnetic and PCB optimization will be addressed in detail. In the second section, novel three-phase converter topologies derived from LLC converters are introduced. These configurations allow the use of star-polygon transformers and stacked cells to achieve higher voltage step-down DC/DC conversion, easing the specifications of the transformer and the inductor. Challenges in integrated magnetic design, thermal management and current sharing are addressed, highlighting the multiphase approach as a viable alternative to single-phase parallelization.

## DIALOGUE PREVIEW SESSION *as of February 4, 2025*

New for APEC 2025

Join us for a special poster session that's all about building excitement for the incredible dialogue sessions happening on Thursday! We've handpicked a selection of posters that showcase a diverse mix of topics and industry interests, all designed to spark lively discussions and fresh ideas. This is your chance to dive into thought-provoking conversations that will leave you buzzing with anticipation for the main event. Don't miss out on this vibrant preview, where dynamic exchanges set the stage for an unforgettable day of ideas and innovation!

12:00 PM – 1:30 PM

LEVEL FOUR, SIDNEY J. MARCUS AUDITORIUM FOYER

**D03.8 A Concept for Current Ripple or Transient Improvements in Multiphase Converters**
**Alexandr Ikriannikov, PhD,** *Analog Devices*
**Point-of-Load (POL) and Multi-Phase Converters**
AUTHORS:Alexandr Ikriannikov, Alex Gao

**D04.4 LLC Converter Main Transformer Losses: Eliminating Air Gaps and Integrating Parallel External Inductors**
**Yu-Chen Liu,** *National Taipei University of Technology*
**Resonant Converters**
AUTHORS:Yu-Chen Liu, Shang-Syun Wu

**D05.5 High-Performance Current Multiplier: A Hybrid Switched Capacitor Solution for High-Current Applications**
**Kevin Zufferli,** *Infineon Technologies AT*
**Resonant Converters**
AUTHORS:Kevin Zufferli, Roberto Rizzolatti, Mario Ursino, Simone Mazzer, Gerald Deboy, Stefano Saggini

**D06.3 Symmetrical Balanced Circuit for Common-Mode Noise Mitigation in LCL-T Resonant Converter**
**Ripun Phukan, PhD,** *Delta Electronics*
**Power Quality and EMI**
AUTHORS:Ripun Phukan, Boyi Zhang, Juan Ruiz, Peter Barbosa

**D07.3 Application-Oriented Test Setup for Measuring Dynamic Output and Transfer Characteristics of GaN-HEMTs**
**Philipp Swoboda,** *Karlsruhe Institute of Technology*
**GaN and SiC Devices and Modules**
AUTHORS:Philipp Swoboda, Martin Fein, Simon Frank, Andreas Liske, Marc Hiller

**D08.7 First Demonstration of a Gallium Oxide Power Converter**
**Joshua Piel, MEng,** *Sensors Directorate, Air Force Research Laboratory*
**Ultra-Wide Bandgap Devices**
AUTHORS:Joshua Piel, Elizabeth Sowers, Daniel Dryden, Thaddeus Asel, Adam Neal, Brenton Noesges, Shin Mou, Andrew Green

**D09.4 A High Frequency Coupled Inductor with Distributed Air Gap for High Power DC-DC Converters**
**Muhammad Fasih Uddin,** *University of Arkansas*
**High-Frequency Magnetics**
AUTHORS:Muhammad Fasih Uddin, Ahmed Ismail, Peyman Darvish, Baher Abu Sba, Yue Zhao

**D11.15 Thermal Modeling and Performance of a Bare-Die Embedded PCB for High Power Density Converters Design**
**Shahid Aziz Khan,** *University of Michigan*
**Power Electronics Packaging**
AUTHORS:Shahid Aziz Khan, Feng Zhou, Mengqi Wang, Duc Dung Le, Shivam Chaturvedi

**D12.1 Research on the Voltage Fluctuation Suppression Strategy in Weak Grid Under Pulsed Power Load Integration**
**Xi Chen,** *Tianjin University*
**Control of Power Electronic Converters**
AUTHORS:Xi Chen, Jiazheng Zhang, Mingjun Bao

**D14.1 A Highly Integrable, Modular and Multi-Functional Fault Monitoring Active Gate Driver with Parallel Buffers for a Global Enhanced Reliability of Gen. 3 SiC Power MOSFETs**
**Mathis Picot-Digoix,** *Safran Tech, Safran*
**Gate Drive Circuits and Fault Protection**
AUTHORS:Mathis Picot-Digoix, Léo Seugnet, Frédéric Richardeau, Jean-Marc Blaquière, Sébastien Vinnac, Thanh-Long Le, Stéphane Azzopardi

**D15.8 Achieving Soft-Charging and Over 20% Input Current Ripple Reduction in a 48-to-6 V Dickson Converter using 3-Phase Split-Phase Control**

**Nagesh Patle,** *University of California, Berkeley*

**Control of Power Electronic Converters**

AUTHORS:Nagesh Patle, Rose A. Abramson, Sahana Krishnan, Jiarui Zou, Robert C. N. Pilawa-Podgurski

**D17.7 Comparative Analysis of Stator-PM Machines: Design Optimization and Electromagnetic Performance Evaluation**

**Maryam Salehi,** *University of North Carolina at Charlotte*

**Device and Component Modeling**

AUTHORS:Maryam Salehi, Madhav Manjrekar

**D18.12 A Novel Speed Sensor-Less Control of a Solar-Powered PMSM Drive**

**Abirami Kalathy,** *Queen's University*

**Modeling and Control Techniques for Motor Drives**

AUTHORS:Abirami Kalathy, Arpan Laha, Praveen Jain, Majid Pahlevani

**D18.9 Cost-Effective Fault Diagnosis for Motor and Inverter using Bootstrap Charging and Single DC Link Current Sensor**

**Gyu Cheol Lim,** *Seoul National University*

**AC, DC, BLDC Motor Drives**

AUTHORS:Gyu Cheol Lim, Won Hyo Jeong, Kahyun Lee, Jung-Ik Ha

**D21.5 Condition Monitoring for DC-Link Capacitors and PV Arrays based on the Start-Up Process of the PV System**

**Yongjie Liu, PhD,** *Aalborg University*

**Photovoltaic (PV) Inverters and Micro Inverters**

AUTHORS:Yongjie Liu, Ariya Sangwongwanich, Chen Liu, Xing Wei, Shuyu Ou, Tamás Kerekes, Jiahong Liu, Huai Wang

**D21.8 Parallel Operation of Grid-Forming Converters based on Kuramoto Oscillators with Virtual Cable Emulation for Improved Power Sharing**

**Vikram Roy Chowdhury, PhD,** *National Renewable Energy Laboratory*

**Photovoltaic (PV) Inverters and Micro Inverters**

AUTHORS:Vikram Roy Chowdhury, Gab-Su Seo, Barry Mather

**D22.6 Optimized Bidirectional On-Board Charger using a Novel Unfolder-DAB Topology**

**Héctor Sarnago,** *Universidad de Zaragoza*

**On-board and Off-board Charging Systems**

AUTHORS:Héctor Sarnago, Ignacio Álvarez, Pablo Briz, Óscar Lucía

**D23.4 Double Pulse Test Platform for Hybrid SiC-IGBT Switch Characterization and Optimal Gate Control Strategy for EV Traction Inverters**

**Rosario Attanasio,** *STMicroelectronics*

**Power Electronics for Hybrid and Electric Vehicles**

AUTHORS:Rosario Attanasio, Harsha Ademane, Ryan Satterlee, Gianni Vitale

**D24.2 A Capacitively Coupled Alternative Electric Field Control for Freeze-Free based High Quality Food Preservation**

**Jaeyong Cho,** *Samsung Electronics*

**Wireless Charging**

AUTHORS:Jaeyong Cho, Junhyeong Park, Sung-Bum Park, Daehyun Kim, Jinsoo Choi

**D25.7 Unveiling Aliasing Effect on Resonant Pole Locations in Wireless Battery Chargers**

**Anwesha Mukhopadhyay, PhD,** *The University of Tennessee Knoxville*

**Wireless Charging**

AUTHORS:Anwesha Mukhopadhyay, Daniel Costinett

# PLENARY SESSION

The APEC Plenary Session is a long-standing tradition of addressing topics of immediate and long-term interest to the practicing power electronics engineer. The on-trend topics featured during the plenary session are brought to you by invited distinguished professionals followed by an interactive Q&A session.

LEVEL FOUR, SIDNEY J. MARCUS AUDITORIUM

1:30 PM – 1:40 PM

## APEC 40th Anniversary Celebration Show

1:40 PM – 2:00 PM

## APEC Opening & Plenary Welcome

### Introduction

> **Stephanie Watts Butler**
APEC 2025 Plenary Chair

### Opening Welcome Message

> **Aung Thet Tu**
APEC 2025 General Chair

### Plenary Introduction

> **Jin Wang**
APEC 2025 Program Chair

2:00 PM – 2:30 PM

## A Technology's Journey: 40 Years of APEC

SPEAKER:

**John G. Kassakian**
Professor of Electrical Engineering, Emeritus
(General Chair, 1st APEC 1986, 2nd APEC 1987)
*The Massachusetts Institute of Technology*

It has been 40 years since the first APEC and the first Issue of IEEE Transactions on Power Electronics (TPEL). What has happened in that nearly half a century? A lot! Power electronics technology has experienced advances that have been transformational – e.g., in semiconductors, control, packaging, economics, sensors – and these advances have made power electronics an enabler for many new applications -- anti-lock brakes, drive by wire, capturing solar and wind energy, high-field MRI. We review this progress, highlighting salient milestones and discuss the current state of our technology. We then consider what developments, and their implications, we might reasonably expect to see within the next decade, and what advances in technology and applications are not yet envisioned but hold promise for the future.

Dr. Kassakian is Professor Emeritus of Electrical Engineering and Computer Science at The Massachusetts Institute of Technology, where from 1991 to 2009 he directed the interdepartmental Laboratory for Electromagnetic and Electronic Systems. He received his undergraduate and graduate degrees from MIT, and served in the US Navy prior to joining the MIT faculty. He is the Founding President of the IEEE Power Electronics Society, and is the recipient of many IEEE awards, including the IEEE William E. Newell Award and the IEEE Power Electronics Society's Distinguished Service Award. He is a Life Fellow of the IEEE and a member of the National Academy of Engineering. He has published extensively in the areas of power electronics, education and automotive electrical systems, co-chaired the MIT study "The Future of the Electric Grid" and is a co-author of the textbook Principles of Power Electronics. He has served on the boards of several public companies and for 12 years was a member of the Board of Directors of ISO-New England, the operator of the New England electricity grid.

2:30 PM – 3:00 PM

## Emerging Applications for Power Electronics In Efficient, Resilient Buildings

SPEAKER:

**Wyatt Merrill**
Technology Manager for Solid-State Lighting and Building Electric Appliances, Devices, and Systems (BEADS)
U.S. Department of Energy

While power electronics have been ubiquitous in residential and commercial buildings for decades, their efficiency and size has improved dramatically and their applications in the built environment continue to evolve. Ongoing modeling and analysis at U.S. Department of Energy (DOE) national laboratories shows that least-cost retrofit solutions for homeowners seeking to electrify their dwelling often require peak-load management to accommodate existing building electrical capacities. Building envelope retrofits can achieve this in a passive way, but often the least-cost, fastest solution is to actively control high-power loads or re-design them in a way that limits their peak power draw from the grid. One emerging method of achieving peak load reductions without impacting performance is to provide surge power at the point of use with an embedded battery, such as in a stove, water heater, or HVAC unit. Such applications represent a "Goldilocks" region for battery sizing in residential buildings (between consumer electronics batteries and whole-home battery energy storage systems) with several unique benefits and open questions relevant to power electronics. This talk will explore how DOE has supported these nascent technologies through R&D projects, what role they can play in providing resilience to buildings and the electrical grid, and what challenges remain for their design and implementation from a power-electronics standpoint.

Wyatt Merrill is a Technology Manager and Technical Project Officer for the U.S Department of Energy in the Building Technologies Office. He manages two federal R&D portfolios, working closely with U.S. national laboratories, industry, and academia on emerging technologies relevant to efficient, healthy, resilient residential and commercial buildings. His research focus areas include next-generation lighting applications, building power distribution architectures, novel building energy storage integration, and plug- and appliance-load efficiency and control strategies. He has been with DOE since 2019, originally as an AAAS Science and Technology Policy Fellow. Prior to joining DOE, he was a recipient of the National Research Council Research Associateship Award in 2017 and a Research Scientist with the National Oceanic and Atmospheric Administration (NOAA) from 2017-2019. He has a PhD in chemistry from the University of Wisconsin-Madison.

3:00 PM – 3:30 PM

## BREAK

3:30 PM – 4:00 PM

## The Role of Power Electronics in Achieving a Sustainable Hydrogen Economy

SPEAKER:

**Francisco Canales**
Corporate Research Fellow
*ABB Switzerland Ltd.*

Decarbonization of major energy-consuming sectors is a top priority of the 2015 Paris Agreement and the Intergovernmental Panel on Climate Change (IPCC) 2023 report. This has significantly challenged today's energy systems with the development of long-term sustainable energy production and storage. Perhaps one of the most promising strategies for addressing this challenge is the implementation of hydrogen solutions, where renewables can be heavily utilized and new ways of storing and transporting this green energy can be explored. To achieve the viability of green hydrogen, production plants must be scaled up to reduce the investment cost. Electrolyzer manufacturers are making significant efforts to increase the capacity of these units, with prototypes now reaching up to 50 MW. In this context, Power Electronics is expected to play a key role in enhancing performance and reducing final production costs by enabling the integration of various systems, such as different types of renewables feeding a cluster of electrolyzers for hydrogen production, potentially with a grid connection. Power Electronics will be crucial in managing the increased power demands, ensuring stable and efficient operation of these high-capacity hydrogen systems. The presentation aims to discuss the role of Power Electronics in future electrified hydrogen systems and outline the challenges and opportunities in these sectors.

Francisco Canales (Member, IEEE) received the Ph.D. degree in electrical engineering from the Virginia Polytechnic Institute and State University, Blacksburg, VA, USA. As a Senior Research Assistant at the Center for Power Electronics Systems, Virginia Tech, he was part of several core research and several industry-sponsored projects. He was an Associate Professor in the Department of Electronic Engineering, CENIDET, México. In his role of Corporate Research Fellow at ABB Ltd, his current research interests center around modular converter designs, resonant switching concepts and high-efficient conversion topologies for industrial, traction and renewable energy applications.

4:00 PM – 4:30 PM

## Integrated Magnetics and Heterogenous Integration Enabling Vertical Power Delivery for High Performance Computing

SPEAKER:

**Cian Ó Mathúna**
Research Director Integrated Power and Energy Systems Embedded & Integrated Magnetics
Tyndall National Institute

Integrated power management and vertical power delivery are becoming essential for power delivery for high performance processors and AI engines. This is facilitating the concept of granular power whereby large arrays of dc-dc converters are integrated within the processor package platform thereby enabling dramatic reduction in overall system energy. This paradigm shift is being enabled by the miniaturisation of magnetic inductors using thin-film magnetic films on silicon and PCB-embedded structures to replace bulky wire-wound devices. This talk will discuss the commercial emergence of magnetics-on-silicon technology (MagIC) and associated PCB-embedded magnetics technologies which are enabling Power Supply on Chip and Power Supply in Package platforms. The various integrated magnetic technologies will be introduced along with their relative performance capabilities. The talk will also discuss the need for the parallel development and utilisation of Heterogeneous Integration and Chiplet platforms for 2.5D and 3D packaging of integrated power as evidenced in the EU and the USA Chips Acts. Key challenges still to be addressed, both from a technology and supply-chain perspective, will also be presented.

Prof. Cian Ó Mathúna is Director of Integrated Power and Energy Systems Research at Ireland's Tyndall National Institute, University College Cork. His team's research, into the miniaturisation and integration of magnetics onto silicon, has contributed to disruptive developments of integrated power management for processors in portable and high performance computing. Using semiconductor fabrication of thin-film magnetics, the team have made bulky magnetic components disappear onto silicon chips. Called "MagIC", Tyndall's magnetics-on-silicon technology has been licensed to global electronics companies and foundries. In 2008, Cian founded the International Workshop on Power Supply on Chip (PwrSoC), now a flagship event for IEEE PELS and PSMA. Through his leadership, and his collaborations with world-leading industry players in Europe, USA and Asia, Ó Mathúna has influenced the emergence of global supply-chains for PwrSoC that has seen high-volume production of magnetics-on-silicon in commercial product. Cian is an IEEE Fellow and, in 2021, received the IEEE PELS Technical Achievement Award for Integration and Miniaturisation of Switching Power Converters and also received an EARTO (European Association of Research and Technology Organisations) Impact Innovation Award.




*speakers, times, and topics subject to change.*

# TECHNICAL LECTURES *as of February 4, 2025*

This part of APEC Technical Program features lecture presentations from authors of peer-reviewed papers that cover all areas of technical interest for the practicing power electronics professional. The rigorous review process ensures that only the most innovative technical solutions are highlighted to provide the highest quality possible. Papers selected for the Lecture Sessions are presented in traditional oral presentations. Papers are selected for the Lecture Sessions for their interest to a broad range of APEC attendees.

8:30 AM – 12:00 PM

## T01: AC-DC Converters I

LEVEL THREE, A315

SESSION CHAIRS

**Mike Ranjram,** *Arizona State University*

**Xiaofan Cui,** *University of California, Los Angeles*

8:30 AM

**T01.1 Versatile Controller Architecture for a Universal DC Fast Charging Front-End**

**Single-Phase and Three-Phase Input**

AUTHORS: Anurag Singh, Sayan Paul, Tejas Bhuse, Trent Martin, Hien Nguyen, Inder Vedula, Nikola Milivojević, Dragan Maksimović, Luca Corradini

8:50 AM

**T01.2 A 10 kV SiC MOSFET Based Three-Phase Single-Stage Isolated MVAC/LVDC Converter for Solid State Transformer Applications**

**Power Factor Correction: CCM, DCM, CRM/BCM Control, Bridgeless**

AUTHORS: Anup Anurag, Chi Zhang, Rudy Wang, Peter Barbosa

9:10 AM

**T01.3 Direct Digital Control Applied to T-Type Vienna Rectifiers for Power Factor Correction**

**Power Factor Correction: CCM, DCM, CRM/BCM Control, Bridgeless**

AUTHORS: Jun-Yang Chang, Tsai-Fu Wu, Chien-Chih Hung, Jui-Yang Chiu

9:30 AM

**T01.4 Active Power Decoupling Method Based on Dual Active Bridge Converter without Additional Components**

**Bidirectional AC-DC Converters**

AUTHORS: Kosuke Takeuchi, Takashi Ohno, Hiroki Watanabe, Yuki Nakata, Jun-Ichi Itoh

9:50 AM

**T01.5 An ANPC-Based Building Block for Medium-Voltage Applications**

**Bidirectional AC-DC Converters**

AUTHORS: Ahmed Rahouma, Hui Cao, David Porras, Zhuxuan Ma, Yue Zhao, Juan Balda

10:40 AM

**T01.6 Analog Control of a 2.5 kW GaN Based CRM PFC with Input Filter Optimization**

**Single-Phase and Three-Phase Input**

AUTHORS: Naveed Ishraq, Ayan Mallik

11:00 AM

**T01.7 An iTHD and Efficiency Optimized Control Method for Triangular Conduction Mode Totem Pole Bridgeless PFC with Zero Current Detection**

**Power Factor Correction: CCM, DCM, CRM/BCM Control, Bridgeless**

AUTHORS: Brent McDonald, Sheng-Yang Yu

11:20 AM

**T01.8 Resonance Current Suppression for AC-DC Active-Clamp Flyback Converter by Triangular Current Mode**

**External AC-DC Adapters**

AUTHORS: Yasuo Uchida, Hiroki Watanabe, Jun-Ichi Itoh

11:40 AM

**T01.9 A Universal DC Fast Charging Front-End with Optimized Film Capacitor Design**

**Single-Phase and Three-Phase Input**

AUTHORS: Sayan Paul, Anurag Singh, Tejas Bhuse, Trent Martin, Hien Nguyen, Inder Vedula, Nikola Milivojević, Dragan Maksimović, Luca Corradini

8:30 AM – 12:00 PM

## T02: Bi-directional DC-DC Converters

LEVEL THREE, A302

SESSION CHAIRS

**Olivier Trescases,** *University of Toronto*

**David Reusch,** *Texas Instruments*

8:30 AM

**T02.1** **Power Characterization of a 1200-V/800-V 22-kVA 30-kHz Unity-Gain Dual-Active-Bridge Converter Prototype**

Bidirectional DC-DC Converters

AUTHORS: Radhika Sarda, Abishek Sethupandi, Madasamy Palavesha Thevar, Howe Li Yeo, Praveenkumar Palani, Vaisambhayana B. Sriram, Anshuman Tripathi

8:50 AM

**T02.2** **Design of Fully Soft-Switched Semi-Dual Active DC-DC Converter for Battery Charging Application**

Hard- and Soft-Switched

AUTHORS: Siva Prabhakar, Shiladri Chakraborty, Sandeep Anand

9:10 AM

**T02.3** **A ZCS-ZVS Strategy for Low Impedance Dual Active Bridges in MHz Range**

Bidirectional DC-DC Converters

AUTHORS: Pushkar Saraf, Michael Solomentsev, Alex Hanson

9:30 AM

**T02.4** **T-Type Multilevel DAB Converter with Reduced Backflow Power**

Bidirectional DC-DC Converters

AUTHORS: Piyali Pal, Ranjan Kumar Behera, Khalifa Al Hosani, Utkal Ranjan Muduli

9:50 AM

**T02.5** **A 6.6 kW Highly Efficient Reconfigurable Dual Active Bridge Converter Designed using Planar Transformer, SiC-Fets and Monolithic Bidirectional Devices**

Bidirectional DC-DC Converters

AUTHORS: Reza Barzegarkhoo, Fabian Groon, Arkadeb Sengupta, Marco Liserre

10:40 AM

**T02.6** **Interleaved Switched-Inductor-Based SIPO Partial Power Converter Module for Battery Management Systems**

Bidirectional DC-DC Converters

AUTHORS: Fengwang Lu, Henry Shu-Hung Chung

11:00 AM

**T02.7** **Single Sensor-Based Fault Localization and Detection in GaN Three-Phase Dual Active Bridge Converters**

Bidirectional DC-DC Converters

AUTHORS: Satyam Sa, Yi Han, Cheng Feng Wang, Olivier Trescases

11:20 AM

**T02.8** **Enhanced Cocharge Operation Scheme in Bidirectional PhaseShift Full-Bridge Converters with Eliminated Voltage Overshoot and Reduced Freewheeling Current**

Bidirectional DC-DC Converters

AUTHORS: Tien-Sheng Li, Minh Ngo, Rolando Burgos, Dong Dong

11:40 AM

**T02.9** **DC Bias Elimination in Isolated DC-DC Converters using Fundamental-Frequency Ripple**

Bidirectional DC-DC Converters

AUTHORS: Arkadeb Sengupta, Thiago Antonio Pereira, Marco Liserre

8:30 AM – 12:00 PM

## T03: Single & Multiphase Inverters

LEVEL THREE, A311

SESSION CHAIRS

**Matt Woongkul Lee,** *Purdue University*

**Laszlo Huber,** *Delta Electronics (Americas) Ltd.*

8:30 AM

**T03.1** **Tunable Matching Network with Dual Phase-Switched Impedance Modulation Actuators**

Single and Multi-Phase Inverters

AUTHORS: Alexander Jurkov, David Perreault

8:50 AM

**T03.2** **Soft-Switched Pulsed Bias Plasma Supply System**

Single and Multi-Phase Inverters

AUTHORS: Julia Estrin, Alexander Jurkov, David Perreault

9:10 AM

**T03.3** **Analysis and Design of a Cyclo-Active-Bridge Inverter for Single-Stage Three-Phase Grid Interface**

**Single and Multi-Phase Inverters**

AUTHORS: Mian Liao, Tanuj Sen, Yang Wu, Minjie Chen

9:30 AM

**T03.4** **Modular Nanosecond Pulse Generator Leveraging GaN and SiC for Versatility and Performance**

**Multilevel Inverters**

AUTHORS: Pablo Briz, Héctor Sarnago, Óscar Lucía

9:50 AM

**T03.5** **A Variable Frequency Technique for EMI and Efficiency Improvements in High-Level Count Flying Capacitor Multilevel Converters**

**Power Quality and EMI**

AUTHORS: Francesca Giardine, Sahana Krishnan, Logan Horowitz, Robert C. N. Pilawa-Podgurski

10:40 AM

**T03.6** **Analysis and Implementation of Minimum-Sensor Capacitor Voltage Estimators for Flying Capacitor Multilevel Converters**

**Multilevel Inverters**

AUTHORS: Syed Tahmid Mahbub, Rahul Iyer, Ivan Petrić, Robert C. N. Pilawa-Podgurski

11:00 AM

**T03.7** **Single-Stage Bidirectional High-Frequency Link DC to Three-Phase AC (4-Wire) Grid-Tied Microinverter**

**Single and Multi-Phase Inverters**

AUTHORS: Aniruddh Marellapudi, Satish Belkhode, Joseph Benzaquen Sune, Deepak Divan

11:20 AM

**T03.8** **Analysis and Design of a Constant Current LCC Class-E Inverter**

**Single and Multi-Phase Inverters**

AUTHORS: Ju Gao, Ziheng Liu, Jiayin He, Hongjie Peng, Chengkang Ao, Jinyan Wang

11:40 AM

**T03.9** **Series Connected Class-E Push-Pull Converters using GaN HEMT for High-Efficiency RF Generators in Float Zone Silicon Production**

**Single and Multi-Phase Inverters**

AUTHORS: Faheem Ahmad, Thore Stig Aunsborg, Jannick Kjær Jørgensen, Stig Munk-Nielsen

8:30 AM – 12:00 PM

## T04: GaN Power Devices

LEVEL THREE, A312

SESSION CHAIRS

**Joseph Kozak,** *Johns Hopkins University Applied Physics Laboratory*

**Aaron Brovont,** *Purdue*

8:30 AM

**T04.1** **State of the Art 1.7kV Lateral GaN HEMTs, an Alternative to SiC**

**GaN and SiC Devices and Modules**

AUTHORS: Karthick Murukesan, Robert Yang, Kamal Varadarajan, Sorin Georgescu, Doug Kang

8:50 AM

**T04.2** **Modeling and Characterization of Current and Future 1.2 kV Wide Bandgap Semiconductor-Based MOSFETs**

**GaN and SiC Devices and Modules**

AUTHORS: Sushanta Gautam, Austin Michael Szczublewski, Samuel Kwabena Atwimah, Aidan Patrick Fox, William Collings, Tolen Michael Nelson, Daniel Georgiev, Raghav Khanna, Andy Koehler, Karl Hobart

9:10 AM

**T04.3** **2.5-kV 6.4-ns 100-kHz Repetitive GaN Marx Generator**

**GaN and SiC Devices and Modules**

AUTHORS: Ruize Sun, Ci Pan, Wanjun Chen, Bo Zhang

9:30 AM

**T04.4** **Novel Dual Output LDO Architecture in 650-V GaN Technology for Power ICs**

**GaN and SiC Devices and Modules**

AUTHORS: Plinio Bau, Thanh Hai Phung, Deniz Aygun, Bart Coomans, Mike Wens

9:50 AM

**T04.5** **Impact of Substrate Bias on the Stability of Bi-directional GaN HEMT in Hard- and Soft-Switching**

**GaN and SiC Devices and Modules**

AUTHORS: Qihao Song, Hongchang Cui, Qiang Li, Yuhao Zhang

10:40 AM

**T04.6** **Characterization of LED Driven GaN-Based Photoconductive Switches**

GaN and SiC Devices and Modules

AUTHORS: Samuel Atwimah, Tolen Michael Nelson, Geoffrey Foster, Daniel Georgiev, Andrew Koehler, Alan Jacobs, Karl Hobart, Micheal Hontz, Raghav Khanna

11:00 AM

**T04.7** **Development and Validation of Repetitive Transient Gate Overvoltage Rating for GaN HEMTs**

GaN and SiC Devices and Modules

AUTHORS: Ricardo Garcia, Angel Espinoza, Siddhesh Gajare, Shengke Zhang

11:20 AM

**T04.8** **Junction Temperature Monitoring of GaN HEMT by using On-Resistance with Voltage Clamp and Current Shunt**

GaN and SiC Devices and Modules

AUTHORS: Xiao Wang, Mingrui Zou, Jiakun Gong, Yulei Wang, Zheng Zeng

11:40 AM

**T04.9** **False Turn-On Failure and Protection of p-Gate GaN HEMT in MHz Class-E Resonant Inverter**

GaN and SiC Devices and Modules

AUTHORS: Ziheng Liu, Ju Gao, Hongjie Peng, Jiayin He, Jinyan Wang, Maojun Wang

8:30 AM – 12:00 PM

## T05: Magnetics Applications I

LEVEL THREE, A301

SESSION CHAIRS

**Matt Wilkowski, MSEE,** *Würth Elektronik*

**George A. Slama,** *Würth Elektronik*

8:30 AM

**T05.1** **Heat Extraction from Ferrite Cores using Metallic Laminations**

Advanced Magnetic Materials and Geometries

AUTHORS: Alyssa Brown, Tan Duy Nguyen, Alex Hanson

8:50 AM

**T05.2** **Folded Flex-PCB Winding Planar Transformer for High-Frequency Isolated DC-DC Converters**

Winding Techniques

AUTHORS: Soundhariya Ganesan Soundararajan, Hans Wouters, Wout Vanderwegen, Wilmar Martinez

9:10 AM

**T05.3** **Winding Strategy Analysis and Optimization for High-Current Matrix Transformer**

Winding Techniques

AUTHORS: Bima Nugraha Sanusi, Pinhe Wang, Michael A. E. Andersen, Ziwei Ouyang

9:30 AM

**T05.4** **Investigation on Impact of Transformer Parasitic Capacitance on Standby Power Consumption in Power Converters**

Winding Techniques

AUTHORS: Kamran Kamran, Andrea Russo, Federica Cammarata, Claudia Malannino, Sebastiano Yuri Ciardo, Ziwei Ouyang

9:50 AM

**T05.5** **PCB-Winding Integrated Transformer for 800-V Dual Active Bridge Converter using 1.2-kV GaN Devices**

High-Frequency Magnetics

AUTHORS: Hans Wouters, Wei-Ren Lin, Nicolas Pirson, Thomas Jochmans, Yu Zuo, Wilmar Martinez

10:40 AM

**T05.6** **Comparative Assessment of Inductance Modeling for PCB-Based Circular Spiral Coils in Inductive Power Transfer Systems**

Winding Techniques

AUTHORS: Gaia Petrillo, Drazen Dujic

11:00 AM

**T05.7** **Compact Air-Core Inductors for Variable Frequency Soft-Switching in 3 Phase Inverters**

High-Frequency Magnetics

AUTHORS: Youssef Fahmy, Matthias Preindl

11:20 AM

**T05.8** **Simulation and Experimental Research on Cooling Performance of Fully-Immersed Evaporative Cooling High-Frequency Transformer**

High-Frequency Magnetics

AUTHORS: Zhanlei Liu, Lingyu Zhu, Yuntian Gao, Yongliang Dang, Cao Zhan, Shengchang Ji

11:40 AM

**T05.9** **High-Efficiency PCB-Embeddable Inductor for Vertical Power IVR Applications**

High-Frequency Magnetics

AUTHORS: Youssef Kandeel, Liang Ye, John Flannery, Takayuki Tsuchida, Naoya Terauchi, Sumiaki Kishimoto, Toshio Hiraoka, Masanori Nagano, Cian Ó Mathúna, Ranajit Sai, Seamus O'Driscoll

8:30 AM – 12:00 PM

## T06: Control of Power Electronic Converters I

LEVEL THREE, A313

SESSION CHAIRS

**Masoud Karimi-Ghartemani,** *Mississippi State University*

**Misha Kumar, MSEE,** *Delta Electronics (Americas) Ltd.*

8:30 AM

**T06.1 An Adaptive Zero Current Switching Control Technique for Multi-Resonant Switched-Capacitor Converters**

**Control of Power Electronic Converters**

AUTHORS: Haifah B. Sambo, Rose A. Abramson, Sahana Krishnan, Robert C. N. Pilawa-Podgurski

8:50 AM

**T06.2 Small-Signal Analysis and External Ramp Design for Multiphase Current-Mode Constant On-Time Control with Phase Overlapping**

**Current-Mode and Voltage-Mode Control**

AUTHORS: Sundaramoorthy Sridhar, Qiang Li

9:10 AM

**T06.3 Multiphase Constant-on-Time Minimum-Deviation Controller for Modern Processors**

**Current-Mode and Voltage-Mode Control**

AUTHORS: Duo Li, Gianluca Roberts, Alan Wu, Aleksandar Prodić

9:30 AM

**T06.4 Closed-Loop Control of a Dual-Side Series/Parallel Piezoelectric-Resonator-Based DC-DC Converter**

**Control of Power Electronic Converters**

AUTHORS: Wen-Chin Brian Liu, Gaël Pillonnet, Patrick Mercier

9:50 AM

**T06.5 High-Bandwidth Embedded Rogowski Coil on Multilayer Substrate with Minimal Contribution to Power Loop Inductance**

**Sensor and Sensor-less Control**

AUTHORS: Takahiro Okamoto, Masataka Ishihara, Kazuhiro Umetani, Eiji Hiraki

10:40 AM

**T06.6 Operating and Switching Frequency Circulating Current Control in Paralleled High Power Adjustable Speed Drives with Common DC Link**

**Control of Power Electronic Converters**

AUTHORS: Kevin Lee, Zhihao Song, Wenxi Yao, Bo Wei

11:00 AM

**T06.7 Mixed-Signal Sliding Mode Controller for Non-Inverting Buck-Boost Photovoltaic DC Optimizers**

**Digital Control-MCUs, DSPs, FPGAs, ASICs**

AUTHORS: Anurag Singh, Sayan Paul, Dragan Maksimović, Luca Corradini

11:20 AM

**T06.8 A Current Sensorless Output Voltage Tracking Controller-Observer for a Boost Inverter using Feedback Linearization**

**Control of Power Electronic Converters**

AUTHORS: Ion Dos Santos, Tailan Orlando, Yohannes Scherer, Telles Lazzarin, Hector Silveira

11:40 AM

**T06.9 Modeling and Control of a Cyclo-Active-Bridge Inverter for Single-Stage Three-Phase Grid Interface**

**Control of Power Electronic Converters**

AUTHORS: Tanuj Sen, Mian Liao, Yang Wu, Minjie Chen

8:30 AM – 12:00 PM

## T07: Modeling & Simulation I

LEVEL THREE, A316

SESSION CHAIRS

**Adam Skorek,** *University of Québec at Trois-Rivières*

**Yunting Liu, PhD,** *Penn State*

8:30 AM

**T07.1 Turn-On Transient Modeling of 10 kV SiC MOSFET Half-Bridge Power Module in LTspice**

**Device and Component Modeling**

AUTHORS: Nianzun Qi, Jannick Kjær Jørgensen, Gao Liu, Zhixing Yan, Morten Rahr Nielsen, Asger Bjørn Jørgensen, Hongbo Zhao, Stig Munk-Nielsen

8:50 AM

**T07.2 A Compact, Automated Sawyer-Tower System for Characterization of the High-Frequency, Soft-Switching Coss Loss of Wide Bandgap Devices**

**Parasitics Extraction and Optimization**

AUTHORS: Katherine Liang, Malachi Hornbuckle, Juan Rivas-Davila

9:10 AM

**T07.3** **Enhancing Behind-the-Meter Visibility of Grid Edge PV Systems and Electric Vehicle Charging Loads Through Integration of Compact Low-Cost Sensors**

**Hardware-in-the-Loop and Rapid Prototyping**

AUTHORS: Mehrnaz Madadi, Paul R. Ohodnicki, Subhashish Bhattacharya

9:30 AM

**T07.4** **Supercapacitor Based TMS Pulse Generator Design-Experimental Results Versus MATLAB MOSFET Simulation Model**

**Device and Component Modeling**

AUTHORS: Soniya Raju, Nihal Kularatna, Marcus Wilson, Alistair Steyn-Ross

9:50 AM

**T07.5** **Application of Artificial Intelligence for Modeling SiC Power MOSFETs**

**Device and Component Modeling**

AUTHORS: Fredo Chavez, Danial Bavi, Sourabh Khandelwal

10:40 AM

**T07.6** **Multi-Objective Design Automation in Power Electronics using Bayesian Optimization Techniques**

**Parasitics Extraction and Optimization**

AUTHORS: Tung-Tan Nguyen, Man-Hay Pong, Huang-Jen Chiu

11:00 AM

**T07.7** **Reduced Order Thermal Modelling of Multi-Chip Silicon Carbide Power Modules**

**Device and Component Modeling**

AUTHORS: Aamir Rafiq, Blake Nelson, Marshal Olimmah

11:20 AM

**T07.8** **Design and Evaluation of Dual-Resolver Emulation for Control System Verification in Aerospace Actuation Applications**

**Hardware-in-the-Loop and Rapid Prototyping**

AUTHORS: Tomas Sadilek, Julian Opificius, Jason Wright, Alec Leslie, Jeremie Tuzizila, Cesar Alzate, Hunter Burnett, Joshua Atkinson, Justin Stricula

11:40 AM

**T07.9** **Un-Terminated Blackbox Modeling for Electric Machines**

**Circuits and Systems**

AUTHORS: Xinliang Yang, Vladimir Mitrovic, Qing Lin, Rolando Burgos

8:30 AM – 12:00 PM

## T08: EV Charging Applications

LEVEL THREE, A314

SESSION CHAIRS

**Dong Cao, PhD,** *University of Dayton*

**Sheldon Williamson, PhD,** *Ontario Tech University*

8:30 AM

**T08.1** **7.2 kW GaN-Based DAB Converter with 37 kW/L Power Density and High Efficiency**

**On-board and Off-board Charging Systems**

AUTHORS: Esmaeil Jalalabadi, Jaksa Rubinic, Yang Jiao, Lucas Lu, Xiaoyu Wang

8:50 AM

**T08.2** **A Novel Interleaving Method for High Power Integrated Electric Vehicle Charger with Three-Phase Permanent Magnet Synchronous Motor**

**Power Electronics for Hybrid and Electric Vehicles**

AUTHORS: Ryota Tanaka, Toshihiro Kai, Kenta Takishima, Yoshiyuki Nagai, Tetsuya Hayashi, Kantaro Yoshimoto

9:10 AM

**T08.3** **A Three-Phase CLLC Resonant Converter with Integrated Planar Magnetics for 22-kW On-Board Chargers**

**On-board and Off-board Charging Systems**

AUTHORS: Tianlong Yuan, Zhangwei Xiang, Abdelrahman Ali, Feng Jin, Qiang Li, Wendell Da-Cunha-Alves, Xiaoshan Liu

9:30 AM

**T08.4** **Reconfigurable LLC Resonant Converter for Wide Voltage Range and Reduced Voltage Stress in DC-Connected EV Charging Stations**

**Power Electronics for Hybrid and Electric Vehicles**

AUTHORS: Yu Zuo, Xiaobing Shen, Bangli Du, Qingcheng Sui, Tim Geboers, Wilmar Martinez

9:50 AM

**T08.5** **Design and Control of GaN Based Three-Phase / Single-Phase Combo Three-Level Flying Capacitor PFC for OBC Applications**

**On-board and Off-board Charging Systems**

AUTHORS: Nidhi Haryani, Laszlo Huber, Anup Anurag, Juan Ruiz, Peter Barbosa

10:40 AM

**T08.6** **Optimization Strategy for Battery Electric Vehicle (BEV) DC Fast Charging (FC) in Cold Environments**

**On-board and Off-board Charging Systems**

AUTHORS: Seif Sarofim, Cheng Feng Wang, Satyam Sa, Avram Kachura, Isaac Muscat, Olivier Trescases

11:00 AM

**T08.7** **DC-Link Voltage Reduction with Synergetic Common-Mode Voltage Control of Single-Phase Two-Stage Non-Isolated EV Chargers**

**On-board and Off-board Charging Systems**

AUTHORS: Dongsu Lee, Juwon Lee, Jung-Ik Ha

11:20 AM

**T08.8** **DC-DC Converter Architecture for Fast Electric Vehicle (EV) Battery Charging Applications**

**On-board and Off-board Charging Systems**

AUTHORS: Shibaji Basu, Arjun Ivimey, Praveen Jain

11:40 AM

**T08.9** **Fast Simulator for the Estimation of Inverter DC-Link Temperature in e-Drives Subjected to Highly Variable Working Cycles**

**Power Electronics for Hybrid and Electric Vehicles**

AUTHORS: Simone Giuffrida, Fabio Mandrile, Radu Bojoi

# INDUSTRY SESSIONS *as of February 4, 2025*

Presentations in Industry Sessions do not have a written paper. This allows authors, particularly those from industry, to publish their latest work without the burden of preparing a formal manuscript. Industry Session presentations allow for the publishing of more current information from a wide range of topics and areas of interest that appeal not just to design engineers but other power electronics professionals including systems engineers, applications engineers, technical marketing, manufacturing, component suppliers, regulatory engineers, and business-oriented professionals in sales, marketing, and procurement.

8:30 AM – 11:55 AM

## IS01: Powering the Post 48V Era: Addressing the Datacenter-Level Power Delivery Challenges in the AI Revolution

LEVEL FOUR, A412

SESSION CHAIRS

**Zichao Ye,** *Google*

**Rolando Burgos,** *Virginia Polytechnic Institute and State University*

8:30 AM

**IS01.1** **ML Challenges to the 48V Architecture and the Next Generation Rack with +/-400Vdc bus**
**Xiong Li,** *Google*

8:55 AM

**IS01.2** **Solid State Transformer (SST-Based) DC Architecture for Datacenter Applications**
**Rudy Wang, PhD,** *Delta Electronics (Americas) Ltd*

9:20 AM

**IS01.3** **Novel Quasi-Single-Stage Isolated 3-φ PFC Rectifier Concept Breaking Through the 99% Efficiency Barrier**
**Johann W. Kolar, PhD,** *ETH Zurich*

9:45 AM

**IS01.4** **MV SiC Power Electronics for Data Centers: Advantages, Challenges, and Control**
**Rolando Burgos,** *Virginia Polytechnic Institute and State University*

10:10 AM

**IS01.5** **Potential Benefits of DC Power Distribution Bus in Data Center Applications**
**Ella Zhou,** *Siemens*

11:05 AM

**IS01.6** **New Strategies in Design to Meet the Demands of AI Data Centers**
**Harry B. Handlin,** *ABB*

11:30 AM

**IS01.7** **Integrated GaN Solution for Server Power Supply Units**
**Fei Yang,** *Texas Instruments*

8:30 AM – 11:55 AM

▸ PSMA SESSION ◂

## IS02: Global Electrification Continues to Grow, the Need for New Passives and Design Methods for Power Applications Has to Match

LEVEL FOUR, A411

SESSION CHAIRS

**Alan J. Cooper, MSc., PhD., CEng MIET,** *YAGEO*

**Frank Puhane, B.Eng,** *Würth Elektronik*

8:30 AM

**IS02.1** **Capacitors and Aircraft Power System Considerations for Higher Temperature Operation and Wide Bandgap Enablement**
**Roger A. Brewer,** *Lockheed Martin*

8:55 AM

**IS02.2** **Considerations for Choosing Capacitors for High Power Applications**
**Frank Puhane, B.Eng,** *Würth Elektronik*

9:20 AM

**IS02.3** **Vapor Deposited Thin Film Thermoset Polymer Dielectrics for High-Performance, High-Reliability, Capacitors for In-Module Snubber Applications.**
**Steven Yializis,** *Polycharge*

9:45 AM

**IS02.4** **Utilizing Machine Learning Techniques for Reliability Analysis and Health Monitoring of DC-Link Capacitors**
**Mark Scott,** *Miami University*

10:40 AM

**IS02.5** **Improving the EMI Performance of Isolated Power Modules**
**Frank Puhane, B.Eng,** *Würth Elektronik*

11:05 AM

**IS02.6** **The Significance of Managing Reactive Power in the Volatile, Uncertain, Complex, and Ambiguous (VUCA) Electric Energy Market**
**Nicola Gallazzi,** *Ducati*

11:30 AM

**IS02.7** **Increasing the Confidence of Capacitor Life Calculations and the Tools Used**
**Alan J. Cooper, MSc., PhD., CEng MIET,** *YAGEO*

8:30 AM – 11:55 AM

## IS03: Innovations in Motor Drives

LEVEL FOUR, A410

SESSION CHAIRS

**Reza Sharifi,** *Texas Instruments*
**Yifei Zheng,** *Infineon*

8:30 AM

**IS03.1** **Comparative Study of Surface Mount SiC MOSFETs in13kW Motor Drive for HVAC E-Compressor in EVs**
**Yuequan Hu, PhD,** *Wolfspeed*

8:55 AM

**IS03.2** **Design and Optimization of SiC-Based 11kW Motor Drive with High Efficiency**
**Iris Liu,** *wolfspeed*

9:20 AM

**IS03.3** **Enhance Traction Motor Efficiency using a GaN based Four-Level Flying Capacitors Inverter**
**Marco Palma, MSCee MBA,** *Efficient Power Conversion*

9:45 AM

**IS03.4** **Highly Integrated Coin-Sized 1 kW GaN-based Motor Drive**
**Edward A. Jones, PhD,** *Infineon Technologies Austria AG*

10:40 AM

**IS03.5** **Meeting Standby Power Regulations in Motor Drive Applications**
**Mark Angelo Tarvina,** *Power Integrations*

11:05 AM

**IS03.6** **Reduction of Motor Bearing Currents in Variable Frequency Drives Using CoolBLUE® and NaLA® Cores**
**Tobias Trupp,** *MAGNETEC GmbH*

11:30 AM

**IS03.7** **Three-Phase Integrated GaN IPM Technology for Enhancing Power Efficiency and Density for Motor-Drive System**
**Toshio Yamanaka,** *Texas Instruments*

8:30 AM – 11:55 AM

▸ PSMA SESSION ◂

## IS04: 3D-Power Packaging for AI and Vehicles

LEVEL FOUR, A402

SESSION CHAIRS

**Jason Rouse, PhD, MBA,** *Taiyo America*
**Brian C. Narveson,** *Narveson Consulting*

8:30 AM

**IS04.1** **Off-Road Vehicles' Power Electronics – Packaging and Thermal Management**
**Brij N. Singh, PhD,** *John Deere*

8:55 AM

**IS04.2** **Modern Power Conversion Enabled by WGB Semiconductors and Innovative Package Solutions**
**Peter Friedrichs, PhD,** *Infineon Technologies AG*

9:20 AM

**IS04.3** **PowerSiP Packaging for AI/Datacenter Applications**
**Vikas Gupta,** *ASE, USA*

9:45 AM

**IS04.4** **Power Technology Report on Embedded and Integrated Magnetics**
**Ranajit Sai,** *Tyndall National Institute*

10:40 AM

**IS04.5** **Advanced Package of Power Modules for AI**
**Ian Chan,** *Cyntec Co. Ltd., Taiwan*

11:05 AM

**IS04.6** **A Packaging Solution for Powering AI Processors**
**Joseph Meyer,** *Ferric Inc., USA*

11:30 AM

**IS04.7** **Integrated GaN & Passive Modules by Panel Level Manufacturing for AI data centers**
**Yoshiaki Aizawa, ME,** *AOI Electronics, Japan*

8:30 AM – 11:55 AM

## IS05: WBG Applications & Control

LEVEL FOUR, A403

SESSION CHAIRS

**Sam Abdel-Rahman,** *Infineon Technologies*

**Lei Han,** *Infineon Technologies*

8:30 AM

**IS05.1** **A Cost Effective Hybrid FOC Solution for Power Tool Applications**
**George Liang**

8:55 AM

**IS05.2** **An Enhanced Pulse Width Modulation Control Technique Optimized for High Conversion Efficiency Across Input Line and Load**
**Hai Trung Huynh, Master of Science,** *Power Integrations*

9:20 AM

**IS05.3** **How to easily convert a hard-switched full-bridge to a zero-voltage-switched full-bridge**
**John M. Dorosa,** *Texas Instruments*

9:45 AM

**IS05.4** **Oscillation stability of parallel connected SiC MOSFETs**
**LIZHONG ZHOU,** *Toshiba America Electronic Components, Inc.*

10:40 AM

**IS05.5** **Paralleling of 3x GaN FETs to 30 kW and Beyond**
**Yu Huang,** *Renesas Electronics*

11:05 AM

**IS05.6** **SR FET Spike Reduction and Primary Switch ZVS During CCM Operation of a Flyback Converter**
**BALA SUDHAKAR SINGAMANENI,** *Power Integrations Inc*

11:30 AM

**IS05.7** **The Safest, Simplest and Most Efficient SiC : Analog Devices' SiC Smart Switch**
**Rifat alam Siddique,** *Automotive Electrification at Analog Devices, Inc.*

8:30 AM – 11:55 AM

▸ PSMA SESSION ◂

## IS06: Reliability Redefined: Optimizing the Design-to-Production Transition for Superior Product Performance

LEVEL FOUR, A404/A405

SESSION CHAIRS

**Crystal Yannarella,** *L3Harris*

**Eric Swenson,** *IBM*

8:30 AM

**IS06.1** **Improving Power System Performance and Power Integrity using Time Domain Reflectometry (TDR)**
**Sathish kumar Krishnananda,** *Tektronix*

8:55 AM

**IS06.2** **Smart Motors: Harnessing Sensor Data and AI for Predictive Maintenance**
**Vivek Shivaram,** *Tektronix*

9:20 AM

**IS06.3** **Ideas for Practical Use Case of Advanced Power Management Telemetry for System Reliability and Predictive Maintenance**
**Tony Ochoa,** *TDK*

9:45 AM

**IS06.4** **Joint GaN Technology Study**
**Elona Lala, MS Electrical Engineer,** *IBM*

10:40 AM

**IS06.5** **Verification of Additional Core Loss Due to Temperature, Voltage and Time at High Frequencies with Accelerated Voltage and Thermal Test**
**Efrain Bernal Alzate,** *Würth Elektronik*

11:05 AM

**IS06.6** **Digital Twin Software Reliability**
**Nathan Burton,** *L3Harris*

11:30 AM

**IS06.7** **IPC 9592C Discussion**
**Eric Swenson,** *IBM*

# EXHIBITOR PRESENTATIONS *as of February 4, 2025*

Many APEC Exhibitors take advantage of the opportunity to make presentations in conjunction with the APEC Exposition. The best of these presentations present a current challenge to the power electronics industry, a brief review of how this challenge has been addressed in the past, and then how that company's products or services offer a solution better than previously existing solutions. The APEC Exhibitor Presentations offer a good way to get a more in-depth look at the latest product and services offered by suppliers to the power electronics industry.

## PRESENTATION I

1:30 PM – 2:00 PM

### Würth Elektronik

### Understanding EMI and Noise Mitigation Methods

EXPO HALL, EXPO THEATER 1

PRESENTED BY:

**Vidal Gonzalez,** *Würth Elektronik*

Electromagnetic Interference (EMI) is an essential consideration in modern electronic design, impacting device performance and compliance with regulatory standards. This presentation provides a brief introduction to the world of Electromagnetic Compatibility (EMC), starting with a fundamental explanation of EMI its definition, sources, and significance in electrical and electronic systems.

We will explore the two primary forms of EMI radiated and conducted emissions focusing on their origins and propagation methods. The session will also outline standardized testing procedures used to evaluate emissions, highlighting key aspects designers should monitor during testing to ensure compliance.

We will explain noise coupling mechanisms that influence EMI behavior, such as capacitive, inductive, and common-mode coupling. We show practical strategies for noise mitigation including grounding techniques and effective noise-filtering approaches.

This presentation aims to bring awareness to engineers, designers, and technical professionals with the foundational knowledge and tools needed to identify, measure, and address EMI challenges in their designs, enabling the development of robust and compliant systems.

1:30 PM – 2:00 PM

### STMicroelectronics

### 48V Architecture for Automotive

EXPO HALL, EXPO THEATER 2

PRESENTED BY:

**Aravind Mathsyaraja,** *STMicroelectronics*

Semiconductor power devices play a crucial role in the efficiency and performance of 48V vehicle electrical systems. Operating at a voltage above conventional 12V levels allows for the use of smaller and lighter wiring & packaging, reducing overall vehicle weight and improving fuel efficiency. There is an increasing demand for cost effective 48V power devices to enable efficient power conversion, control, and distribution within the vehicle while adhering to stringent functional safety standards. This discussion will focus on next generation integrated power solutions in advanced Gallium Nitride (GaN) and silicon that utilize innovative packaging and digital IP for 48V motor control, load & wire protection, and 48V-12V power conversion.

1:30 PM – 2:00 PM

### Infineon

### Powering Innovation: The Next Generation of 650 V CoolMOS ™ 8, 750 V CoolSiC™ G2 and Top Side Cooling Q-DPAK Technology

EXPO HALL, EXPO THEATER 3

PRESENTED BY:

**Zsolt Gyimesi,** *Infineon*

This presentation introduces the latest advancements in power management technology, featuring the 650 V CoolMOS 8 SJ MOSFET and 750 V CoolSiC Gen2 trench SiC MOSFET product families. These cutting-edge technologies are designed to provide highly efficient solutions for challenging applications, including artificial intelligence server power supplies, humanoid

robot charging, and electric vehicle charging. The presentation will showcase flagship design examples that demonstrate the exceptional performance of these new product families, as well as innovative packaging solutions such as the TOLL and Q-DPAK packages.

1:30 PM – 2:00 PM

## Wolfspeed

### Delivering Breakthrough Performance at Real-world Conditions

EXPO HALL, EXPO THEATER 4

PRESENTED BY:

**Ugo Ghisla,** *Wolfspeed*

Designers of high power automotive, industrial and renewable energy systems can achieve the ultimate in performance with a highly flexible new technology platform. Wolfspeed's Gen 4 power devices represent a paradigm shift in silicon carbide technology that puts three performance vectors at the center of every design: holistic system efficiency, durability, and lower system cost. From its inception, this new technology platform was designed with true customer challenges in mind and delivers the most in circuit value at real-world conditions. This presentation will focus on automotive applications and the new performance benchmarks that are achievable with the new technology.

1:30 PM – 2:00 PM

## ACME Electronics

### A State-of-the-art Heterogeneous Core Design to Further Boost Your Power Density

LEVEL THREE, A301

PRESENTED BY:

**Justin Lee,** *ACME Electronics*

The previous generation of hybrid core design with 3 gaps for power chokes has been verified to be able to improve saturation current with even lower core loss than the conventional ferrite framework. However, the size issue in comparison and benchmark to alloy powder cores limits the power density. In this session a state-of-the-art heterogeneous core framework and the performance of power boost effect are presented. Unlike alloy powder cores, the advanced heterogeneous design can be easily applied to the core geometry with great complexity to suit your specific requirements and with highly satisfactory C/P value.

1:30 PM – 2:00 PM

## Alpha & Omega

### Multi-Phase Controller and Power Stage for AI Server and Graphic Card Power

LEVEL THREE, A302

PRESENTED BY:

**Rhys Philbrick,** *Alpha & Omega*

Alpha & Omega Semiconductor's 16-Phase, dual loop controller is designed specifically for demanding GPU and AI SoC power requirements. The AOZ73016QI controller design is based on the company's high performance, proprietary AOS Advanced Transient Modulator (A2TM) control scheme. The AOZ73016QI offers value added features such as RDS(on) and DCR sensing for current monitoring and current balance. The AOZ73016QI control scheme offers excellent current balance at all load conditions as well as during fast load transients. These features enable AOS' controller to support both DrMOS and Smart Power Stages (SPS) to deliver a complete AI server and graphic card power solution along with increased design flexibility.

1:30 PM – 2:00 PM

## Delta Electronics

LEVEL THREE, A311

PRESENTED BY:

*Delta Electronics*

***Please check the mobile app for more information.***

1:30 PM – 2:00 PM

## Indium Corporation

### Materials Technology for Flux-Free Soldering Applications in Power Electronics

LEVEL THREE, A312

PRESENTED BY:

**Ryan Mayberry,** *Indium Corporation*

In this session, we will examine the latest power device manufacturing trends influencing materials selection in die-attach, package-attach, and discrete device soldering applications. Best practices for flux-free reflow methodologies will be outlined, including the deployment of novel solder paste technology to reduce process steps, cycle times, and efficiency in mass production.

## PRESENTATION 2

2:15 PM – 2:45 PM

### Power Integrations

EXPO HALL, EXPO THEATER 1

PRESENTED BY:

*Power Integrations*

***Please check the mobile app for more information.***

2:15 PM – 2:45 PM

### Würth Elektronik

### Advancing Power Solutions Using TLVR with High-Current Multiphase Dual Inductors

EXPO HALL, EXPO THEATER 2

PRESENTED BY:

**Manish Khandelwal,** *Würth Elektronik*

The demand for higher efficiency, reduced power losses, and compact designs in modern electronics has driven significant advancements in power conversion topologies and components. This presentation explores the role of Würth Elektronik's High-Current Multiphase Dual Inductors (WE-HCMD) in enabling Trans-Inductor Voltage Regulator (TLVR) topologies to address these challenges.

The TLVR topology is pivotal for applications requiring high current density and fast transient response, particularly in next generation computing and data center systems. The exceptional current-handling capacity, low DC resistance, and robust thermal performance of WE-HCMD inductors make them notably strategic to enhance TLVR designs.

This session will examine how the combination of TLVR architecture and WE-HCMD inductors optimizes energy efficiency, reduces power losses, and supports scalable solutions in demanding environments. By focusing on critical technical parameters and addressing common design trade-offs, this session provides a practical guide to improving power converter performance. Attendees will benefit from a review of the key design considerations, practical examples and actionable knowledge that underscore the value of this integration to advance applications with leading-edge technologies.

2:15 PM – 2:45 PM

### Texas Instruments

### Perpetuum Mobile – OR Pushing the Efficiency & Power Density Limits of Low-Power Flyback Converters

EXPO HALL, EXPO THEATER 3

PRESENTED BY:

**Laszlo Balogh,** *Texas Instruments*

Flyback converters are one of the most popular power conversion topologies for isolated DC/DC applications below the 120W to 150W range in every market segment. And in many higher-power systems flyback converters are used as auxiliary power supplies or to supply bias for high-performance gate drivers, especially when floating drivers require isolated bias rails. The latest industry trend for consumer applications – especially for USB Power Delivery – is integrated power stages where the controller, driver and the high-voltage primary side power transistor are all co-located in the same package offering a complete solution for the high-voltage side of the converter. This type of implementation is popular due to its simplicity, ease of use and the need for higher power density – in other words smaller size and weight – which is enabled by best in class efficiency. This presentation will introduce a new class of integrated flyback power stages. These new, highly integrated devices from Texas Instruments use state-of-the-art control algorithms and TI's own eMode GaN power switches. They offer many industry-first features such as high-voltage startup and keep alive power delivery for the controller itself and can generate their own bias power, providing input and output voltage sensing without the traditional auxiliary winding of the flyback transformer or the need of high-voltage resistor dividers and many more. This presentation will explain how these advanced features can minimize the last bits of wasted power loss in the flyback converter and serve as the enablers for higher efficiency and power density.

2:15 PM – 2:45 PM

## Mitsubishi Electric USA

### Expanding the LV100 Lineup to Include 3.3kV SiC SBD-Embedded MOSFETs (Unifull™) and Other Next Generation Technologies

EXPO HALL, EXPO THEATER 4

PRESENTED BY:

**Michael Rogers,** *Mitsubishi Electric USA*

The industry standard LV100 package is now available with Unifull™ technology (SBD-Embedded SiC MOSFETs), achieving 60% lower switching loss compared to the 1st Generation 3.3 kV full-SiC module. Unifull™ also ensures high reliability by preventing bipolar degradation. We have introduced a novel structure, the bipolar mode activation (BMA) cell, to enhance surge current capability, achieving a similar level to body-diode-operated SiC-MOSFET modules. Continuous current and repetitive surge tests confirm the robustness to bipolar degradation of Unifull™ chips. Additionally, our module exhibits excellent moisture resistance according to the High Voltage High Humidity High Temperature Reverse Bias (HV-H3TRB) test.

The LV100 lineup also is being expanded with:

- 8th generation IGBTs implementing a Split-Dummy-Active (SDA) gate structure to realize current ratings up to 1800A at 1200V.
- 2.5kV IGBTs and SiC MOSFETs optimized for renewable energy and energy storage applications
- SoLid Cover+ (SLC+) packaging which includes Al-alloy wire bonds for significant improvements of power cycling lifetime

2:15 PM – 2:45 PM

## Chip-GaN Semiconductor

### MCU-Driven GaNevo: Simplifying Power Module

LEVEL THREE, A301

PRESENTED BY:

**Professor Chen, Ke-Horng,** *Chip-GaN Semiconductor*

GaNevo Power GaN, our patented IC supplied by Chip-GaN Power Semiconductor Company, offers a groundbreaking advancement in power module technology. By reducing the pin number to just three, GaNevo minimizes the overall power module size, providing a streamlined and efficient solution. This innovative design simplifies high-power module construction, eliminating the need for system engineers to consider the driving capability of the controller or use additional external passive components.

The GaNevo series includes products with on-resistance values of 100m?, 70m?, and 50m?, and features multiple protection functions such as Overcurrent Protection (OCP), Short Circuit Protection (SCP), and Over Temperature Protection (OTP). Compared to state-of-the-art Power GaN devices, GaNevo stands out for its high reliability, robust power driving capabilities, and superior efficiency. Additionally, GaNevo products are cost-effective, making them an attractive option in the market.

This presentation will highlight the technical merits and practical advantages of the GaNevo Power GaN series, showcasing its potential to revolutionize power module design. Attendees will learn how GaNevo can drive innovation and efficiency in various applications, making it a key player in the future of semiconductor technology.

2:15 PM – 2:45 PM

## Chroma

LEVEL THREE, A302

PRESENTED BY:

*Chroma*

***Please check the mobile app for more information.***

2:15 PM – 2:45 PM

## Magnetics

### Designing Low Loss Inductors with Next-Generation Powder Core Materials

LEVEL THREE, A311

PRESENTED BY:

**John Noble,** *Magnetics*

New powder core materials are now available for low-loss inductors in GaN and SiC applications. This presentation reviews design concepts and discusses various options for efficient inductors. Magnetics' new Kool Mu Ultra and XFlux Ultra powder blends are compared against traditional materials.

2:15 PM – 2:45 PM

## SIMPLIS Technologies

### Simulating the Conducted EMI Performance of a Switching Power Supply

LEVEL THREE, A312

PRESENTED BY:

**Andrija Stupar,** *SIMPLIS Technologies*

Using the new LISN block (now available in SIMetrix/SIMPLIS v9.20), we show how to measure the conducted EMI performance of a switching power supply. A comparison of the measured results against an EMI specification is performed using a Design Verification Module (DVM) post-processing script implemented in Python, the results of which are used to determine the attenuation requirements for an EMI filter. With those requirements, we calculate the EMI filter component values utilizing the optimizer function in SIMetrix/SIMPLIS. We then measure the EMI performance of the resulting combination of power supply and EMI filter to verify that the performance meets the EMI specification. Finally, we verify that the power supply with EMI filter meets system stability requirements.

# PRESENTATION 3

3:00 PM – 3:30 PM

## STMicroelectronics

### Comprehensive Power Delivery Solution for Modern AI Data Centers

EXPO HALL, EXPO THEATER 1

PRESENTED BY:

**Gianni Vitale and Paolo Sandri,** *STMicroelectronics*

The continuous evolution of data centers and the increasing demand for higher AI data computation capabilities with low latency execution strongly influence the power delivery technologies and architectures. The power requirement for single AI/ML racks is projected beyond 200kW, a significant increase from the current 30kW-40kW. This shift requires a radical change in power architecture and the adoption of advanced technologies such as Silicon Carbide (SiC) and Gallium Nitride (GaN).

A major aspect of this transformation is the adoption of an 800V DC bus distribution. This approach lowers current ratings for power components, reduces copper usage in PCBs and cables, and increases overall efficiency. The presentation will focus on the 800V DC bus and its impact on power delivery in data centers, detailing the different stages adopted in the power delivery chain: high voltage AC/DC and DC/DC conversion, intermediate 48V bus conversion, and multiphase architectures for high-current CPUs/GPUs.

3:00 PM – 3:30 PM

## Nisshinbo Micro Devices

### Smarter, Smaller, Simpler: Advanced IC Innovations that Streamline Designs for Power Systems

EXPO HALL, EXPO THEATER 2

PRESENTED BY:

**Shigeki Kajitani,** *Nisshinbo Micro Devices*

In today's world, where reducing environmental impact and enhancing efficiency are paramount, innovation is rapidly advancing in both the automotive and industrial equipment sectors. In response to this shift, new power solutions are becoming increasingly vital. A key common trend is the transition to 48V systems, trending to even higher voltage ranges. In this context, standard power products featuring noise immunity, low power consumption with up to 80V input range, along with unique solutions such as high voltage monitor ICs and leakage detection ICs, need to address the principles of 'Smarter, Smaller, Simpler.' Nisshinbo ICs achieve high reliability and precision beyond discrete configurations while significantly reducing component count and board space. Through these efforts, we deliver optimized, compact power systems and products that reduce engineers' workload by preventing unintended design revisions due to unforeseen issues, thereby driving technological progress.

3:00 PM – 3:30 PM

## onsemi

### Simplifying Loss Simulations Using a Self-Service PLECS Model Generator

EXPO HALL, EXPO THEATER 3

PRESENTED BY:

**Didier Balocco,** *onsemi*

This session begins with an overview of the benefits offered by onsemi's intuitive web-based Self-Service PLECS Model Generator (SSPMG) platform. Next, we will examine the primary passive components contributing to active device losses. Finally, we will show how integrating Würth's passive component knowledge into SSPMG facilitates the creation of accurate PLECS models, leading to precise system simulations and component selection.

3:00 PM – 3:30 PM

## Nexperia

EXPO HALL, EXPO THEATER 4

PRESENTED BY:

*Nexperia*

***Please check the mobile app for more information.***

3:00 PM – 3:30 PM

## ROHM

### Automotive Grade 650V GaN Devices

LEVEL THREE, A301

PRESENTED BY:

**Kengo Ohmori,** *ROHM*

In recent years, improving power conversion efficiency and reducing size have become important social issues that require further advancements in the power device sector. As GaN devices generally provide higher switching characteristics and lower ON resistance than silicon devices, they are expected to contribute to lower power consumption of various power supplies and greater miniaturization of peripheral components. Along with mass-producing industry-leading SiC devices and feature-rich silicon devices, ROHM develops automotive grade 650V GaN HEMTs featuring market-leading performance that contributes to higher efficiency and smaller size in onboard charger applications.

3:00 PM – 3:30 PM

## Peak Nano Films

### Better than BOPP: Unlocking Higher Temperatures with Low Loss In Nanolayered Polymer Capacitor Films

LEVEL THREE, A302

PRESENTED BY:

**Mason Wolak,** *Peak Nano Films*

Future scale-up of grid-integrated fusion machines will require significant advances in pulsed power technologies to ensure efficient and cost-effective energy generation coupled with longterm operational reliability. Recent advances of impedance-matched Marx Generators (IMGs) are enabling pulsed power based fusion systems with higher operating efficiencies, lowering operating costs, and reduced footprints. Further optimization of IMGs toward necessary operation milestones of millions to billions of shot lifetimes requires significant technical breakthroughs in associated energy storage capacitor components, with material design surpassing the apabilities of current state-of-the-art wound film capacitors. Demonstration of a new, patented, nanolayered capacitor polymer film manufacturing technology will be discussed enabling capacitor performance exceeding current biaxially oriented polypropylene-based devices. Stemming from the ability to process two or more polymer materials in very regular structures, capacitor performance greater than 125 C was demonstrated while maintaining electrical losses equivalent to BOPP in drop-in replacement wound film capacitor devices. A description of additional nanolayered high temperature/high dielectric constant capacitor films materials and timeline for commercial launch and availability of multi-million pound annual film production will be discussed. We will also discuss the existing global capacitor film supply chain and identify gaps that must be urgently addressed to guarantee that availability of critical capacitor components for pulse power systems scales at a suitable rate to support proposed fusion commercialization timelines.

3:00 PM – 3:30 PM

## ALTAIR

### Faster than Realtime Power Converter & Motor Drive System Simulations with Trained Physics Models for System Cost Optimization

LEVEL THREE, A311

PRESENTED BY:

**Nikos Dimitrakopoulos & Albert Dunford,** *ALTAIR*

Is a design or architecture decision worth the effort? To answer this question, we will show how to use simulation data to train systems models. Our case study will be a battery electric vehicle, BEV, with a full drive cycle simulation. A typical motor drive simulation will generate data that will be used to train a reduced fidelity system model for use in the BEV drive cycle simulation. This system model will be trained over a broad range of design scenarios including parallel devices, adaptive gate drive, battery voltages, operating temperatures, etc. The objective is to enable designers to easily evaluate the impact of a design decision on system efficiency and the resulting impact on cost or range to determine: is the engineering effort worth it? The system simulation runs faster than realtime and can be used to quickly and easily compare the inverter efficiency impact and cost. Inverter efficiency improvements can have major impacts on the overall system cost with reduced battery pack needs and resulting structural changes to the vehicle.

3:00 PM – 3:30 PM

## Soitec

LEVEL THREE, A312

PRESENTED BY:

*Soitec*

***Please check the mobile app for more information.***

# PRESENTATION 4

3:45 PM – 4:15 PM

## AmberSemi

### AmberSemi – the Generational Power Architectures Paradigm Shift: Bringing Unique Digital Power Solutions to the Market That Solve the Entire Power Ecosystem Challenge.

EXPO HALL, EXPO THEATER 1

PRESENTED BY:

**Thar Casey,** *AmberSemi*

With the advent of AI and the pervasiveness of its solutions finding homes from datacenters to industrial applications, its presenting multiple unique challenges and opportunities for the power market. At the high end of the market, with servers and datacenters, AI is stressing every aspect of the power transmission. From demanding high power from multiple sources, maintaining high efficiency across the entire distribution path to requiring extremely high-power density and current at the end GPU. All while maintaining high uptime and reliability ensuring faults do not cause cascading problems.

Solving these problems require a different way of thinking, viewing the problem from a system viewpoint from source to load rather than breaking the problem into different discrete chunks.

AmberSemi, a startup company based in Silicon Valley is at the forefront of this paradigm shift. Using a system viewpoint with a combination of innovation in power conversion, control and architecture, semiconductor processes and material science to bring unique digital power solutions to the market that solve the entire power ecosystem challenge.

As an overview of AmberSemi approach to the market, we're pioneering new solutions for improved power transmission including 800V DC architectures, 48V/50V intermediate bus voltages, ideal for factories, datacenters and even automotive battery systems. This improves efficiency for large power systems and provides a better approach to power distribution and conversion steps. For lower power AC distribution systems, we have our first silicon device on display today. The AmberSemi AC Direct DC Enabler demonstrates our ability to convert directly from AC mains, either 120V or 240V to a non-isolated, regulated 5W DC output without the use of a bridge rectifier or complex magnetics. The small 14 x 14mm package provides the entire conversion while maintaining high efficiency of 80 %. This type of innovation is possible through our breakthrough power architecture and unique control algorithms.

With these high voltage distribution systems, the second system challenge is how to effectively monitor and isolate the rails in the case of extreme events or faults. AmberSemi is solving this problem through the introduction of telemetry and protection devices utilizing solid state pass devices. This is the first modernization of protection devices since Thomas Edison invented the circuit breaker 1879.

Completing the system view, moving from the front-end distribution to the final point of load power, Amber is continuing to drive innovation with its breakthrough architectures to deliver high current, 1000s of Amps, in extremely small form factors for digital loads, whether that is a processor, FPGA or AI chip,

We invite you to stop by our booth, talk to our team, so you can see how AmberSemi solutions are changing the landscape providing both power control, conversion and protection to your system. Whether that's industrial controls, factory automation, test and measurement, EV or datacenters. We look forward to talking to you.

3:45 PM – 4:15 PM

## ROHM

### Advances in SiC MOSFET Device and Packaging Technology from ROHM

EXPO HALL, EXPO THEATER 2

PRESENTED BY:

**Ming Su,** *ROHM*

In recent years, SiC power devices have become a game changer in advanced power electronics for electric vehicles and industrial power systems. Leveraging over 20 years of R&D history and a vertically integrated production system, ROHM is in the final phase of development for its 5th Generation SiC MOSFETs, featuring 30% reduction in high-temperature Rds_on, improved productivity with 8-inch wafer process and other benefits. In parallel, novel discrete and power module packages are available for SiC devices to support high voltage ratings, enhanced reliability, system downsizing and easy assembly, enabling power converter design with higher levels of power density and dependability.

3:45 PM – 4:15 PM

## West Coast Magnetics

EXPO HALL, EXPO THEATER 3

PRESENTED BY:

*West Coast Magnetics*

*Please check the mobile app for more information.*

3:45 PM – 4:15 PM

## pSemi Murata

### Industry First – 3 & 4-level, Buck Converter for Fast Charging

EXPO HALL, EXPO THEATER 4

PRESENTED BY:

**Laurence McGarry,** *pSemi Murata*

Multi-level, buck conversion enables low profile, high-efficiency power conversion for applications such as battery fast-charging. This paper describes an industry first – the productization of 3 and 4 level buck regulator technology. We describe an overview of the technology, some of the challenges and potential use-cases.

3:45 PM – 4:15 PM

## Cleverscope

### The Cleverscope CS1202 Isolated Transistor Digitizer

LEVEL THREE, A301

PRESENTED BY:

**Bart Schroder,** *Cleverscope*

The Cleverscope CS1202 Transistor digitizer is used to simultaneously measure VDS, VSAT, IS, VG and calculate PSWITCH, ESWITCH, PCONDUCTION, and ECONDUCTION on a switching transistor.

In our presentation we detail the high CMMR fiber connection used to make high side measurements, the 200ps time resolution measurements around the switching edge, and the hardware power and energy measurements used to calculate real losses over many seconds.

We'll cover the automated measurement of circuit parasitics such as bus, power loop and gate driver inductance, and detail how the CS1202 can be used for double pulse as well as continuous operation performance measurement, and improvement.

3:45 PM – 4:15 PM

## SABIC

### Reliability of HTV150A Films for High Temperature and High Voltage Capacitors for AC-DC Inverter Applications

LEVEL THREE, A302

PRESENTED BY:

**Dr. Adel Bastawros,** *SABIC*

High efficiency electric vehicles demand efficient AC-DC inverters operating at high voltages and temperatures reaching 150°C. SABIC's ELCRES™ HTV150A High temperature capacitor films having reduced dissipation losses at 150°C have been developed for high voltage inverter applications. Capacitors made with 3µm and 5µm films pass 2000 hours of life-testing at 150°C and applied voltage of 500 and 900V respectively. Capacitance changes, dielectric losses, and insulation resistance remained within acceptable limits over the 2000-hour test duration.

Additional damp heat reliability testing at 85°C and 85% Relative Humidity showed little or no change in capacitance, losses, and insulation resistance over 1000 hours of aging.

HTV150A films have a unique feature of reduced dissipation losses as operating temperature and frequency increase, offering the designer an opportunity to reduce heat generation in the capacitors and lead to overall efficiency gain in the inverter module.

3:45 PM – 4:15 PM

## Semikron Danfoss

### 2kV SiC Drives Electrification Through Speed and Simplicity

LEVEL THREE, A311

PRESENTED BY:

**Paul Drexhage,** *Semikron Danfoss*

The latest generation of silicon carbide power modules is set to transform power converters used in EV charging, renewables, and energy storage. With 2kV blocking capability, these modules drastically reduce the size and complexity of high-power converters. A variety of solutions are now available to address applications from 100kW to beyond 2MW. PCB-mount half-bridges, intelligent power modules, and high-power stacks give designers a wide range of flexibility.

3:45 PM – 4:15 PM

## Bosch Semiconductors

LEVEL THREE, A312

PRESENTED BY:

*Bosch Semiconductors*

*Please check the mobile app for more information.*

# DEBATE SESSIONS

Every year, the APEC Committee handpicks a handful of hot topics and brings together a panel of distinguished experts to engage in a dynamic exchange of views. The Debate Sessions are structured around pivotal questions designed to spark debate, ensuring a representation of diverse perspectives. Kickstarting the session with introductory remarks from our panelists, we then open the floor to you—our audience of specialists—to weigh in with your insights, challenge the experts, and steer the conversation with your questions. Get ready for an invigorating exchange of ideas that is as informative as it is animated and walk away with a deeper understanding of the latest trends and controversies in power electronics.

4:30 PM – 6:00 PM

## DEBATE 1:

### Magnetics vs Capacitors – Which Presents the Lesser Obstacle to Advancing Power Electronics?

LEVEL FOUR, A412

SESSION CHAIR

- **George A. Slama,** *Senior Application and Content Engineer, Würth Elektronik*

DEBATE SPEAKERS

- **Jim Marinos,** *Executive VP Engineering, Payton Planar Magnetics*
- **Charles R. Sullivan, PhD,** *Professor, Dartmouth University*
- **Peter A. Blais,** *Senior Director, Yageo*
- **Jerry Zhai,** *President, MaxEpic*

During the past, several decades we have seen the power density of power supplies increase by orders of magnitude. Operating at higher frequencies has brought the greatest reduction but seems to be running out of steam. Apart from topology, the specific devices that have limited reduction have been either magnetic components, capacitive components, or semiconductors. Today, with bandgap (GaN & SiC) switching devices, the focus is on controllers, topologies and low parasitic in passive components. When magnetics is small, the area used by the capacitors usually increases. Some designs show small magnetics on one side of the board but not the sea of capacitors on the other. High frequency has made inductance values at the same level as previous parasitic inductances. Inductors appear to be merely a loop of wire with a core. Small ceramic capacitors have large swings in value with applied voltage negating their size advantage. One promising area of development is transient load voltage regulation (TLVR), where magnetics is employed to reduce the number of capacitors required for fast transient response. This reflects an ongoing "tug of war" between magnetics and capacitors in power supply design.

4:30 PM – 6:00 PM

## DEBATE 2:

### SiC vs GaN – Which Will Lead in Power Conversions?

LEVEL FOUR, A411

SESSION CHAIR

- **Maurizio Di Paolo Emilio,** *Editor & Technical Writer, AspenCore Power Electronics News*

DEBATE SPEAKERS

- **Kevin Speer,** *Technology Director – Silicon Carbide Business Unit, Microchip Technology*
- **Alex Lidow, PhD,** *CEO, Efficient Power Conversion (EPC)*
- **Mrinal Das,** *Sr. Director of Solutions Engineering and Marketing, Power Solutions Group, onsemi*
- **Thomas Neyer,** *Vice President GaN, Infineon*

This session will delve into the evolving dynamics between Silicon Carbide (SiC) and Gallium Nitride (GaN), two transformative wide bandgap technologies in power conversion. The growing overlap in their applications as GaN moves to higher voltage ranges will be the key point of discussion. We will discuss important and contentious issues, such as determining which technology offers superior figures of merit, reliability, and cost-effectiveness. We will also address critical factors such as the differences in substrate materials and manufacturing complexities, which significantly influence performance, scalability, and cost. During this session, we will examine various points to uncover the challenges and opportunities for SiC and GaN in sectors like renewable energy, industrial applications, and automotive, and how these factors will shape the future of power electronics.

4:30 PM – 6:00 PM

## DEBATE 3:

### The Power or Peril of AI-driven Designs – Will They Light Up the Power Supply Landscape or Will They Go Up In Flames?

LEVEL FOUR, A404/A405

SESSION CHAIR

- **Robert C.N. Pilawa-Podgurski,** *Professor, University of California, Berkeley*

DEBATE SPEAKERS

- **Grant Pitel,** *CTO, Magna-Power Electronics, Inc.*
- **Babak Fahimi,** *Professor, University of Texas at Dallas*
- **Dragan Maksimović, PhD,** *Distinguished Professor, University of Colorado – Boulder*
- **Laszlo Balogh,** *Distinguished Member of Technical Staff, Texas Instruments*

Recently there has been a significant adoption of Artificial intelligence in magnetics design, power supply design, power system control and failure prediction. Given this rapid adoption many controversial questions arise. For example, does using AI result in less or more optimal design, does it compromise or enhance system reliability, does it improve design time or does it hinder new engineers learning basic skills? In this dynamic debate the industry leading expert panel, together with you will discuss the pros and cons of using AI for power systems design. Come and join this session to learn how to best use this technology to your advantage and how to avoid its perils.

8:30 AM – 12:00 PM

## T09: Point-of-Load Converters

LEVEL THREE, A302

SESSION CHAIRS

**Peyman Asadi,** *Renesas*

**Cahit Gezgen,** *Infineon Technologies*

8:30 AM

**T09.1 A Monolithic Regulated 160 MHz Resonant DC-DC Converter**

**Resonant Converters**

AUTHORS: Giacomo Ripamonti, Stefano Michelis, Georgios Bantemits, Pablo Daniel Antoszczuk, Khalil Khalife, Nils Hans Van Der Blij, Sokratis Koseoglou, Mattia Balutto, Francesco Driussi, Stefano Saggini

8:50 AM

**T09.2 Reconfigurable Trans-Inductor Voltage Regulator with Improved Light Load Efficiency in Data Center Applications**

**Point-of-Load (POL) and Multi-Phase Converters**

AUTHORS: Ziyao Wang, Zehui Li, Haoyu Wang

9:10 AM

**T09.3 Fully Integrated Voltage Regulators (FIVRs) with Package In-Situ Coupled CoaxMIL Inductor for High Power Density Microprocessor Applications**

**Point-of-Load (POL) and Multi-Phase Converters**

AUTHORS: Jaeil Baek, Beomseok Choi, Siddharth Kulasekaran, Huong Do, Brandon Marin, Jose Chavarria, Leigh Wojewoda, Kaladhar Radhakrishnan

9:30 AM

**T09.4 Multiphase Lateral Flux Indirect Coupled Inductor for Vertical Power Delivery Voltage Regulator Module**

**Point-of-Load (POL) and Multi-Phase Converters**

AUTHORS: Adhistira Naradhipa, Qiong Wang, Qiang Li

9:50 AM

**T09.5 A High Density Three-Level Quadratic Buck Hybrid Converter for 48V-to-PoL Conversion**

**Point-of-Load (POL) and Multi-Phase Converters**

AUTHORS: Kejia Wang, Si Yuan Sim, Yin Quen Choong, Xin Zhang, Sriharsh Pakala, Cheng Huang

10:40 AM

**T09.6 Air-LEGO: A Magnetic-Free Ultra-Thin 24V-to-1V 120A VRM with Air-Coupled Inductors**

**Voltage Regulator Modules (VRM)**

AUTHORS: Haoran Li, Wenliang Zeng, Youssef Elasser, Minjie Chen

11:00 AM

**T09.7 A 15A 48V-Input Dual-Path Hybrid Dickson Converter with 6 mm³ Low Saturation Current Inductors for Point-of-Load Conversion**

**Point-of-Load (POL) and Multi-Phase Converters**

AUTHORS: Hua Chen, Young-Seok Noh, Minxiang Gong, Vivek De, Arijit Raychowdhury

11:20 AM

**T09.8 An Ultra-Fast Control Strategy and Pre-Current-Balancing Measures Prepared for Rapid Transients in Constant On-Time Controllers**

**Voltage Regulator Modules (VRM)**

AUTHORS: Yijie Qian, Yuan Gao, Wenze Shu, Lingyun Li, Shen Xu, Weifeng Sun

11:40 AM

**T09.9 Loosely Coupled Trans-Inductor Voltage Regulator (LC-TLVR) Inductor as Compensation Inductor (Lc)**

**Point-of-Load (POL) and Multi-Phase Converters**

AUTHORS: Pavan Kumar, Arturo Sanchez Hernandez

8:30 AM – 12:00 PM

## T10: Magnetics Modelling

LEVEL THREE, A301

SESSION CHAIRS

**Adam Skorek,** *University of Québec at Trois-Rivières*

**Matt Wilkowski, MSEE,** *Würth Elektronik*

8:30 AM

**T10.1 Novel Complex Permeability Model of Powder Magnetic Materials**

**Magnetics Modeling and Simulations**

AUTHORS: Lukas Mueller, James Cox, Jun Wang, Enrique Garcia

8:50 AM

**T10.2 Design Study Evaluating Impact of Gap Loss on Nanocrystalline Inductor Cores with Experimental Validation**

**Magnetics Modeling and Simulations**

AUTHORS: Maurice Sturdivant, Brandon Grainger, Christopher Bracken, Paul R. Ohodnicki

9:10 AM

**T10.3** **A Permanent Magnet Variable Inductor for DC Fault Current Limiting Applications**

**Magnetics Modeling and Simulations**

AUTHORS: Mark Nations, Subhashish Bhattacharya

9:30 AM

**T10.4** **Design-Oriented Modeling and Multi-Objective Optimization of Two-Phase Coupled Inductors in Multiphase PWM Converters**

**Magnetics Modeling and Simulations**

AUTHORS: Yicheng Zhu, Jiarui Zou, Robert C. N. Pilawa-Podgurski

9:50 AM

**T10.5** **MagNetX: Extending the Magnet Database for Modeling Power Magnetics in Transient**

**Magnetics Modeling and Simulations**

AUTHORS: Hyukjae Kwon, Shukai Wang, Haoran Li, Youssef Elasser, Gyeong-Gu Kang, Daniel Zhou, Davit Grigoryan, Minjie Chen

10:40 AM

**T10.6** **Non-Monotonic Influence of DC Bias on Ferrite Core Loss Up to 10 MHz with Sine Wave Excitation**

**High-Frequency Magnetics**

AUTHORS: Bohua Zhang, Martin Pfost

11:00 AM

**T10.7** **Comprehensive SPICE Model for Inductors Considering Magnetic Losses Under DC Bias Current**

**Magnetics Modeling and Simulations**

AUTHORS: Yuki Sato, Hirokazu Matsumoto, Junichi Kotani, Shohei Tomioka, Kenichiro Tanaka

11:20 AM

**T10.8** **Indented Core to Reduce and Desensitize Inductor's Fringing Losses without Increasing Volume**

**Advanced Magnetic Materials and Geometries**

AUTHORS: Rajaie Nassar, Promit Datta, Guo-Quan Lu, Christina DiMarino, Khai D. T. Ngo

11:40 AM

**T10.9** **Coupled Inductor Analysis and Finite Element Modeling Assisted Design for Boost Extender Topology**

**Magnetics Modeling and Simulations**

AUTHORS: Vikas Kumar Rathore, Michael Evzelman, Mor Mordechai Peretz

8:30 AM – 12:00 PM

## T11: Power Conversion for Microgrids

LEVEL THREE, A315

SESSION CHAIRS

**Ali Khajehoddin, PhD,** *University of Alberta*

**Jacob Mueller,** *Sandia National Laboratories*

8:30 AM

**T11.1** **Stability Analysis of Current-Limited Grid-Forming Inverters with Frequency Stabilization: An Equivalent Impedance Approach**

**Microgrid Systems**

AUTHORS: Bowen Yang, Gab-Su Seo

8:50 AM

**T11.2** **Revisit Active Power Oscillation in Multi-Virtual Synchronous Generators Gride**

**Microgrid Systems**

AUTHORS: Junjie Xiao, Pavol Bauer, Zian Qin

9:10 AM

**T11.3** **A Novel Current Control Technique for Off-Grid Single-Phase Inverters**

**Microgrid Systems**

AUTHORS: Arpan Laha, Abirami Kalathy, Praveen Jain, Majid Pahlevani

9:30 AM

**T11.4** **Intelligent Low-Bandwidth Frequency Controller for VSGs at Economic Dispatch in Islanded Microgrid**

**Microgrid Systems**

AUTHORS: Shraf Eldin Sati, Ahmed Al-Durra, Hatem Zeineldin, Tarek El-Fouly, Ehab F. El-Saadany

9:50 AM

**T11.5** **Hardware-in-the-Loop of a Grid Forming Control Strategy Applied to a DC Off-Grid Green Hydrogen Production System**

**Microgrid Systems**

AUTHORS: Diego Montoya-Acevedo, René Contreras-Barrios, Ángel Maureira-Riquelme, Esteban Ibáñez-Muñoz, Catalina Gonzalez-Castaño, Carlos Restrepo

10:40 AM

**T11.6** **Experimental Validation of a 40kW, 480V Point-to-Point DC Interlinks for Controller-Agnostic, Interoperable Networked Microgrids**

**Microgrid Systems**

AUTHORS: Maximiliano Ferrari, Michael Starke, John Smith, Joao Pereira Pinto, Misael Francisco Martínez Montejano

11:00 AM

**T11.7** **Andronov-Hopf Oscillator-Based Grid-Forming Converters with Embedded Disturbance Rejection for Non-Ideal Loading Condition**

**Microgrid Systems**

AUTHORS: Vikram Roy Chowdhury, Gab-Su Seo, Barry Mather

11:20 AM

**T11.8** **Estimation of Rectifier Output Current of the LLC Converter**

**Solid-State Transformers**

AUTHORS: Xin Wu, Yi Zhou, Haihong Long, Dehong Xu

11:40 AM

**T11.9** **A 100kHz Digitally Controlled 10kW, 2-Channel Solar MPPT Converter using 3-Level Topology with >75W/in³ Power Density and >98.5% Peak Efficiency**

**Energy Storage Systems**

AUTHORS: Ranajay Mallik, Akshat Jain

8:30 AM – 12:00 PM

## T12: Control of Power Electronic Converters II

LEVEL THREE, A311

SESSION CHAIRS

**Jaber Abu Qahouq,** *The University of Alabama (UA)*

**Paolo Mattavelli, PhD,** *University of Padova*

8:30 AM

**T12.1** **A Bootstrapless KY-S-Hybrid Buck-Boost Converter with Full Range iLs Reduction and 400% Line Transient Response Acceleration for AI-Mobile Application**

**Control ICs**

AUTHORS: Chuan-En Chang, Cheng-Ta Chuang, Hao-Ran Huang, Chieh-Ju Tsai, Ching-Jan Chen

8:50 AM

**T12.2** **Digital Control of a 600-V to 28-V 20-kW Two-Stage DC-DC Converter**

**Digital Control-MCUs, DSPs, FPGAs, ASICs**

AUTHORS: Shreyas Bharat Shah, Rachit Pradhan, Jiaqi Yuan, Mohamed Ibrahim, Ahmed Elezab, Samuel Hemming, Giorgio Pietrini, Piranavan Suntharalingam, Mario F Cruz, Ali Emadi

9:10 AM

**T12.3** **Self-Calibrated Digital Current Emulation for High-Frequency Hysteretic Current-Mode Control in GaN PFC Converters**

**Current-Mode and Voltage-Mode Control**

AUTHORS: Mohammad Shawkat Zaman, Olivier Trescases

9:30 AM

**T12.4** **High-Frequency Flying Capacitor Four-Level Drain Supply Modulator**

**Digital Control-MCUs, DSPs, FPGAs, ASICs**

AUTHORS: Audrey Cheshire, Paul Flaten, Zoya Popović, Dragan Maksimović

9:50 AM

**T12.5** **Discontinuous Modulation Strategy for Voltage and Temperature Balancing of MMCs**

**Control of Power Electronic Converters**

AUTHORS: Davide D'Amato, Stayner Nóbrega Barros, Jun-Hyung Jung, Marco Liserre

10:40 AM

**T12.6** **Damping Control and Improvement of Grid-Forming Inverter from a Wideband Stability Perspective**

**Control of Power Electronic Converters**

AUTHORS: Rui Kong, Subham Sahoo, Yubo Song, Frede Blaabjerg

11:00 AM

**T12.7** **A Grid-Forming Split-Phase Three-Leg Inverter with Unbalanced Loading and Active Power Decoupling**

**Control of Power Electronic Converters**

AUTHORS: Namwon Kim, Renata Kimpara, Michael Starke

11:20 AM

**T12.8** **Completely Decentralized Active and Reactive Power Control of Grid-Connected Cascaded H-Bridge Inverters with Integrated Battery Storage**

**Control of Power Electronic Converters**

AUTHORS: Soham Dutta, Brian Johnson

11:40 AM

**T12.9** **Small-Signal Modeling and Damping Design of Unfolding-Based Single Stage AC-DC Converter using the Extra Element Theorem**

**Control of Power Electronic Converters**

AUTHORS: Dakota Goodrich, Aditya Zade, Shubhangi Gurudiwan, Mahmoud Mansour, Regan Zane, Hongjie Wang

8:30 AM – 12:00 PM

## T13: Renewable Energy Systems

LEVEL THREE, A316

SESSION CHAIRS

**Yongheng Yang,** *Zhejiang University*

**Haoyu Wang,** *Shanghai Tech University*

8:30 AM

**T13.1 Methods to Enhance Cybersecurity of Multiple Inverters in Large Grid Connected PV / Battery Energy Storage Systems**

**Photovoltaic (PV) Inverters and Micro Inverters**

AUTHORS: Hasan Ibrahim, Jaewon Kim, Peng-Hao Huang, Vishwam Raval, Prasad Enjeti

8:50 AM

**T13.2 Optimal DC-DC Converter Topology and Control Algorithm for Fuel Cell Electric Vehicle with Series-Connected Supercapacitor**

**Fuel Cells and Other Emerging Renewable Energy Systems**

AUTHORS: Hyeon Soo Kim, Yun Seong Hwang, Seung Hyun Kang, Man Jae Kwon, Byoung Kuk Lee

9:10 AM

**T13.3 Reliability-Constrained Design of a High-Gain Power Optimizer based on a Real Mission Profile**

**Photovoltaic (PV) Inverters and Micro Inverters**

AUTHORS: Stefano Cerutti, Francesco Iannuzzo, Ariya Sangwongwanich, Tamás Kerekes, Mario Giuseppe Pavone, Francesco Gennaro, Natale Aiello, Francesco Musolino, Paolo Stefano Crovetti

9:30 AM

**T13.4 Submodule Voltage Balancing Technique of Solar MMC for Firing the Switches using Integrated PWM Modules**

**Photovoltaic (PV) Inverters and Micro Inverters**

AUTHORS: Ahmed Elsanabary, Saad Mekhilef, Mokhtar Aly, José Rodriguez

9:50 AM

**T13.5 Single-Stage High-Frequency-Link Split-Phase Microinverter with High Voltage Gain based on Buck-Boost AC Chopper**

**Photovoltaic (PV) Inverters and Micro Inverters**

AUTHORS: Xuewen Li, Jia Liu, Jinjun Liu

10:40 AM

**T13.6 Fault Diagnosis and Tolerant Strategy for Triple-Port Hydrogen Converter using SSA-Optimized Random Forest Algorithm**

**Fuel Cells and Other Emerging Renewable Energy Systems**

AUTHORS: Shiqi Zhang, Yiyina Teng, Naizhe Diao, Xiaoqiang Guo, Vladimir Terzija, Lichong Wang

11:00 AM

**T13.7 Resilient Operation for Grid-Connected Cascaded H-Bridge Multilevel Inverter with Improving PV Source Stress**

**Photovoltaic (PV) Inverters and Micro Inverters**

AUTHORS: Jinli Zhu, Yuan Li, Hector Akuta, Jeonghun Kim, Uthandi Selvarasu, Shumeng Wang, Vikram Roy Chowdhury, Brad Lehman, Fang Z. Peng

11:20 AM

**T13.8 A Medium Voltage Grid-Connected PV Inverter with a New Modular High Voltage Gain Converter Featuring Internal Modified Voltage Doubling Balancers**

**Photovoltaic (PV) Inverters and Micro Inverters**

AUTHORS: Kajanan Kanathipan, Muhammad Ali Masood Cheema, John Lam

11:40 AM

**T13.9 Split-Source Common-Ground Inverter for Photovoltaic Applications**

**Photovoltaic (PV) Inverters and Micro Inverters**

AUTHORS: Mahmoud A. Gaafar, Mohamed Orabi, Samir Kouro, Ahmed Ibrahim, Eltaib Ibrahim

8:30 AM – 12:00 PM

## T14: Wireless Power Transfer: Design & Control

LEVEL THREE, A312

SESSION CHAIRS

**Zeljko Pantic,** *North Carolina State University*

**Weijin Qiu,** *John Deere*

8:30 AM

**T14.1 Comprehensive Investigation and Proposal of a New Wireless Charging Road Structure using Low-Environmental-Impact Magnetic Concrete**

**Wireless Charging**

AUTHORS: Shuntaro Inoue, Yuko Kano, Shin Tajima

8:50 AM

**T14.2** **Design of a Bidirectional High Power Inductive Power Transfer System with Auxiliary Winding for Automotive Applications**

**Wireless Charging**

AUTHORS: Luis Ruiz Chamorro, Nikola Mirković, Alberto Delgado Expósito, Pedro Alou Cervera, Miroslav Vasić

9:10 AM

**T14.3** **Mutual Inductance and Load Identification Method Based on the Voltage Transients of WPT Systems**

**Wireless Charging**

AUTHORS: Xiaosheng Wang, Chaoqiang Jiang, Yibo Wang, Liping Mo

9:30 AM

**T14.4** **Digitally Controlled Misalignment-Tolerant Inductive Power Transfer System with Adaptive Hybrid Compensation for CC/CV Charging of E-Scooter**

**Wireless Charging**

AUTHORS: Niranjan Shrestha, V.S.R.Varaprasad Oruganti, Sheldon Williamson

9:50 AM

**T14.5** **On/Off Control of Modular Inductive Power Transfer System**

**Wireless Charging**

AUTHORS: Kunxiao Zhou, Guangdong Ning, Heyuan Li, Xinlin Wang, Minfan Fu

10:40 AM

**T14.6** **Receiver Side Regulation of LCC Wireless Power Transfer System with Variable Notch Filter**

**Wireless Charging**

AUTHORS: Hsin-Che Hsieh, Jih-Sheng Lai

11:00 AM

**T14.7** **84.7 Percent Peak Efficiency Stress Tolerant DC DC Buck Converter for Li Ion Battery Driven Standby Circuits in 18nm FDSOI**

**Power for IoT**

AUTHORS: Gautam Dey Kanungo, Pijush Kanti Panja, Vikas Bugade, Kallol Chatterjee

11:20 AM

**T14.8** **Leveraging Ultrasound and Neural Networks for Non-Invasive Power Converter Efficiency Estimation**

**Non-contact Sensors for Power Electronics**

AUTHORS: Youssof Fassi, Vincent Heiries, Jérôme Boutet, Julien Marianne, Sébastien Martin, Mathilde Chareyron, Clément Chambon, Sébastien Boisseau

11:40 AM

**T14.9** **A Load-Independent Multi-Relays Wireless Power Transfer with Self-Regulation and Single Compensation Network**

**Wireless Charging**

AUTHORS: Jong-Hun Kim, Najam Ul Hassan, Seogyong Jeong, Myeong-Ho Kim, Min-Sik Kim, Jee-Hoon Jung, Byunghun Lee, Se-Un Shin

8:30 AM – 12:00 PM

## T15: Power Electronics Applications I

LEVEL THREE, A313

SESSION CHAIRS

**Jeffery Nilles,** *Alpha&Omega Semiconductors*

**Raj Kumar Kokkonda, MS,** *North Carolina State University*

8:30 AM

**T15.1** **A GaN-Based Single-Stage Solid-State Transformer Replacement for 40 VA Class 2 Line-Frequency Transformers**

**AC-DC-AC Applications and Matrix Converters**

AUTHORS: Allen Nguyen, Charles Sullivan

8:50 AM

**T15.2** **Survey of Components and Topologies for High-Efficiency and High-Power Density 48V DC-DC Converters**

**Datacenter/Telecom Power Architecture and System Considerations**

AUTHORS: Joseph Winkler, Niklas Deneke, Bernhard Wicht

9:10 AM

**T15.3** **A Novel Solid-State Circuit Breaker using B-TRAN™**

**Solid State and Hybrid Circuit Breakers**

AUTHORS: Mudit Khanna, Ruiyang Yu, Milad Tayebi, Jiankang Bu, Jeffrey Knapp

9:30 AM

**T15.4** **Development of a Supercritical Fluid-Insulated Fast Mechanical Switch for MVDC Hybrid Circuit Breakers**

**Solid State and Hybrid Circuit Breakers**

AUTHORS: Zhiyang Jin, Qichen Yang, Alfonso Cruz, Lukas Graber

9:50 AM

**T15.5** **Dynamic Impedance Matching for a Variable Reluctance Energy Harvesting Application with Constrained Space**

**Energy Harvesting**

AUTHORS: Fernando Pérez, Alejandro Redondo, Airán Francés, Gabriel Mujica

10:40 AM

**T15.6** **Renewable Energy-Powered DC-Converted Refrigerator based on a Supercapacitor-Assisted Technique**

**Energy Harvesting**

AUTHORS: Nirashi Polwaththa Gallage, Nihal Kularatna, Alistair Steyn-Ross, Dulsha Kularatna-Abeywardana

11:00 AM

**T15.7** **Design and Evaluation of Flexible Inductors for Wearable Power Electronics**

**Portable Power**

AUTHORS: Sean Logi, Selin Bagci, Katherine Kim

11:20 AM

**T15.8** **Design of Boost Power Factor Corrector and Asymmetrical Half-Bridge Flyback Converter for USB-PD Applications**

**Portable Power**

AUTHORS: Yun-Keng Cheng, Tsorng-Juu Liang, Kai-Hui Chen, Ming-Chang Tsou

11:40 AM

**T15.9** **Computationally Efficient Current Sensorless Predictive Control for PMSM Drive Fed by a Matrix Converter with CMV-Free Operation**

**AC-DC-AC Applications and Matrix Converters**

AUTHORS: Ali Sarajian, Ibrahim Harbi, Quanxue Guan, Davood Arab Khaburi, Ralph Kennel, José Rodriguez, Patrick Wheeler, Mokhtar Aly

8:30 AM – 12:00 PM

## T16: Motor Drives I

LEVEL THREE, A314

SESSION CHAIRS

**Ali Safayet,** *Halla Mechatronics*

**Ziaur Rahman, PhD,** *Booz Allen Hamilton*

8:30 AM

**T16.1** **PMSM Motor Drive with Current Direct Digital Control and Near 1st-Order Speed Control**

**AC, DC, BLDC Motor Drives**

AUTHORS: Po-Chang Lee, Tsai-Fu Wu, Han Ku, Chien-Chih Hung, Jui-Yang Chiu

8:50 AM

**T16.2** **Fault-Tolerant Multilevel Converter for Multiphase Switched Reluctance Motor Drives based on q+2 Converter**

**AC, DC, BLDC Motor Drives**

AUTHORS: Mahmoud A. Gaafar, Mohamed Orabi, Hao Chen, Mostafa Dardeer

9:10 AM

**T16.3** **Uncertainty-Aware Artificial Intelligence for Gear Fault Diagnosis in Motor Drives**

**AC, DC, BLDC Motor Drives**

AUTHORS: Subham Sahoo, Huai Wang, Frede Blaabjerg

9:30 AM

**T16.4** **Neural Network based Digital Twin Health Monitoring of BLDC Motor Drives for Robots**

**AC, DC, BLDC Motor Drives**

AUTHORS: Mohamed Metwly, Benjamin Luckett, Charles Clark, Jiangbiao He, Biyun Xie

9:50 AM

**T16.5** **MTPA Control using Predictive P&O Method for Dual Parallel Surface-Mounted Permanent Magnet Synchronous Motor Drives Fed by a Single Inverter**

**AC, DC, BLDC Motor Drives**

AUTHORS: Jae-Seong Kim, Kyo-Beum Lee

10:40 AM

**T16.6** **A Novel I-f Startup Strategy with Smooth Transition to Sensorless Control for CSI-Fed PMSM Drives used in Submersible Pumps**

**AC, DC, BLDC Motor Drives**

AUTHORS: Milad Bahrami-Fard, Majid Ghasemi Korrani, Babak Fahimi

11:00 AM

**T16.7** **Simulation-Assisted Design and Implementation of an Electrically Excited Synchronous Motor Drive System**

**AC, DC, BLDC Motor Drives**

AUTHORS: Shih-Gang Chen, Jun-Ming Hsu, Chun-Yen Chen, Ming-Shi Huang

11:20 AM

**T16.8** **Implementation and Analysis of Direct Torque Control on High-Speed PMSMs: A Comparative Study of Commercial and Laboratory-Developed Motors**

**AC, DC, BLDC Motor Drives**

AUTHORS: Md Moniruzzaman, Kishor Joshi, Md Rashedur Rahman, Md Khurshedul Islam, Seungdeog Choi, Masoud Karimi-Ghartemani

11:40 AM

**T16.9** **A Ferrite based Carbon Reinforced Composite Wrapped IPM Rotor Design for High-Speed Traction Applications**

**AC, DC, BLDC Motor Drives**

AUTHORS: Md Rashedur Rahman, Md Khurshedul Islam, Md Moniruzzaman, Seungdeog Choi, Han-Gyu Kim, Andrew Walters

1:30 PM – 5:00 PM

## T17: Resonant & Quasi-Resonant DC-DC Converters

LEVEL THREE, A301

SESSION CHAIRS

**Mladen Ivankovic,** *infineon technologies*

**Sombudha Chakraborty,** *Texas Instruments*

1:30 PM

**T17.1** **A Novel Phase-Mode Controller for Resonant Converters**

**Resonant Converters**

AUTHORS: Claudio Adragna, Daniele Cazzaniga, Stefano Manzoni

1:50 PM

**T17.2** **A Regulated 36V-60V-Input VIN-Insensitive Resonant Switched-Capacitor Converter with Large Voltage Conversion Ratio**

**Resonant Converters**

AUTHORS: Yichao Ji, Jingyi Yuan, Lin Cheng

2:10 PM

**T17.3** **A Hybrid Switched Capacitor Converter Enabling Capacitive-Based Wireless Power Transfer for Battery Charging Applications**

**Resonant Converters**

AUTHORS: Jade Sund, Samantha Coday

2:30 PM

**T17.4** **A 48V to 50-110V Resonant Power-Bus Charger with Reduced Conduction Loss for MHz-Frequency Long-Range LiDAR Driver**

**Resonant Converters**

AUTHORS: Hangxiao Ma, Xuchu Mu, Yang Jiang, Weihang Zhang, Jincheng Zhang, Rui Martins, Pui-In Mak

2:50 PM

**T17.5** **A Trajectory Controlled 48-to-24 V Resonant Switched Capacitor Converter with 98.7% Efficiency and Ultrafast Dynamic Response**

**Resonant Converters**

AUTHORS: Hélène Ma Yang, Liang Wang, Haoyu Wang, Wai Tung Ng

3:40 PM

**T17.6** **Low Power, Non-Isolated, Extremely-High Step-Up, Quasi-Resonant Hybrid DC–DC Converter**

**Hard- and Soft-Switched**

AUTHORS: Kumar Joy Nag, Aleksandar Prodić

4:00 PM

**T17.7** **Isolated Soft-Switching Flying-Capacitor based Quasi-Resonant Step-Up Converter**

**Resonant Converters**

AUTHORS: Kumar Joy Nag, Aleksandar Prodić

4:20 PM

**T17.8** **Accurate Small-Signal Phasor Transformation-Based Modeling of Secondary-Side Diode-Bridge Rectifiers for Battery Charging Applications**

**Resonant Converters**

AUTHORS: Aditya Zade, Regan Zane

4:40 PM

**T17.9** **High-Efficiency Isolated Piezoelectric Transformers for Magnetic-Less DC-DC Power Conversion**

**Resonant Converters**

AUTHORS: Sourav Naval, Wentao Xu, Mustapha Touhami, Jessica Boles

1:30 PM – 5:00 PM

## T18: GaN & SiC Power Devices

LEVEL THREE, A302

SESSION CHAIRS

**Jaeil Baek,** *Intel Corporation / ATTD*

**Zhiguo Pan,** *Schneider Electric*

1:30 PM

**T18.1** **First Characterization of GaN Power Device and IC at Deep Cryogenic Temperatures Down to 100 mK**

GaN and SiC Devices and Modules

AUTHORS: Xin Yang, Matthew Porter, Zineng Yang, Zichen Xi, Liyang Jin, Liyan Zhu, Linbo Shao, Yuhao Zhang

1:50 PM

**T18.2** **Dynamic Environment-Aware Lifetime Prediction of SiC MOSFET Modules Through LSTM**

GaN and SiC Devices and Modules

AUTHORS: Md Zakir Hasan, Seungdeog Choi, Youssef Aider, Prashant Singh, Chun-Hung Liu

2:10 PM

**T18.3** **Guarding-Based C-V Characterization of 10 kV SiC MOSFET in Half-Bridge Module Configuration**

GaN and SiC Devices and Modules

AUTHORS: Nianzun Qi, Gao Liu, Zhixing Yan, Shaokang Luan, Pawel Piotr Kubulus, Yuan Gao, Stefan Meyer, Hongbo Zhao, Asger Bjørn Jørgensen, Stig Munk-Nielsen

2:30 PM

**T18.4** **Automated Characterization Platform for Comprehensive Dynamic Rdson Assessment of GaN HEMTs from 50 K to 400 K**

GaN and SiC Devices and Modules

AUTHORS: Tian Qiu, Zheyu Zhang, Purushottam Khadka, Ahmed Shahnewaz Siraj, Dilip Rana

2:50 PM

**T18.5** **A Gate Driving Scheme for GaN Git with Enhanced Short Circuit Capability for Motor Drive Application**

GaN and SiC Devices and Modules

AUTHORS: Zongjie Zhou, Yan Cheng, Kevin Jing Chen

3:40 PM

**T18.6** **Online Detection and Reduction of the Influence of Parameter Tolerance of Paralleled SiC MOSFETs in an EV Inverter Environment**

GaN and SiC Devices and Modules

AUTHORS: Hadiuzzaman Syed, Jochen Streit, Robert Kragl, Muhammad Muneeb Alam, Alberto Martinez-Limia, Karl Oberdieck, Ertuğrul Sönmez

4:00 PM

**T18.7** **Dynamic Current Sharing Issues with Paralleling SiC Power MOSFETs**

GaN and SiC Devices and Modules

AUTHORS: Ching-Yao Liu, Chen-Chan Lee, Jih-Sheng Lai

4:20 PM

**T18.8** **Integrated Short-Circuit Protection Design based on Dual-Channel Gate Driver for Series Connected Medium-Voltage SiC MOSFETs**

GaN and SiC Devices and Modules

AUTHORS: Rui Wang, Drazen Dujic

4:40 PM

**T18.9** **Long-Term High-Temperature Dynamic Gate Stress Reliability of a Last-Generation, Automotive-Grade, Planar 1200 V SiC MOSFET**

GaN and SiC Devices and Modules

AUTHORS: Giuseppe Mauromicale, Alessandro Sitta, Michele Fiore, Michele Calabretta, Francesco Iannuzzo

1:30 PM – 5:00 PM

## T19: Gate Drive Circuits I

LEVEL THREE, A311

SESSION CHAIRS

**Zahra Saadatizadeh,** *Mississippi State University*

**Davide Giacomini,** *Infineon Technologies AG*

1:30 PM

**T19.1** **Innovative Gate Driver Structure Achieving Low Time Skew Across Isolation Barrier for Parallel Connected SiC Modules**

Gate Drive Circuits and Fault Protection

AUTHORS: Louison Gouy, Anne-Sophie Descamps, Nicolas Ginot, Christophe Batard

1:50 PM

**T19.2** **Fully Integrated Closed-Loop Active Gate Driver IC with Real-Time Control of Gate Current Change Timing by Gate Current Sensing**

Gate Drive Circuits and Fault Protection

AUTHORS: Yaogan Liang, Katsuhiro Hata, Makoto Takamiya

2:10 PM

**T19.3** **Analyze and Design of Digitally Load Current Modulated Active Gate Driver for GaN HEMTs based Buck DC-DC**

Gate Drive Circuits and Fault Protection

AUTHORS: Wentao Liu, Zhina Lian, Taotao Wu, Xiaochuan Peng, Hao Min

2:30 PM

**T19.4** **Impact of Real-Time Variable Gate-Drive Strength on Drive Cycle Efficiency in SiC Inverter-Fed PMSM Traction Drives**

Gate Drive Circuits and Fault Protection

AUTHORS: Matteo Pizzuto, Aiswarya Balamurali, Aniket Anand, Narayan Kar

2:50 PM

**T19.5** **Demonstration of Efficiency Increase of 350 V-to-13.3 V Isolated DC-DC Converters for Electric Vehicles by Active Gate Driving**

Gate Drive Circuits and Fault Protection

AUTHORS: Yohei Sukita, Katsuhiro Hata, Hiroki Kondo, Kenichi Watanabe, Kenichi Nagayoshi, Makoto Takamiya

3:40 PM

**T19.6** **A Multi-Level Active Gate Driver for Achieving Thermal Balance in Parallel Connected Power MOSFETs**

Gate Drive Circuits and Fault Protection

AUTHORS: Jingyuan Liang, Lingwei Sun, Wen Tao Cui, Wai Tung Ng, Motomitsu Iwamoto, Haruhiko Nishio

4:00 PM

**T19.7** **A Fast Short-Circuit Protection Method for Ohmic Gate P-GaN HEMT based on Gate Charge**

Gate Drive Circuits and Fault Protection

AUTHORS: Yue Wu, Xi Jiang, Song Yuan, Xiaowu Gong, Zhaoheng Yan, Jiahong Chen, Yun Xu, Jinjie Liu

4:20 PM

**T19.8** **Comparison of Ultrafast-Rise-Time Gate Drivers for Wide-Bandgap Devices in Sub-Microsecond Pulsed Power Applications**

Gate Drive Circuits and Fault Protection

AUTHORS: Soham Roy, Tan Duy Nguyen, Neeraj Anantha, Alex Hanson

4:40 PM

**T19.9** **A Discrete Multilevel Active Gate Driver for GaN HEMTs to Optimize the Switching Behavior**

Gate Drive Circuits and Fault Protection

AUTHORS: Celine Lawniczak, Martin Pfost

1:30 PM – 5:00 PM

## T20: Modeling & Simulation II

LEVEL THREE, A312

SESSION CHAIRS

**Jason Neely,** *Sandia National Laboratories*

**Jingbo Liu,** *Eaton*

1:30 PM

**T20.1** **Attenuation of Fundamental Component of Differential Mode Noise using Active EMI Filter**

Circuits and Systems

AUTHORS: Guru Abhilash Mulumudi, Naveed Ishraq, Ayan Mallik

1:50 PM

**T20.2** **Graph Neural Network based Performance Modeling for the Dual Active Bridge Converter with Operational Generalization**

Circuits and Systems

AUTHORS: Weihao Lei, Fanfan Lin, Xinze Li, Xiaokun Bao, Xin Zhang

2:10 PM

**T20.3** **An Augmented State Space Modelling Approach for DC-DC Converter Start-Up in Closed Loop**

Circuits and Systems

AUTHORS: Waseah Anjum, Arkadeb Sengupta, Marco Liserre

2:30 PM

**T20.4** **The Utilization of a Parallel Computing Algorithm for Accelerating Switching-Level Modeling of Power Electronics Simulations in a T-Type PV Inverter**

Circuits and Systems

AUTHORS: Buck F. Brown III, Liwei Wang, Zheyu Zhang, Johan Enslin, Yi Li

2:50 PM

**T20.5** **A New Reduced Order Analytical Switching Model for eGaN HEMTs**

Device and Component Modeling

AUTHORS: Ruqi Li, Douglas Arduini, Phen Lumod, Shobhana Punjabi, River Lin, Harold Gutierrez

3:40 PM

**T20.6** **Proposal of an Alternative Reverse Recovery Calculation Method**

Device and Component Modeling

AUTHORS: Brian Deboi, Blake Nelson, Austin Curbow

4:00 PM

**T20.7** **Improvement of CM EMI Attenuation Ability of Transformer with Negative Capacitor**

**Parasitics Extraction and Optimization**

AUTHORS: Qinghui Huang, Yiming Li, Yirui Yang, Shuo Wang, Yanwen Lai, Zhedong Ma

4:20 PM

**T20.8** **Damping Factor based PCB Parasitic Inductance Value Optimization to Minimize Voltage Overshoot and Settling Time of Semiconductors**

**Parasitics Extraction and Optimization**

AUTHORS: Reza Shahbazi, Yunting Liu

4:40 PM

**T20.9** **Hardware Implementation of Virtual Resistance based FRT Logic in Programmable 3-Level ANPC Inverters**

**Hardware-in-the-Loop and Rapid Prototyping**

AUTHORS: Mohammad Safayet Hossain, Shuvangkar Chandra Das, Paychuda Kritprajun, Amin Banaie, Tapas Barik, Deepak Ramasubramanian, Aboutaleb Haddadi, Evangelos Farantatos, Ulrich Muenz

1:30 PM – 5:00 PM

## T21: Critical Applications in Space & Transportation

LEVEL THREE, A313

SESSION CHAIRS

**Tao Yang,** *University of Nottingham*

**Jean Marcos Lobo da Fonseca,** *CAT*

1:30 PM

**T21.1** **Rad-Hard PSFB Controller for High-Voltage Space Applications**

**Power Electronics for Aerospace**

AUTHORS: Reynaldo Gonzalez, Robert Bolaños

1:50 PM

**T21.2** **Modeling, Control and Digital Implementation of a Buck Converter Operating in Triangular Current Mode for a Wide Output Voltage Range Space Application**

**Power Electronics for Aerospace**

AUTHORS: Regina Ramos, Sara Pérez Sánchez, Guillermo Núñez Rodríguez, Pedro Alou Cervera, Javier Torres Cabanuz

2:10 PM

**T21.3** **Thermal Model and Optimization of a Multi-Winding Transformer for Lunar Surface Power Transmission**

**Power Electronics for Aerospace**

AUTHORS: Zhining Zhang, Yuzhou Yao, Junchong Fan, Juchen Yang, Robert Guenther, Pengyu Fu, Jin Wang

2:30 PM

**T21.4** **Active Gate Driver Power Supply for High-Reliability Applications**

**Power Electronics for Aerospace**

AUTHORS: Joseph Kozak, Juan Ramirez, Jesse Lin, Allison Orr, Alexander Martin, Hala Tomey

2:50 PM

**T21.5** **A Hybrid Energy Storage System for eVTOL Unmanned Aerial Vehicles using Supercapacitors**

**Power Electronics for Aerospace**

AUTHORS: Ali Alenezi, Peng-Hao Huang, Prasad Enjeti

3:40 PM

**T21.6** **Evaluation of Retired Lithium-Ion Batteries for Second-Life Applications Through Electrochemical Impedance Spectroscopy**

**Vehicular Power Electronic Circuits and Systems**

AUTHORS: Latha Anekal, Sheldon Williamson

4:00 PM

**T21.7** **Uninterruptable Non-Isolated Integrated Power Electronics Converter (UNIPEC) for Commercial Truck Auxiliary Power Unit**

**Power Electronics for Shipboard and Other Transportation Applications**

AUTHORS: Pouya Zolfi, Ahmad Alzahrani, Ayman EL-Refaie

4:20 PM

**T21.8** **Investigation of Electrical Safety for Non-Isolated Single-Phase On-Board Chargers used in BEV/PHEV**

**On-board and Off-board Charging Systems**

AUTHORS: Soya Kataoka, Shohei Funatsu, Hiroaki Matsumori, Takashi Kosaka, Keisuke Nakamura, Subrata Saha

4:40 PM

**T21.9** **An 8-Level Flying Capacitor Multilevel Converter for Electric Aircraft Pulse Deicing**

**Power Electronics for Aerospace**

AUTHORS: Nicole Stokowski, Andrew Freeman, Aidan Rodgers, Aria Delmar, Jonathan Sengstock, Alex Solecki, Andrew Stillwell

1:30 PM – 5:00 PM

## T22: Motor Drives II

LEVEL THREE, A315

SESSION CHAIRS

**Ziaur Rahman, PhD,** *Booz Allen Hamilton*

**Ali Safayet,** *Halla Mechatronics*

1:30 PM

**T22.1** **Impact of Position Measurement Delay Angle on Performance of PMSM Drives for Electric Power Steering in a Wide Speed Range**

**Modeling and Control Techniques for Motor Drives**

AUTHORS: Yingzhe Wu, Hengbin Zhang, Yuxiang Xue, Lisheng Wang, Hui Li, Shan Yin

1:50 PM

**T22.2** **Physical Parameter Estimation for a Two-Level VSI Three-Phase PMSM Electric Drivetrain**

**Modeling and Control Techniques for Motor Drives**

AUTHORS: Bernard Steyaert, Ananda Tjakra Adisurja, Matthias Preindl

2:10 PM

**T22.3** **A Novel Two-Dimensional Random Switching Frequency PWM Method for Variable Frequency Drives**

**Power Quality and EMI for Motor Drives**

AUTHORS: Mostafa Abarzadeh, Kevin Lee

2:30 PM

**T22.4** **Optimized Maximum Torque and Minimum Loss Fault-Tolerant Control Schemes for Dual Three-Phase PMSM**

**Modeling and Control Techniques for Motor Drives**

AUTHORS: Syed Mohammad Maaz, Dong-Choon Lee

2:50 PM

**T22.5** **Wireless Actuation of Magnetic Robots with a Modular 60 mT 3-D Helmholtz Coil System**

**Actuators**

AUTHORS: Konstantinos Manos, Yifan Rao, Tuo Zhao, Kevin Liu, Daniel Zhou, Calvin Nguyen, Eric Chen, Glaucio H. Paulino, Minjie Chen

3:40 PM

**T22.6** **A Versatile PHIL based Motor Emulator Testbench using a High-Performance Power Amplifier Testbench**

**AC, DC, BLDC Motor Drives**

AUTHORS: Seyedeh Nazanin Afrasiabi, Rajendra Thike, Mathews Boby, K. S. Amitkumar

4:00 PM

**T22.7** **A 450V Three Phase GaN IPM Achieving 99.1% Efficiency in Smallest 12mm x12mm Package for 250W Power Delivery without Heatsink**

**AC, DC, BLDC Motor Drives**

AUTHORS: Maik Kaufmann, Manu Balakrishnan, Stefan Herzer, Anand Chellamuthu, Hely Zhang

4:20 PM

**T22.8** **FEA based High-Frequency Synthesis for the Design and Optimization of GaN-Based Dual Three Phase Motor Drive System**

**Integrated Motor Drives**

AUTHORS: Syed Imam Hasan, Alper Uzum, Ashraf Siddiquee, Yilmaz Sozer, Krishna Namburi

4:40 PM

**T22.9** **Evaluation of Passive Common-Noise Canceller Considering Both of Thermal Equilibrium and Common-Mode Noise Cancellation**

**Power Quality and EMI for Motor Drives**

AUTHORS: Koji Mitsui, Kenshiro Katsura, Koki Notake, Koji Yamaguchi

1:30 PM – 5:00 PM

## T23: Solid State Transformer Design & Control

LEVEL THREE, A314

SESSION CHAIRS

**Ali Khajehoddin, PhD,** *University of Alberta*

**Hang Dai,** *GE Aerospace Research*

1:30 PM

**T23.1** **Performance Evaluation of Isolated DC/DC Converters in Modularized Bridge Rectifier Solid-State Transformer**

**Solid-State Transformers**

AUTHORS: Zhenchao Li, Andrea Cervone, Drazen Dujic

1:50 PM

**T23.2** **Active and Reactive Power Flow Control of the Dual Active Bridge Converter**

**Solid-State Transformers**

AUTHORS: Lauryn Morris, Thomas W. Francois, Jonathan Saelens, Oroghene Oboreh-Snapps, Arnold Fernandes, Praneeth Uddarraju, Sophia A. Strathman, Jonathan W. Kimball

2:10 PM

**T23.3** **Comparative Analysis of Carbon Footprints and Material Usage of Solid-State Transformers and Low-Frequency-Transformer-Based MVac-LVdc Interfaces for High-Power EV Charging**

**Solid-State Transformers**

AUTHORS: Luc Imperiali, Rudy Wang, Anup Anurag, Peter Barbosa, Johann Walter Kolar, Jonas Huber

2:30 PM

**T23.4** **Trade Study of Isolation Requirements and Magnetic Core Selection for Medium Frequency-Medium Voltage Transformers**

**Solid-State Transformers**

AUTHORS: Mohendro Kumar Ghosh, Mark A. Juds, Brandon Grainger, Ahmad El Shafei, Bogdan S. Borowy, Paul R. Ohodnicki

2:50 PM

**T23.5** **Comparative Evaluation of a Multilevel LLC Resonant Converter for a Modular DC/DC Stage in a Electrolyzer Power Supply**

**Solid-State Transformers**

AUTHORS: Samuel S. Queiroz, Levy F. Costa

3:40 PM

**T23.6** **Cost-Effectiveness Assessment of SiC MOSFET and Si IGBT Semiconductors in a Three-Level Resonant Converter for Solid-State Transformer**

**Solid-State Transformers**

AUTHORS: Samuel S. Queiroz, Levy F. Costa

4:00 PM

**T23.7** **Comparative Performance Analysis of Medium Voltage 3L-ANPC and 3L-DNPC Pole Enabled by Series-Connection of 10kV SiC MOSFETs and 10kV SiC JBS Diodes for Sine Triangle PWM Operation**

**Solid-State Transformers**

AUTHORS: Sanket Parashar, Shubham Rawat, Nithin Kolli, Raj Kumar Kokkonda, Subhashish Bhattacharya

4:20 PM

**T23.8** **A Zero Harmonic Distortion Master Converter for Medium Voltage Microgrids**

**Microgrid Systems**

AUTHORS: Gabriel Vilkn Ramos, Dener Brandão, Thiago Parreiras, Danilo Brandão, Braz de Jesus Cardoso Filho

4:40 PM

**T23.9** **An MILP Approach for Modeling and Analyzing the BESS for Smoothing Renewable Fluctuations Considering BESS Capacity Attenuation in the Bulk Power System with High Inverter-Based Resource Penetration**

**Energy Storage Systems**

AUTHORS: Hualong Liu, Wenyuan Tang

1:30 PM – 5:00 PM

## T24: Reliability, Efficiency, & Thermal Performance of Power Modules & Components

LEVEL THREE, A316

SESSION CHAIRS

**Vidhi Patel,** *ABB*

**Zhou Dong,** *University of Tennessee at Knoxville*

1:30 PM

**T24.1** **Thermal and Efficiency Characterization of Immersion Cooled SiC Traction Inverter**

**Thermal Management**

AUTHORS: Yiju Wang, Reza Ilka, Jiangbiao He

1:50 PM

**T24.2** **FPGA-Based Hybrid Simulator for Real-Time 3-D Temperature Monitoring of Power Converters**

**Thermal Management**

AUTHORS: Xianghao Mo, Daniel Ríos Linares, Regina Ramos, Miroslav Vasić

2:10 PM

**T24.3** **A New Subassembly Concept for Enhanced Heat Dissipation and Reliability of Power Module**

**Power Modules / High Density Design**

AUTHORS: Yosuke Nakata, Yuji Sato, Shin Uegaki, Jun Fujita, Akihiko Furukawa, Masayoshi Tarutani

2:30 PM

**T24.4 Stand-Alone RDS–ON Sensor for In-Situ Prognostic, Protection and Reliability Enhancement of Power Converters**

**Quality and System Reliability Including EMI/EMC**

AUTHORS: Zaheen Mustakin, Qiang Mu, Lucas Pereira, Jiale Zhou, Tiefu Zhao, Babak Parkhideh

2:50 PM

**T24.5 Electrical Evaluation of a Modular High Voltage 3D Power Module using Direct Dielectric Liquid Cooling**

**Power Electronics Packaging**

AUTHORS: Omar Sanjakdar, Yvan Avenas, Rachelle Hanna, Guillaume Piquet Boisson, Emmanuel Marcault, Antoine Philippe

3:40 PM

**T24.6 Board Level Reliability of Gull-Wing, Micro-Leaded and Lead-Less Packaged MOSFETs in Automotive Environments**

**Power Electronics Packaging**

AUTHORS: Christopher Liu, Vijayakrishna Satyamsetti, Xuanjing Wei, Christian Radici, Peter Vines, Wayne Lawson

4:00 PM

**T24.7 Cost Effective and High Noise Immunity Methodology for Aging Evaluation of DC-Link Capacitors in Traction Inverters**

**Quality and System Reliability Including EMI/EMC**

AUTHORS: Seyed Hossein Aleyasin, Fausto Stella, Radu Bojoi, Enrico Vico

4:20 PM

**T24.8 A 3D Structure of Single-Sided Cooling Power Module with Low Thermal Resistance and Low Inductance**

**Power Modules / High Density Design**

AUTHORS: Hirofumi Hisamochi, Koki Notake, Yoshiaki Takahashi, Koji Yamaguchi

4:40 PM

**T24.9 Aging of Y-Capacitor in an EMI Filter and Its Impact on Common-Mode Noises**

**Quality and System Reliability Including EMI/EMC**

AUTHORS: Tahmid Ibne Mannan, Seungdeog Choi, Subarto Kumar Ghosh, Md Moniruzzaman

8:30 AM – 11:55 AM

▸ PSMA SESSION ◂

## IS07: The Transformer in the Solid-State Transformer

LEVEL FOUR, A412

SESSION CHAIRS

**George A. Slama,** *Würth Elektronik*

**Edward Herbert, BEEE.** *PSMA*

8:30 AM

**IS07.1** **Recommended Practices for Solid State Transformer Design and Testing**
**Paul Ohodnicki,** *University of Pittsburgh*

8:55 AM

**IS07.2** **Addressing Insualtion and Isolation Issues in the Solid State Transformer**
**Zhicheng Guo,** *Arizona State University*

9:20 AM

**IS07.3** **Enabling High Power Transformer Design With Advanced Magnetic Mmaterials**
**Veda Samhitha Duppalli, PhD,** *CorePower Magnetics*

9:45 AM

**IS07.4** **Thermal Design and Limits of the Transformer in the Solid State Transformer**
**Subhashish Bhattacharya, PhD,** *North Carolina State University*

10:40 AM

**IS07.5** **Managing Trade-Offs in Design of High-Power Medium Frequency Transformers for Solid-State Transformers**
**Drazen Dujic,** *Power Electronics Laboratory, EPFL*

11:05 AM

**IS07.6** **Medium Frequency Transformers for Data Centers**
**Isaac Wong,** *North Carolina State University*

11:30 AM

**IS07.7** **Evolution of the Solid State Transformer for Different Applications**
**Rafal Wojda,** *Oak Ridge National Laboratory*

8:30 AM – 11:55 AM

## IS08: Gate Driver, Protection & Safety Circuits

LEVEL FOUR, A411

SESSION CHAIRS

**Emanuel Eni, PhD,** *Infineon Technologies*

**Sasikala Thangam, B.E EEE.** *Texas Instruments*

8:30 AM

**IS08.1** **A Novel Integrated Gate Driver Design for 650V GIT GaN HEMT**
**Zhemin Zhang,** *Infineon*

8:55 AM

**IS08.2** **Eliminate the Cost for Negative Bias by Integrated Negative Rail and Bootstrap Diode**
**Mengxuan Wei,** *texas instruments*

9:20 AM

**IS08.3** **Integrated Advanced Gate Driver Protection and Safety Features for High Power Systems**
**Luowei Wen, PhD,** *Texas Instruments*

9:45 AM

**IS08.4** **Is DESAT Still a Relevant Short-Circuit Protection for Today's Fast SiC MOSFETs?**
**Emanuel Eni, PhD,** *Infineon Technologies*

10:40 AM

**IS08.5** **Performance Comparison of a Pre-Driver with External FETs vs an Integrated High-Current FET Driver for High Power Applications**
**Sasikala Thangam, B.E EEE,** *Texas Instuments*

11:05 AM

**IS08.6** **Pushing the Switching Performance Limits of Power Semiconductors Using Dynamic Drive**
**Daniel E. Norwood,** *Texas Instruments*

11:30 AM

**IS08.7** **Transformer-less Fast Negative Voltage Generator for SiC MOSFET Gate Drive**
**Jianlong Chen,** *Wolfspeed*

8:30 AM – 11:55 AM

## IS09: AC-DC & Flyback Applications

LEVEL FOUR, A410

SESSION CHAIRS

**Elisabetta Mahmutovic,** *Texas Instruments*

**Armando Mesa,** *onsemi*

8:30 AM

**IS09.1** **1.4 kW E-Scooter Battery Charger with Wide Range CV and CC Operation Modes**
**Miguel Carlos C. de la Pena,** *Power Integrations*

8:55 AM

**IS09.2** **3-Level Flying Capacitor Bridgeless PFC for High Power Density Server and Telecom Applications**
**David Meneses, PhD,** *Infineon Technologies Nordic AB Filial*

9:20 AM

**IS09.3** **3-port USB-C Charger and Adapter Meeting Latest Efficiency, Standby and Tiny-Load Requirements**
**Alfredo Medina Garcia,** *Infineon Technologies AG*

9:45 AM

**IS09.4** **A Critical Analysis of Discrete and Power Module in Silicon Carbide Technology in On-Board Charger PFC Stage**
**Giuseppe Aiello, PhD,** *STMicroelectronics*

10:40 AM

**IS09.5** **High Efficiency 180W USB PD Adapter with SR-ZVS Flyback Converter**
**Remya Kuriakose, MTech,** *Power Integrations*

11:05 AM

**IS09.6** **Improving Light Load Efficiency of 5 V – 28 V Output USB-PD Notebook Adapters**
**Ralph Ryan I. Ipurong,** *Power Integrations*

11:30 AM

**IS09.7** **Modeling and Verifying Loop Stability for a New Pulse Width Modulation Flyback Control Scheme**
**Adrian R. Umadhay,** *Power Integrations*

8:30 AM – 11:55 AM

## IS10: AI Tools for More Efficient Power Electronics Design

LEVEL FOUR, A402

SESSION CHAIRS

**Kevin Hermanns,** *PE-Systems GmbH*

**Stephanie Watts Butler,** *WattsButler LLC*

8:30 AM

**IS10.1** **Circuit AI for Bill Of Materials (BOM); Switching Loss Optimization; Capacitor RMS Current Estimation and MORE**
**Prasad Enjeti,** *Texas A&M University*

8:55 AM

**IS10.2** **Using AI & High Performance Computing to design Power Electronics**
**Audrey Reznik, MS,** *Red Hat*

9:20 AM

**IS10.3** **Computational Intelligence Techniques for Improved Virtual Prototypes in Power Electronics**
**Peter Wilson, PhD MBA FIET FBCS FHEA SMIEEE,** *University of Bath*

9:45 AM

**IS10.4** **MagNet Challenge for Data Driven Power Magnetics Modeling**
**Minjie Chen, PhD,** *Princeton University*

10:40 AM

**IS10.5** **Generating Lumped Element Equivalent Circuit Model Netlists for Passive Components Using a Small Language Model (SLM)**
**Richard Blakey, PhD MSc MBA,** *Würth Elektronik*

11:05 AM

**IS10.6** **AI for Converter Design: From Components and Control to Systems**
**Wilmar Martinez, PhD,** *KU Leuven – EnergyVille*

11:30 AM

**IS10.7** **Cascading AI Techniques for the Approximation of Power Losses in Inductive Systems**
**Andreas Rosskopf,** *Fraunhofer IISB*

8:30 AM – 11:55 AM

## IS11: WBG Converter Design

LEVEL FOUR, A403

SESSION CHAIRS

**Darwin Fernandez,** *Texas Instruments*

**Jason Zhang, MSEE,** *Navitas Semiconductor*

8:30 AM

**IS11.1** **500kHz Inverter Design Using Bidirectional GaN Switches**
**Jason Zhang, MSEE,** *Navitas Semiconductor*

8:55 AM

**IS11.2** **Conducted EMI Mitigation of Silicon Carbide (SiC) Based 25kW Three-Phase Three-level T-Type Neutral Point Clamped (3P3LT2NPC) Inverter**
**Sidharth Gupta,** *Wolfspeed*

9:20 AM

**IS11.3** **Designing a Single-Stage Dual-Output Flyback Converter Using a High Voltage GaN Switch for Wide Input Voltage Range**
**Han Cui, MSC,** *Power Integrations*

9:45 AM

**IS11.4** **Experimental Analysis of Gate Voltage Transients and Their Relation to Partial Turn-On in Silicon Carbide MOSFETs**
**Urvi Ahluwalia, MS,** *Wolfspeed*

10:40 AM

**IS11.5** **Industry's First Stackable Boost Converter with Integrated GaN FETs**
**Florian Schimkat, MSc,** *Texas Instruments*

11:05 AM

**IS11.6** **Paralleling Smart Discrete GaN HEMTs with Current Sense**
**Zhemin Zhang,** *Infineon*

11:30 AM

**IS11.7** **Single Phase HERIC Inverter for Residential Hybrid Inverter Applications**
**Kasra Khazraei,** *Infineon*

8:30 AM – 11:55 AM

▸ PSMA SESSION ◂

## IS12: New Era of Power Technologies, Devices, Topologies and Applications

LEVEL FOUR, A404/A405

SESSION CHAIRS

**Karthick Murukesan, PhD,** *Power Integrations*

**Reenu Garg,** *Microchip Technologies*

8:30 AM

**IS12.1** **GaN Bidirectional Switches: Present & Future**
**Davide Bisi, PhD,** *Renesas Electronics*

8:55 AM

**IS12.2** **High Performance 5 kW, 4-Level Totem-Pole PFC Converter Using 200 V GaN FETs for Open Compute Servers**
**Michael A. de Rooij, PhD,** *Efficient Power Conversion Corporation*

9:20 AM

**IS12.3** **Optimization of Si/SiC Hybrid Switches Performance for High Power Inverters**
**Gianni Vitale, MD,** *STMicroelectronics*

9:45 AM

**IS12.4** **Innovating at the System Level in the Era of Highly Efficient Semiconductors**
**Mrinal Das,** *onsemi*

10:40 AM

**IS12.5** **Superior Performance of Infineon's High Voltage CoolGaNTM Bidirectional AC Switch**
**Jingcun Liu,** *Infineon*

11:05 AM

**IS12.6** **Improving the Efficiency and Reducing Costs by PSMT mSiC(TM) MOSFETs**
**Ehab Tarmoom,** *Microchip Technology*

11:30 AM

**IS12.7** **GaN D-mode vs. E-mode: A Clash of Technologies? Or the Perfect Co-existence?**
**Jim Honea, PhD,** *Nexperia*

1:30 PM – 4:55 PM

## IS13: Powering AI Server Demands

LEVEL FOUR, A412

SESSION CHAIRS

**Francesco Di Domenico,** *Infineon Technologies*

**Harry Soin, MASc,** *AEI*

1:30 PM

**IS13.1** **Design of 5.5kW 3-phase LLC Converter with SiC MOSFETs for AI Server Applications**
**Yifei Zheng,** *Infineon Technologies*

1:55 PM

**IS13.2** **High Power Density 8kW Power Supply for Server and Data Center Applications**
**David Meneses, PhD,** *Infineon Technologies Nordic AB Filial*

2:20 PM

**IS13.3** **Power Supplies and Rack Architecture Evolution to Meet AI Servers Demands**
**Sam Abdel-Rahman,** *Infineon Technologies*

2:45 PM

**IS13.4** **Saras Embedded STile Advanced Technology Enabling High Performance Integrated Power Delivery Networks**
**Imran Khan, PhD,** *Saras Micro Devices*

3:40 PM

**IS13.5** **Vertical Power Delivery Enables Higher Performance from xPU and AI Products**
**Tim Phillips, MBA,** *Empower Semiconductor*

4:05 PM

**IS13.6** **Zero-Bias TLVR Exploration for Future Datacenter Computing Applications**
**Chi Hsu, MA,** *Google*

4:30 PM

**IS13.7** **Zero-Bias Trans-Inductor and Metal-Based Trans-inductor for High Performance Computing Infrastructures**
**Chi-shiuan Shie, MA,** *Cyntec*

1:30 PM – 4:55 PM

▸ PSMA SESSION ◂

## IS14: Advancing Power Solutions: Integrating Wide Bandgap Technologies for Next-Generation Applications

LEVEL FOUR, A411

SESSION CHAIRS

**Renee Yawger,** *Efficient Power Conversion (EPC)*

**Llewellyn Vaughan-Edmunds,** *Navitas Semiconductor*

1:30 PM

**IS14.1** **Leading the Way with Industry's Smallest Integrated HV Half-Bridge and Highly Efficient Pinout**
**Nitish Nitish,** *Texas Instruments*

1:55 PM

**IS14.2** **Enabling GaN Bidirectional AC Switches Through Self Biased Monolithically Integrated Substrate Management Circuit**
**Alexander Young,** *Infineon*

2:20 PM

**IS14.3** **GaNSlim Power IC & DPAK-4L Package Enables 100W, 100cc, PD3.1 Continuous Power Solution with 95% Efficiency**
**Tom Ribarich,** *Navitas Semiconductor*

2:45 PM

**IS14.4** **Powerstage GaN Integrated Circuits Operation in Robotic Applications**
**Marco Palma, MSCee MBA,** *Efficient Power Conversion*

3:40 PM

**IS14.5** **The Next Decade for GaN**
**David Czajkowski, MA,** *MinDCet NV*

4:05 PM

**IS14.6** **Pruning the Power Tree**
**David Chen,** *Power Integrations*

4:30 PM

**IS14.7** **Unlocking the Potential of Multi-level Inverters with Integrated ICeGaN Technologies**
**Daniel Murphy,** *Cambridge GaN Devices*

1:30 PM – 4:55 PM

## IS15: DC-DC Conversion

LEVEL FOUR, A410

SESSION CHAIRS

**Sudhakarababu Chakkirala, Ph. D,** *Power Integrations*

**Richard Chung,** *ST Microelectronics*

1:30 PM

**IS15.1 A Practical, Compact Resonant Transformer Solution for High Voltage Applications**
**Matthew Russell,** *Bourns Electronics*

1:55 PM

**IS15.2 Comparison of Silicon MOSFET vs GaN for Isolated Half Bridge LLC Converters in Visual Display OLED TV Applications**
**Ben Lough,** *Texas Instruments*

2:20 PM

**IS15.3 How to Achieve 30x Higher Power Density and Ultra-low EMI with Advanced Integration Technology of Isolated Converters**
**Pei-Hsin Liu, PhD,** *Texas Instruments*

2:45 PM

**IS15.4 Hybrid Control Method to Extend Gain Range In Phase-shifted LLC Converter**
**Ramkumar Sivakumar,** *Texas Instruments*

3:40 PM

**IS15.5 Hybrid-Flyback: A Novel Power Topology for Ultra-flat SMPS Designs**
**Alfredo Medina Garcia,** *Infineon Technologies AG*

4:05 PM

**IS15.6 Maximize Efficiency in Isolated DC/DC Converters for Electric Vehicle Fast Charging Systems**
**Christopher D. New, PhD,** *Wolfspeed*

4:30 PM

**IS15.7 Split Inductor Self-balancing HV Buck**
**Roberto Scibilia,** *Texas Instruments*

1:30 PM – 4:55 PM

## IS16: Power Modules & Emerging Applications

LEVEL FOUR, A402

SESSION CHAIRS

**Anuj S. Narain, MSEE,** *Wolfspeed*

**Adam Anders, MSEE,** *Wolfspeed*

1:30 PM

**IS16.1 High-Reliability and Compact Integrated Actuation Power Solution for Light Weight Aerospace Applications up 15 kW**
**Amit Gole,** *Microchip Technology*

1:55 PM

**IS16.2 Power Electronics- Reducing the Size and Increasing the Functionality of Medical Equipment.**
**Frank Cirolia, BSEE,** *Advanced Energy*

2:20 PM

**IS16.3 Reliability Analysis of Newer Generations of SiC Baseless Power Module in Bidirectional EV-Charging Application**
**Andrea Bianchi, MA,** *ABB*

2:45 PM

**IS16.4 SEMITRANS 20 with 2kV SiC MOSFETS for Next Generation High Power Converters**
**Kevork Haddad, MASc,** *Semikron Danfoss*

3:40 PM

**IS16.5 Scalable Multi-battery Pack Charging & Back-up Solutions**
**Christian Greeff,** *Texas Instruments*

4:05 PM

**IS16.6 Study of a Passive Approach for Improving Transient Current Sharing among Paralleled SiC MOSFETs**
**Yuequan Hu, PhD,** *Wolfspeed*

4:30 PM

**IS16.7 The Role of Silicon Carbide in Enabling the Next Generation of Aerospace Transportation Applications**
**Dereje Woldegiorgis, PhD,** *Wolfspeed Inc*

1:30 PM – 4:55 PM

## IS17: Advanced Magnetics

LEVEL FOUR, A403

SESSION CHAIRS

**George A. Slama,** *Würth Elektronik*

**Edward Herbert, BEEE,** *PSMA*

1:30 PM

**IS17.1** **A New AC Rated Measurement Method for Wireless Power Transmission Coils Which Will Influence the Design of Wireless Power Systems**
**Cem Som,** *Würth Elelctronics Midcom*

1:55 PM

**IS17.2** **Fundamentals, Models and Performance of the Boosted Coupled Inductors**
**Alexandr Ikriannikov, PhD,** *Analog Devices*

2:20 PM

**IS17.3** **Innovative Approaches to High-Frequency Planar Transformers: Leveraging Nanocrystalline Materials for Enhanced Performance**
**Andre Buettner, Dipl. Ing.,** *Actain Engineering GmbH*

2:45 PM

**IS17.4** **Innovative Manufacturing Method for Inductors: Realizing Excellent Magnetic Properties and Reliability by Low-pressure Molding using Magnetic Molding Compound**
**Hiroki Sonokawa,** *Resonac Corporation*

3:40 PM

**IS17.5** **Magnetic Powder Materials with High Permeability for Inductor Applications**
**Yunfan Zhang,** *Shenzhen POCO Magnetic Co., Ltd*

4:05 PM

**IS17.6** **Removing Effects of Parallel Capacitances from Inductance and Resistance Measurements**
**Bryce L. Hesterman, MSEE,** *Utah State University*

4:30 PM

**IS17.7** **Resolving Noise and Transformer Saturation from Magnetic Field Interactions in Integrated Electronics**
**Mason Hsu,** *Google*

1:30 PM – 4:55 PM

▸ PSMA SESSION ◂

## IS18: Advanced Power Electronics & System Designs to Accelerate Transportation Electrification

LEVEL FOUR, A404/A405

SESSION CHAIRS

**Fernando Salcedo,** *U.S. Department of Energy – VTO*

**Dinesh Kithany, MBA (Marketing),** *Wired & Wireless Technologies (WAWT)*

1:30 PM

**IS18.1** **Next-Drive – Power Electronics and Electric Motor Requirements for Extending Life of Electrified Medium & Heavy-Duty Vehicles (MHDVs)**
**Burak Ozpineci, PhD,** *Oak Ridge National Laboratory*

1:55 PM

**IS18.2** **Safety Critical Designs Considerations in High Power Wireless Charging**
**John M. Wolgemuth, PE,** *InductEV*

2:20 PM

**IS18.3** **Modernizing Control Software Testing of Electric Powertrain Components**
**Dovlyn Curtis,** *Typhoon Hil, inc.*

2:45 PM

**IS18.4** **Advancements in Power Electronics to Enable Behind-the-Meter Storage Support of Extreme Fast Charging**
**John Kisacikoglu,** *National Renewable Energy Laboratory (NREL)*

3:40 PM

**IS18.5** **The Evolving Wireless EV Charging (WEVC) Technology Landscape**
**Dinesh Kithany, MBA (Marketing),** *Wired & Wireless Technologies (WAWT)*

4:05 PM

**IS18.6** **Medium Voltage Grid-tied Solid-State Transformers to Support High Power EV Charging**
**Andy Schroedermeier, PhD,** *EATON*

4:30 PM

**IS18.7** **Triple-Active Bridge Design to Enable Scalable High-Power Solid-State Transformers**
**Matthew Honickman,** *Mission Power Corp.*

## PRESENTATION 5

12:00 PM – 12:30 PM

### Würth Elektronik

#### Custom Transformers in Power Supplies: Achieving Precision, Efficiency, and Competitive Edge

EXPO HALL, EXPO THEATER 1

PRESENTED BY:

**Jared Birk,** *Würth Elektronik*

The transformer is the heart of any power supply, but off-the-shelf options often fall short in meeting specific electrical, mechanical, or efficiency needs. This presentation highlights how custom transformers can address these challenges, optimizing performance, saving PCB space, and ensuring a precise fit for unique applications. We'll also tackle concerns about cost, lead times, and minimum order quantities, showing how custom designs can deliver better efficiency, improved performance, and a competitive edge in the market.

12:00 PM – 12:30 PM

### STMicroelectronics

#### High-Efficiency GaN Solutions for Motor Control: Compact, Heatsink-Free Designs for Advanced Three-Phase Applications

EXPO HALL, EXPO THEATER 2

PRESENTED BY:

**Gianluigi Forte,** *STMicroelectronics*

Please join us to explore our latest solutions and innovations in motor control technology: a 1kW GaN power board designed for single-phase AC input to three-phase output applications, achieving high power density (30W/cm³) without a heatsink and utilizing a high switching frequency (100kHz) and a heatsink-less GaN System in Package (SiP) solution based on the new GaNSPIN product family, rated at 350W. This innovative SiP features a 600V half-bridge gate driver with 650V GaN half-bridge transistors featuring 138m? RDSon @ 25 C.

The seminar will cover advanced features such as an inrush current limiter, field-oriented control compatible with ZeST and HSO algorithms based on STM32 microcontrollers. Additionally, we will discuss insulated current sensing with Hall sensors, support for absolute and quadrature differential encoder decoding networks, and integrated resistive brake over-voltage protection and energy reversal management.

12:00 PM – 12:30 PM

### Mersen

#### SiC Power Stack Development: From Simulation to Design and Digital Control

EXPO HALL, EXPO THEATER 3

PRESENTED BY:

**Dr. Dominique TOURNIER, Dr. Philippe ROUSSEL,** *Mersen*

Mersen develops customer specific SiC power stack designs as well as evaluation kits, from a few 10's to several 100's of kVA. This workflow usually starts with the thermal simulation of the cooling solution based upon the expected power module losses. The next step generally aims at lowering the DC-link inductance loop by optimizing the design of the bus bar-capacitor link to keep the inductance value as low as 10nH. This paper will review the simulation strategies we use at Mersen, exemplified by real-case studies. Finally, this paper will highlight our latest developments regarding power stack control and how we support our customer across the development journey, from the converter topology, the selection of semiconductor technology to the PWM digital signal generation.

12:00 PM – 12:30 PM

### TDK

#### Stacking the Deck for Vertical Power Delivery

EXPO HALL, EXPO THEATER 4

PRESENTED BY:

**Bill Pelletier,** *TDK*

OVERVIEW. Designing high density power delivery systems is the hot (thermal management) topic in a fast changing (transient response) segment that results in some of the most innovative power solutions in the world. TDK's high current µPOL regulators are one of the latest to crest existing size and performance barriers. Achieving these breakthrough densities requires a dual focus on thermal and electrical innovation.

TDK's FS1412 is the first in a family of power modules to offer embedded silicon technology (SESUB) combined with our CapDriveTM control topology … stacking the deck for vertical power delivery.

THERMAL PERFORMANCE. SESUB technology is a Silicon Embedded SUBstrate that enables us to implant the power IC deep in a stack of copper that allows the inductor to be on top of the silicon; saving space while providing the ultimate thermal solution. Having the best

thermal management possible is very important, but it is only the beginning. We also need a control topology that can deliver the challenging electrical performance required.

CAPDRIVE TOPOLOGY. TDK's high current µPOL regulators are designed using CapDrive, a capacitor coupled, interleaved buck that lends itself to parallel operation. By splitting the current between two power paths in the module we can reduce the inductor component height, and thus the overall height of the module. The coupled capacitor topology has several key advantages for electrical performance:

- Reduces power loss for increased efficiency
- Improves transient response
- Reduces switch voltage stress
- Allows for smaller geometry silicon
- Reduces noise
- Improves current sharing
- Doubles the duty cycle

CONCLUSION. µPOL regulators deliver the ultimate 1-2 punch, combining innovative packaging technology with a powerful control topology … µPOL regulators are stacking the deck for vertical power delivery.

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12:00 PM – 12:30 PM

## Boschman Advanced Packaging Technology

### Boschman Advanced Packaging Technology

LEVEL THREE, A301

PRESENTED BY:

**Scott Cheney,** *Boschman Advanced Packaging Technology*

Enabling Sintering-, Transfer molding- and Trim & Form processes for Power module assembly.

One of the critical building blocks for the "electric revolution" are power modules to make the entire electric eco-system more efficient, reliable, cost effective and smarter. Currently, automotive is pioneering these technologies with the advent of electric vehicles, but it is expected that these technologies will see quick and widespread adoption throughout other sectors in the energy system.

For these high-power applications, the conventional semiconductor material – Silicon (Si) – is reaching its physical limits it terms of power density, switching frequency, operating temperature, and breakdown voltage. As a result, the industry is moving to next generation semiconductor materials, so called Wide-bandgap materials (WBG) to replace Silicon (Si) such as Silicon Carbide (SiC) and Gallium Nitride (GaN). While these materials offer breakthrough properties, they are not a drop-in replacement and essentially require all new designs, materials, and processes to deal with higher temperatures and offer better thermal resistance, performance and reliability. Specifically, for back-end semiconductor packaging:

1. Silver Sintering (to replace and overcome thermal limitations of tin solders)
2. Epoxy Molding (to replace and overcome thermal limitations of silicone gel)
3. Trim and Form (to trim and form Power and signal leads, inc. pre- and postprocessing steps)

Boschman has pioneered both processes with early adopters in the industry and has positioned itself as the market leader for both Pressure Sintering and Advanced Transfer Molding.

Powertrim technologies has pioneered Trim and Form processes with early adopters in the industry and has positioned itself as the market leader for these solutions.

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12:00 PM – 12:30 PM

## Kikusui America

### The Kikusui High-Capacity Regenerative Electronic Load PXZ Series contributes to carbon neutrality and reduces energy loss

LEVEL THREE, A302

PRESENTED BY:

**Dr. DILIP GHIMIRE,** *Kikusui America*

The PXZ series of highly efficient, reliable, high-capacity regenerative electronic loads has a rated power of 20 kW in 3U. In addition to the constant-current, constant-resistance, constant-voltage, and constant-power operat- ing modes, this series has an I-V character- istic function that allows the user to set arbi- trary I-V characteristics for each CC and CV operating mode.

The series is also equipped with various functions, such as sequence, pre-charge, synchronous operation, pulse, sine, and VMCB functions. LAN, USB, and RS232C communication functions are in- cluded as standard, allowing easy integration into various evaluation systems. The PXZ series is highly scalable, and its capacity can be increased up to 200 kW when operating in parallel (up to 10 units).

Wide Operating Range With an Expansion Ratio

The PXZ20K-500 has an operating range of 10 V to 500 V, while the PXZ20K-1500 has a range of 30 V to 1500 V.

An operating area ranges from 2.25 to 3 times the expansion ratio. create a definable slope in the curve where a higher IR will result in a steeper slope.

12:00 PM – 12:30 PM

## Nayak Corporation

### State of the Art in Power Electronic Converter EMT Models for Studying Renewable Resources in Power Grid

LEVEL THREE, A311

PRESENTED BY:

**Huanfeng Zhao,** *Nayak Corporation*

Power electronic converters play a crucial role in robustly and efficiently integrating renewable energy resources (e.g., large solar power plants and wind farms) into the power grid. Electromagnetic transient (EMT) simulation of the power electronic converters and the connected grid provides the most accurate simulation results over a wide frequency range and is considered essential for managing today's complex power networks. As such, the latest guidelines from the North American Electric Reliability Corporation (NERC) require EMT models for all newly connected bulk power system (BPS) inverter-based resources (IBR). Due to the high computational burden required for accurate simulation of power electronic systems, many flavors of EMT converter models are being developed for conducting interconnection studies. In this tutorial, we will demonstrate the latest power electronic converter models used in interconnection studies through live simulation examples. Conclusions will also be drawn regarding the applicability of each power electronic model based on its accuracy, frequency range and computational efficiency. Both PSCAD and RTDS models will be discussed and demonstrated.

12:00 PM – 12:30 PM

## onsemi

LEVEL THREE, A312

PRESENTED BY:

*onsemi*

***Please check the mobile app for more information.***

# PRESENTATION 6

12:45 PM – 1:15 PM

## Samwha USA Inc.

EXPO HALL, EXPO THEATER 1

PRESENTED BY:

*Samwha USA Inc.*

***Please check the mobile app for more information.***

12:45 PM – 1:15 PM

## Renesas

### Power Trends in Datacenters: Moving From General Servers to Artificial Intelligence Servers

EXPO HALL, EXPO THEATER 2

PRESENTED BY:

**Pietro Scalia,** *Renesas*

Power Trends in Datacenters: moving from General Servers to Artificial Intelligence Servers discusses current market trends in datacenters and AI, Power content in datacenter from AC to SoC, in OCP Racks, the creation of the DC intermediate bus from the AC portion, and the role of IBC converters in low-voltage applications and Advanced Packaging Trends.

12:45 PM – 1:15 PM

## pSemi Murata

### Advances in 2-stage Buck Regulator Bring Higher Power Delivery to Optical Transceivers

EXPO HALL, EXPO THEATER 3

PRESENTED BY:

**Tatsuya Kubo,** *pSemi Murata*

The presentation covers a technology deep dive into the novel 2-stage architecture, charge pump followed by buck regulator, for high efficiency power conversion ideal for low profile applications. The paper provides a description of advanced techniques that enable higher current delivery to low output voltages, compatible with <10nm technology ASICs.

12:45 PM – 1:15 PM

## Cambridge GaN Devices

### ICeGaN® Leads the Industry in GaN Integration

LEVEL THREE, A301

PRESENTED BY:

**Peter Di Maso,** *Cambridge GaN Devices*

This presentation will demonstrate how ICeGaN® technology leads in simplification, cost reduction, robustness, carbon footprint and efficiency of GaN power applications. Cambridge GaN Devices' leading products and how they enable advantages in power electronic systems will be illustrated.

12:45 PM – 1:15 PM

## Nexperia

LEVEL THREE, A302

PRESENTED BY:

*Nexperia*

*Please check the mobile app for more information.*

12:45 PM – 1:15 PM

## Sager

LEVEL THREE, A311

PRESENTED BY:

*Sager*

*Please check the mobile app for more information.*

12:45 PM – 1:15 PM

## Tower Semiconductor

### Tower Semiconductor's BCD Technology Foundry Offerings: From Automotive to Datacenter PD

LEVEL THREE, A312

PRESENTED BY:

**Mete Erturk,** *Tower Semiconductor*

With its worldwide manufacturing capabilities in USA, Japan, and Israel; Tower Semiconductor offers best-in-class foundry processes for power management. In this presentation we will highlight how IC companies benefit from using Tower's 200mm and 300mm power management technologies. We will discuss unique features for high efficiency power conversion, such as the recently released 3.3V gate oxide technology; as well as Tower's industry leading design services capabilities to accelerate time to market for a variety of markets including Automotive, Mobile PMIC, and power delivery for advanced server processors.

8:00 AM – 9:40 AM

## T25: 48V-to-1V Direct DC-DC Converters

LEVEL THREE, A302

SESSION CHAIRS

**Cahit Gezgin, PhD,** *Infineon Technologies AG*

**Mark DeMarie,** *IBM*

8:00 AM

**T25.1** **2200A/48V-to-1V Low-Profile Direct Power Converter with Standard PCB Transformer**

**Point-of-Load (POL) and Multi-Phase Converters**

AUTHORS: Alejandro Figueroa, Pablo Mazariegos, Álvaro Cobos, Javier Goicoechea, Alejandro Castro, José Antonio Cobos

8:20 AM

**T25.2** **Single-Stage 48V-to-1V Regulator with a Half-Turn Transformer and Current-Doubler Rectifier**

**Voltage Regulator Modules (VRM)**

AUTHORS: Xinmiao Xu, Qiang Li

8:40 AM

**T25.3** **Ultra-Low-Profile Single-Stage Voltage Regulator Module (VRM) for Next-Generation AI Accelerators**

**Voltage Regulator Modules (VRM)**

AUTHORS: Xufu Ren, Jinfeng Zhang, Zhenshuai Rong, Borong Hu, Teng Long

9:00 AM

**T25.4** **Novel TLVR Operation in Multi-Stage Voltage Regulator Module with Current Multipliers**

**Voltage Regulator Modules (VRM)**

AUTHORS: Kevin Zufferli, Roberto Rizzolatti, Mario Ursino, Simone Mazzer, Gerald Deboy, Stefano Saggini

9:20 AM

**T25.5** **Interphase LC-Oscillation Suppression with Fast Line-Transient Response in 48-V Series-Capacitor Buck Converters for Automotive Applications**

**Point-of-Load (POL) and Multi-Phase Converters**

AUTHORS: Wan Lin Jiang, Yongxi Liu, Nameer Khan, John Pigott, Henk Jan Bergveld, Vikram Chaturvedi, Olivier Trescases

8:00 AM – 9:40 AM

## T26: Multilevel Inverters

LEVEL THREE, A311

SESSION CHAIRS

**Yunting Liu, PhD,** *Penn State*

**Dingrui Li,** *Clemson University*

8:00 AM

**T26.1** **An Approach to Compensate for Low Frequency DC-Link Voltage Ripple in High Power ANPC Inverter**

**Multilevel Inverters**

AUTHORS: Shaozhe Wang, Ankit Vivek Deshpande, Rolando Sandoval, Erick Pool-Mazun, Enrique Garza-Arias, Prasad Enjeti

8:20 AM

**T26.2** **A Cascaded Multilevel Inverter System with Hot-Swapping and Fault Isolation Capability for Improved Resiliency**

**Multilevel Inverters**

AUTHORS: Uthandi Selvarasu, Vikram Roy Chowdhury, Shumeng Wang, Jinli Zhu, Mahshid Amirabadi, Yuan Li, Brad Lehman

8:40 AM

**T26.3** **Layout Optimization for Parasitic Inductance Reduction of GaN-Based NPL.X Multilevel Inverter**

**Multilevel Inverters**

AUTHORS: Ali Halawa, Jinyeong Moon, Woongkul Lee

9:00 AM

**T26.4** **Topology Selection and Design Methodology for SiC based Solar Photovoltaic Medium Voltage Direct Grid Connect Inverters**

**Multilevel Inverters**

AUTHORS: Jenson Joseph C Attukadavil, Baylon G Fernandes

9:20 AM

**T26.5** **EMI Modeling of PCB-Based Three-Level Active Neutral-Point-Clamped GaN Converter**

**Power Quality and EMI**

AUTHORS: Mohammad Hassan Adeli, Necmi Altin, Erkan Deniz, Adel Nasiri

8:00 AM – 9:40 AM

## T27: Power MOSFETs & IGBTs I

LEVEL THREE, A315

SESSION CHAIRS

**Ming Liu,** *Shanghai Jiao Tong University*

**Ben Lough,** *Texas Instruments*

8:00 AM

**T27.1 A Novel Layout for Improving Current Sharing of Paralleled SiC MOSFETs with TO-247 Package**

**Power Silicon MOSFETs, BJTs, IGBTs, etc.**

AUTHORS: Che-Wei Chang, Matthias Spieler, Rolando Burgos, Ayman EL-Refaie, Renato Amorim Torres, Dong Dong

8:20 AM

**T27.2 A Sensor-Less IGBT On-State Voltage Estimation Method using Inverter Control Variables**

**Power Silicon MOSFETs, BJTs, IGBTs, etc.**

AUTHORS: Shuyu Ou, Subham Sahoo, Ariya Sangwongwanich, Yongjie Liu, Frede Blaabjerg

8:40 AM

**T27.3 A Novel Non-Intrusive Online Monitoring Method for Diagnosing the Lift-Off of Bonding Wires in SiC MOSFETs**

**Power Silicon MOSFETs, BJTs, IGBTs, etc.**

AUTHORS: Keqi Song, Henry Shu-Hung Chung, Ho-Tin Tang

9:00 AM

**T27.4 Optimizing MOSFET Selection for EMC-Critical Automotive Applications**

**Power Silicon MOSFETs, BJTs, IGBTs, etc.**

AUTHORS: Sacha Cazzitti, Christian Radici, Andrew Forsyth, Cheng Zhang, Peter Vines

9:20 AM

**T27.5 Improving Dynamic Current Sharing Between Parallel MOSFETs by Optimizing Device Parameters**

**Power Silicon MOSFETs, BJTs, IGBTs, etc.**

AUTHORS: Kunal Jha, Kapil Kelkar, Marina Hedenik, David Penof

8:00 AM – 9:40 AM

## T28: Design Techniques for Power Modules

LEVEL THREE, A312

SESSION CHAIRS

**Vidhi Patel,** *ABB*

**Weiqiang Chen, PhD,** *ABB*

8:00 AM

**T28.1 A 21.6 kW/L Two-Phase Immersion-Cooled Isolated DC-DC Converter**

**Power Electronics Packaging**

AUTHORS: Aleksandar Ristic-Smith, Kawsar Ali, Daniel Rogers

8:20 AM

**T28.2 Extraction of Common Mode Parasitic Capacitance in Balance Filter for the Prediction of EMI Noise Suppression**

**Quality and System Reliability Including EMI/EMC**

AUTHORS: Qiuzhe Yang, Xingyu Chen, Zijian Wang, Qiang Li

8:40 AM

**T28.3 A 660W, 96% Efficiency 3D Heterogeneously Integrated Digital DC/DC Power Module for Vertical Power Delivery**

**Power Electronics Packaging**

AUTHORS: Haoyu Wang, Xuliang Wang, Yan Wang, Xiaosen Liu

9:00 AM

**T28.4 Planar Rogowski Coil-Based Switch Current Measurement for a 1.2 kV SiC MOSFET Embedded Die PCB**

**Embedded Technologies, 3D Packaging, and**

AUTHORS: Matthias Spieler, Che-Wei Chang, Ayman EL-Refaie, Dong Dong, Rolando Burgos

9:20 AM

**T28.5 Effect of Magnetic Couplings on Conducted EMI of GaN-Based PFC Converter**

**Quality and System Reliability Including EMI/EMC**

AUTHORS: Tyler McGrew, Qiang Li

8:00 AM – 9:40 AM

## T29: Gate Drive Circuits II

LEVEL THREE, A313

SESSION CHAIRS

**Seungdeog Choi,** *Mississippi State University*

**Kang Wei,** *Texas Instruments*

8:00 AM

**T29.1** **Optically-Controlled 3.3 kV SiC MOSFET with Fast Switching Speed and Low Optical Power**

**Gate Drive Circuits and Fault Protection**

AUTHORS: Xin Yang, Guannan Shi, Liyang Jin, Yuan Qin, Matthew Porter, Che-Wei Chang, Xiaoting Jia, Dong Dong, Linbo Shao, Yuhao Zhang

8:20 AM

**T29.2** **Optimization Techniques for Parallel-Connected Devices in IPMs for Consumer Use**

**Gate Drive Circuits and Fault Protection**

AUTHORS: Keisuke Kawamoto, Haruhiko Murakami, Teruaki Nagahara, Michael Rogers, Akiko Goto, Shoji Saito, Koichiro Noguchi

8:40 AM

**T29.3** **Investigating the Temperature Dependency and Operating Parameters of a Self-Driving Active Gate Driver**

**Gate Drive Circuits and Fault Protection**

AUTHORS: Vin Loong Choo, Martin Pfost

9:00 AM

**T29.4** **Use of Switched-Capacitor Circuit to Generate Negative Gate-Source Voltage Pulses**

**Gate Drive Circuits and Fault Protection**

AUTHORS: Ho-Tin Tang, Henry Shu-Hung Chung

9:20 AM

**T29.5** **An Optically Isolated Gate Driver with Simultaneous Data and Power Transmission Through a Miniaturized, Efficient Photonic Platform**

**Gate Drive Circuits and Fault Protection**

AUTHORS: Jiajun Li, Mariia Klymenko, Yanqiao Li, William Scheideler, Jason Stauth

8:00 AM – 9:40 AM

## T30: Energy Flow & Battery Management Systems

LEVEL THREE, A316

SESSION CHAIRS

**Jonathan W. Kimball, PhD,** *Missouri University of Science and Technology*

**Stanley Atcitty,** *Sandia National Laboratories*

8:00 AM

**T30.1** **Optimal Shared Energy Storage Capacity Configuration in Multi-Energy Microgrids Considering Battery Lifetime Loss based on Relaxation Techniques**

**Microgrid Systems**

AUTHORS: Hualong Liu, Wenyuan Tang

8:20 AM

**T30.2** **Virtual Resistance Control for an Active Battery Management System**

**Energy Storage Systems**

AUTHORS: Alastair Thurlbeck, Ashraf Siddiquee, Mithat Kisacikoglu, Yilmaz Sozer

8:40 AM

**T30.3** **Internal Voltage Source Saturation Impact on Stability Limits of Grid Forming Converter**

**Distributed Energy Systems**

AUTHORS: Divyanshu Bansal, Aravind G, L Umanand

9:00 AM

**T30.4** **A Zero Harmonic Distortion Grid-Connected Grid-Forming Converter for Battery Energy Storage System Applications**

**Energy Storage Systems**

AUTHORS: Gabriel Vilkn Ramos, Thiago Parreiras, Fangzhou Zhao, Xiongfei Wang, Braz de Jesus Cardoso Filho

9:20 AM

**T30.5** **Single Cell Energy Router Justification for Three Phase Near Zero Energy Buildings**

**Distributed Energy Systems**

AUTHORS: Hossein Nourollahi Hokmabad, Tala Hemmati Shahsavar, Oleksandr Matiushkin, Tanel Jalakas, Oleksandr Husev, Juri Belikov

8:00 AM – 9:40 AM

## T31: MHz Frequency Wireless Power Transfer

LEVEL THREE, A301

SESSION CHAIRS

**Jungwon Choi,** *University of Washington*

**Gui-Jia Su,** *Oak Ridge National Laboratory*

8:00 AM

**T31.1 A Multi-UAV Charging Station Enabling Free Landing by Grid Pattern Transmitter**

**Wireless Charging**

AUTHORS: Jungho Kim, Hyunkyeong Jo, Seoktae Seo, Bonyoung Lee, Hyungki Min, Franklin Bien

8:20 AM

**T31.2 Capacitor Design for Self-Resonant Coils for Long-Distance Wireless Power Transfer System**

**Wireless Charging**

AUTHORS: Mostak Mohammad, Vandana Rallabandi, Omer C. Onar, Gui-Jia Su

8:40 AM

**T31.3 A 10.4-kW High-Power-Transfer-Density Multi-MHz Capacitive Wireless Power Transfer System for EV Charging Utilizing Stacked-Inverter Stacked-Rectifier Architecture**

**Wireless Charging**

AUTHORS: Dheeraj Etta, Miguel Alvarez Dominguez, Sounak Maji, Syed Saeed Rashid, Khurram Afridi

9:00 AM

**T31.4 Reduced-Fringing-Field Multi-MHz Capacitive Wireless Power Transfer System using Metasurface-Based Couplers with Active Field Cancellation**

**Wireless Charging**

AUTHORS: Syed Saeed Rashid, Dheeraj Etta, Matteo Ciabattoni, Francesco Monticone, Khurram Afridi

9:20 AM

**T31.5 Living Object Detection in Wireless Power Transfer Systems using Remote Capacitive Bio-Signals Monitoring**

**Non-contact Sensors for Power Electronics**

AUTHORS: Bruno Miguel Gil Rosa, Paul Mitcheson

8:00 AM – 9:40 AM

## T32: 48V Intermediate Bus Converters

LEVEL THREE, A314

SESSION CHAIRS

**Xin Zhang, PhD,** *IBM*

**Jason Stauth,** *Dartmouth College*

8:00 AM

**T32.1 Modified N:1 Switched Capacitor Converter with Reduced Capacitor DC Bias Voltage for High Power Density**

**Hard- and Soft-Switched**

AUTHORS: Taewoo Lee, Dam Yun, Sunghyuk Choi, Jung-Ik Ha

8:20 AM

**T32.2 Wide Range Digital Control for Three-Level Buck Converters with Sensorless Flying-Cap Voltage Balancing**

**Point-of-Load (POL) and Multi-Phase Converters**

AUTHORS: Hossein Hajisadeghian, Giovanni Bonanno

8:40 AM

**T32.3 A Comparative Investigation of a New Continuous Voltage Conversion Ratio Approach in a Zero-Inductor Voltage Converter**

**Point-of-Load (POL) and Multi-Phase Converters**

AUTHORS: Sina Salehi Dobakhshari, Aamna Nasir Hameed, Binghui He, Mojtaba Forouzesh, Yan-Fei Liu

9:00 AM

**T32.4 A 96.1% Peak Efficiency, 6.8 kW/in³, 48V-to-6V On-Package Intermediate Bus Converter with LV-GaN Power Transistors**

**Point-of-Load (POL) and Multi-Phase Converters**

AUTHORS: Mausamjeet Khatua, Nachiket Desai, Harish Krishnamurthy, Sheldon Weng, Jingshu Yu, Huong Do, Samuel Bader, Han Wui Then, Krishnan Ravichandran, James Tschanz, Kaladhar Radhakrishnan, Vivek De

9:20 AM

**T32.5 A 48V to 2.4V-5V 95.8%-Peak-Efficiency 869W/in³-Power-Density Fibonacci Dual-Path Hybrid DC-DC Converter with Inductor Current Reduction and Low Output Resistance**

**Voltage Regulator Modules (VRM)**

AUTHORS: Yichao Ji, Zeguo Liu, Lin Cheng

10:10 AM – 11:50 AM

## T33: DC-DC Converter Applications

LEVEL THREE, A302

SESSION CHAIRS

**Robert Mascia,** *Hewlett Packard Enterprise*

**Hoi Lee,** *University of Texas at Dallas*

10:10 AM

**T33.1** **An Ultra-Fast Very Large Scale Interleaved Li-Fi Transmitter**

**Point-of-Load (POL) and Multi-Phase Converters**

AUTHORS: Daniel Zhou, Konstantinos Manos, Minjie Chen

10:30 AM

**T33.2** **Isolated PWM DC-DC Converter with Single Magnetic Component, ZVS and Self-Balanced Switched-Capacitor Voltage**

**Hard- and Soft-Switched**

AUTHORS: Pablo M. Gil, Juan Rodríguez, Diego G. Lamar

10:50 AM

**T33.3** **Analysis and Design of a Low-Complexity ZVS Buck-Boost Converter**

**Hard- and Soft-Switched**

AUTHORS: Burkhard Ulrich

11:10 AM

**T33.4** **A High Conversion-Ratio Hybrid Series-Parallel DC-DC Converter with Pseudo-Soft-Charging and Inductor Current Frequency Multiplication**

**Point-of-Load (POL) and Multi-Phase Converters**

AUTHORS: Avinash Maddela, Kishalay Datta, Jason Stauth

11:30 AM

**T33.5** **A Real-Time Variation Control of Deadtime in GaN-Based Bidirectional Buck-Boost Converter for Lithium-Ion Battery Formation System**

**Bidirectional DC-DC Converters**

AUTHORS: Jong-Hun Lim, Go Woon Heo, Je-Yeong Lim, Dong Hwan Kim, Byoung Kuk Lee

10:10 AM – 11:50 AM

## T34: Inverter Modulation & Control Strategies

LEVEL THREE, A311

SESSION CHAIRS

**Karun Arjun Potty,** *Lucid Motors*

**Diego Raffo,** *Infineon Technologies*

10:10 AM

**T34.1** **A Space Vector PWM Strategy for Charging of Bootstrap Capacitor in Three-Level Neutral-Point-Clamped Inverter**

**PWM Strategies**

AUTHORS: Anantha Hegde, Asamira Suzuki, Hirokazu Nakamura, Takamune Kabashima, Koji Higashiyama, Keiji Akamatsu

10:30 AM

**T34.2** **A Complementary Carrier based PWM Strategy for Average Current Sampling of Three-Phase Inverter using Single Current Sensor**

**PWM Strategies**

AUTHORS: Byeong-Il Kim, Joonseok Kim, Yeongsu Bak, June-Seok Lee

10:50 AM

**T34.3** **Short-Circuit Ride-Through for a CRM-Based Soft-Switching Three-Phase Inverter**

**PWM Strategies**

AUTHORS: Xingyu Chen, Gibong Son, Qiang Li

11:10 AM

**T34.4** **Modified Space Vector Modulation with Low Bandwidth Sensor to Reduce Losses in Soft Switching Three-Phase Inverters**

**Single and Multi-Phase Inverters**

AUTHORS: Md Didarul Alam, Nazmul Hassan, Iqbal Husain, Liming Liu, Hongrae Kim

11:30 AM

**T34.5** **A Feedforward Ripple Reduction Control Strategy based on a Hybrid GaN/Si Interleaved Inverter**

**PWM Strategies**

AUTHORS: Mowei Lu, Jurgis Reinotas, Xiaoyang Tian, Stefan Goetz

10:10 AM – 11:50 AM

## T35: Power MOSFETs & IGBTs II

LEVEL THREE, A315

SESSION CHAIRS

**Marie Lawson,** *Hungtington Ingalls Industries*

**Roberto Scibilia,** *Texas Instruments*

10:10 AM

**T35.1 IGBT Comparison for Optimized Switching Behavior in the SiC/Si-Hybrid Switch**

**Power Silicon MOSFETs, BJTs, IGBTs, etc.**

AUTHORS: Adrian Amler, Thomas Heckel, Daniel Ruppert, Cornelius Rettner, Martin März

10:30 AM

**T35.2 Forward Recovery and its Mitigation in Hybrid Si/SiC-Based DC–AC Converters**

**Power Silicon MOSFETs, BJTs, IGBTs, etc.**

AUTHORS: Yan Zhou, Thomas Lehmeier, Adrian Amler, Martin März

10:50 AM

**T35.3 Real-Time IGBT Module Ageing Characterization Through Temperature Monitoring**

**Power Silicon MOSFETs, BJTs, IGBTs, etc.**

AUTHORS: Quirc Perez-Farre, Luis F. Gomez-Rivera, Carlos Lopez-Torres, Kai Dannehl, Antoni García-Espinosa, Alejandro Paredes-Camacho

11:10 AM

**T35.4 Experimental Validation of Triangular SOA via Infrared Thermography of a MOSFET Die Operating in the Thermally Unstable Linear-Mode for Automotive Applications**

**Power Silicon MOSFETs, BJTs, IGBTs, etc.**

AUTHORS: Yacine Ayachi Amor, Christian Radici, Kerry Abrams, Philip Ellis, Peter Vines, Wayne Lawson

11:30 AM

**T35.5 Feasibility Study of the SuperIGBT: A Series-Connected High Voltage IGBT with a Single Gate**

**Power Silicon MOSFETs, BJTs, IGBTs, etc.**

AUTHORS: Junhong Tong, Alex Huang, Huanghaohe Zou, Zhiyuan Ma

10:10 AM – 11:50 AM

## T36: Magnetics Design & Modelling

LEVEL THREE, A312

SESSION CHAIRS

**Matt Wilkowski, MSEE,** *Würth Elektronik*

**George A. Slama,** *Würth Elektronik*

10:10 AM

**T36.1 Low Profile, Laminated Nife Transformers for Flyback Converters**

**Advanced Magnetic Materials and Geometries**

AUTHORS: Xuan Wang, Reza Mounesi, Matthew Catanoso, Matthew Fox, Adel Nasiri, Mark Allen

10:30 AM

**T36.2 Comprehensive Demonstration of New Magnetic Designs Utilizing Magnetic Anisotropy of the Cores for Integrated Magnetics**

**High-Frequency Magnetics**

AUTHORS: Yota Takamura, Honami Nitta, Tatsuya Miyazaki, Kimito Yamanaka, Ryosuke Ishido, Akira Namba, Keisuke Fujisaki, Shigeki Nakagawa

10:50 AM

**T36.3 A Two – Stage Artificial Neural Network (ANN) – based Design and Optimization of High Frequency Transformers for Dual Active Bridge Converter**

**Magnetics Modeling and Simulations**

AUTHORS: Lufan Zhou, Alberto Delgado Expósito, Adam Ruszczyk, Simon Round, Miroslav Vasić

11:10 AM

**T36.4 Modeling and Optimizing Winding Arrangement for Gapped Planar Magnetics based on Artificial Neural Network**

**Magnetics Modeling and Simulations**

AUTHORS: Hanqing Cao, Bima Nugraha Sanusi, Ziwei Ouyang

11:30 AM

**T36.5 Free-Shape Optimization of VHF Air-Core Inductors using a Constraint-Aware Genetic Algorithm**

**Magnetics Modeling and Simulations**

AUTHORS: Thomas Guillod, Charles Sullivan

10:10 AM – 11:50 AM

## T37: Packaging of Power Devices & Modules

LEVEL THREE, A301

SESSION CHAIRS

**Lee Gill,** *Sandia National Laboratories*

**Joshua Stewart,** *Aerospace Corporation*

10:10 AM

**T37.1** **Organic Direct Bonded Copper-Based Rapid Prototyping for Silicon Carbide Power Module Packaging**

**Power Electronics Packaging**

AUTHORS: Shuofeng Zhao, Joshua Major, Douglas DeVoto, Sarwar Islam, Xiaoling Li, Mike Tant, Faisal Khan, Sreekant Narumanchi

10:30 AM

**T37.2** **Discrete Power Device Packaging with Integrated Direct Two-Phase Cooling**

**Power Electronics Packaging**

AUTHORS: Jinpeng Cheng, Jinxiao Wei, Hao Feng, Li Ran

10:50 AM

**T37.3** **Investigation of Die Top-Side Re-Metallization for SiC-Based Double-Side Cooled Power Modules**

**Power Electronics Packaging**

AUTHORS: Narayanan Rajagopal, Christina DiMarino

11:10 AM

**T37.4** **Design of Low Parasitic Inductance GaN HEMT Flip-Chip Power Module**

**Power Electronics Packaging**

AUTHORS: Mohammad Dehan Rahman, Tanzila Akter, Abu Shahir Md Khalid Hasan, H. Alan Mantooth, Xiaoqing Song

11:30 AM

**T37.5** **A Scalable Dual-Orthogonal-Cooling Packaging Concept for Parallel-Series SiC Chips**

**Power Modules / High Density Design**

AUTHORS: Ekaterina Muravleva, Youssef Abotaleb, Blake Anderson, Zichen Zhang, Boyi Zhang, Jerry L. Hudgins, Jun Wang

10:10 AM – 11:50 AM

## T38: Modeling & Simulation III

LEVEL THREE, A313

SESSION CHAIRS

**Rafal Wojda,** *Oak Ridge National Laboratory*

**Jacob Mueller,** *Sandia National Laboratories*

10:10 AM

**T38.1** **Parasitic Impact Analysis and Design of Hybrid EMI Filter for Active Clamp Flyback SMPS**

**Parasitics Extraction and Optimization**

AUTHORS: Tahmid Ibne Mannan, Seungdeog Choi, Masoud Karimi-Ghartemani

10:30 AM

**T38.2** **Overview of Dynamic Characterization of Switches for Three Phase Voltage Source, Current Source, and Matrix Converter Applications**

**Circuits and Systems**

AUTHORS: Sneha Narasimhan, Sathya Rupan Thirumoorthi, Subhashish Bhattacharya

10:50 AM

**T38.3** **Advanced Modeling Technique of Class-E Inverter Considering Low Ron of eGaN FETs and Different Design Procedures**

**Circuits and Systems**

AUTHORS: Manas Palmal, Jungwon Choi

11:10 AM

**T38.4** **PiezoNet and Data-Driven Models for Time-Domain Characterization of Piezoelectric Resonators**

**Device and Component Modeling**

AUTHORS: Davit Grigoryan, Mian Liao, Haoran Li, Shukai Wang, Tanuj Sen, Matthew Tan, Minjie Chen

11:30 AM

**T38.5** **A New Gate Charge De-Embedding Method for Accurate On-Wafer Characterization of HV MOSFET Devices**

**Parasitics Extraction and Optimization**

AUTHORS: João Roberto R. O. Martins, Rachid Hamani, Vincent Quenette, Joerg Gessner

10:10 AM – 11:50 AM

## T39: Auxiliary Systems & Applications in EVs

LEVEL THREE, A314

SESSION CHAIRS

**Rasoul Hosseini, PhD,** *General Motors*

**Yateendra Deshpande,** *Conifer Systems*

10:10 AM

**T39.1 4 kW Auxiliary Power Module for Electric Vehicles Utilizing a Dual-Phase LLC DC-DC Converter**

**Power Electronics for Hybrid and Electric Vehicles**

AUTHORS: Mojtaba Forouzesh, Xiang Yu, Yan-Fei Liu, Paresh C. Sen

10:30 AM

**T39.2 New Reverse Mode Control Method of Phase-Shift Full-Bridge Converter for Bidirectional Auxiliary Power Module**

**Power Electronics for Hybrid and Electric Vehicles**

AUTHORS: Jongyoon Chae, Dongmin Kim, Dongmin Choi, Gun-Woo Moon

10:50 AM

**T39.3 In-Situ EV EIS with a High-Density Flying Capacitor Multi-Level Converter Supercapacitor System**

**Power Electronics for Hybrid and Electric Vehicles**

AUTHORS: Avram Kachura, Gaël Vergès, Samantha Murray, Olivier Trescases

11:10 AM

**T39.4 A Novel 500-kHz LLC-T Resonant Converter with Wide Output Range**

**Power Electronics for Hybrid and Electric Vehicles**

AUTHORS: Zhengming Hou, Dong Jiao, Jih-Sheng Lai

11:30 AM

**T39.5 High Efficiency Traction Drive Operation with a Partial Load Three-Phase Triangular Current Mode Modulation Concept**

**Power Electronics for Hybrid and Electric Vehicles**

AUTHORS: Bhaskar Chatterjee, Jan Allgeier, Thomas Plum, Marc Hiller

10:10 AM – 11:50 AM

## T40: Grid-Tied Inverter Control

LEVEL THREE, A316

SESSION CHAIRS

**Jonathan W. Kimball, PhD,** *Missouri University of Science and Technology*

**Raj Kumar Kokkonda, MS,** *North Carolina State University*

10:10 AM

**T40.1 Analysis of Maximum Power Transfer Limit for Linear Operation of Dual-Active-Bridge Converters**

**Solid-State Transformers**

AUTHORS: Radhika Sarda, Ezequiel Ramos Rodriguez, Gaowen Liang, Glen G. Farivar, Josep Pou, Vaisambhayana B. Sriram, Anshuman Tripathi

10:30 AM

**T40.2 Enhanced Control for Integrated Active Power Decoupling in Single-Phase Three-Level Flying Capacitor PFC Converter**

**Power Quality, UPS, Active Power Filters**

AUTHORS: Gleisson Balen Rosset, Rafael Peña-Alzola, Cristian Blanco Charro, Angel Navarro-Rodríguez, Pablo García Fernandez

10:50 AM

**T40.3 Improving Transient Stability of PLL-Synchronized Grid-Following Inverters**

**Power Quality, UPS, Active Power Filters**

AUTHORS: Surya Prakash, Kalpana Beura, Mohamed Alkhatib, Omar Al Zaabi, Khalifa Al Hosani, Utkal Ranjan Muduli

11:10 AM

**T40.4 Online Impedance-Based Analysis for Power System Stability Assessment using Transformer-Less and Filter-Less Switch-Mode Perturbation Generator**

**Smart Grid and Metering**

AUTHORS: Tomoya Ide, Yuko Hirase, Cheng Huang, Takanori Isobe

11:30 AM

**T40.5 PIR-R Control for Three-Phase Grid-Connected Inverter with Unbalanced Grid Current Correction**

**Power Quality, UPS, Active Power Filters**

AUTHORS: Haneen Ghanayem, Xingyu Yang, Mohammad Alathamneh, Robert M. Nelms

8:00 AM – 11:50 AM

▸ PSMA SESSION ◂

## IS19: Advancing Power Semiconductors Through AI & Digital Tools

LEVEL FOUR, A412

SESSION CHAIRS

**Jaume Roig, PhD,** *onsemi*

**Stephanie Watts Butler,** *WattsButler LLC*

8:00 AM

**IS19.1** **Machine Readable Datasheets to Digital Twins**
**Kevin Hermanns,** *PE-Systems GmbH*

8:25 AM

**IS19.2** **Copper Plane Generation based Artificial Microorganism**
**Wilfried Wessel,** *Siemens*

8:50 AM

**IS19.3** **Advancing Power Electronics Through AI & Digital Tools**
**Steven Lee,** *Keysight Technologies*

9:15 AM

**IS19.4** **Distributed Learning of Power MOSFET Characteristics for Enhanced Manufacturing and Simulation**
**William C. Weeman, MSEE, EIT,** *Keithley Instruments*

10:10 AM

**IS19.5** **Fab Technology Co-Optimization: Bringing Physics-based Digital Twin to Power Device Product Development**
**David Green,** *Silvaco*

10:35 AM

**IS19.6** **Application of State-of-the-art Technology CAD (TCAD) To the Virtual Design of Si, SiC and GaN Power Transistors Optimized for Converters Targeting Charging, Motor Drives and Data Center Applications**
**Ricardo Borges,** *Synopsys*

11:00 AM

**IS19.7** **AI Applied to Diagnostic and Monitoring of Power Modules for Traction Inverter**
**Gianni Vitale, MD,** *STMicroelectronics*

11:25 AM

**IS19.8** **Energy and Carbon Footprint of AI in Power Electronics – How Sustainable Are We?**
**Subham Sahoo,** *Aalborg University*

8:00 AM – 9:40 AM

## IS20: The Need for CyberSecurity in Power Supplies, Converters and Systems

LEVEL FOUR, A411

SESSION CHAIRS

**Conor Quinn,** *Advanced Energy Industries*

**Eric Swenson,** *IBM*

8:00 AM

**IS20.1** **The Evolution of Security in Digitally Controlled Power Supplies**
**Peter J. Miller, MS,** *Texas Instruments*

8:25 AM

**IS20.2** **PMBus 1.5 Part IV: New Commands for Securing PMBus**
**Robert Santucci, PhD,** *Intel Corporation*

8:50 AM

**IS20.3** **Cyber Security Requirements in Open Compute Project's M-CRPS Power Supply**
**Donato Kava,** *Advanced Energy Industries*

9:15 AM

**IS20.4** **Encryption Methodologies for Power Assemblies**
**Justin Henspeter, MSEE,** *IBM*

8:00 AM – 11:50 AM

▸ PSMA SESSION ◂

## IS21: Energy Management, Storage, and Electrification from Microwatts to Megawatts

LEVEL FOUR, A410

SESSION CHAIRS

**Lincoln Xue,** *Tianjin University*

**Jeff Perkins, MBA,** *Yole Inc.*

8:00 AM

**IS21.1** **Intelligent Energy Storage for Homes**
**Tim Moore**

8:25 AM

**IS21.2** **Grid-Forming Solutions with Energy Storage Integration**
**Jack Flicker,** *Sandia National Laboratories*

8:50 AM

**IS21.3** **Challenges of an Inverterized Grid**
**Brendan Preece, MS, PE,** *Southern Company*

9:15 AM

**IS21.4** **EnerHarv – Driving an Ecosystem for Collaboration in Self-Powering IoT Edge Devices**
**Brian Zahnstecher, ME,** *PowerRox*

10:10 AM

**IS21.5** **RISEnergy – Synergies in and Access to Cross-Cutting Renewable Energy Technologies in Europe**
**Michael Hayes, MEngSc,** *Tyndall National Institute*

10:35 AM

**IS21.6** **Electrification and Its Impact on the Grid: Challenges and Opportunities**
**Baskar Vairamohan, MSEE, PE, CEM,** *EPRI*

11:00 AM

**IS21.7** **Electrification and IEEE TEC**
**Don Tan,** *E2 Systems*

11:25 AM

**IS21.8** **Grid Interfaces for Transportation Electrification**
**Babu Chalamala, PhD,** *Sandia National Laboratories*

8:00 AM – 9:40 AM

## IS22: Accurate Power-Related Measurement and Data Analysis Methodologies

LEVEL FOUR, A402

SESSION CHAIRS

**Ben Dannan,** *Signal Edge Solutions*
**Heidi Barnes.** *Keysight Technologies*

8:00 AM

**IS22.1** **Ground Loops: How They Interfere with Low Impedance and Sensitive Measurements**
**STEVEN M. SANDLER,** *www.picotest.com*

8:25 AM

**IS22.2** **Predictive Digital-Twin Simulations that Shatter Old School Rules-of-Thumb**
**Heidi Barnes,** *Keysight Technologies*

8:50 AM

**IS22.3** **Precision Power Measurements for Voltage Regulator Characterization and POL Modeling**
**Ben Dannan,** *Signal Edge Solutions*

9:15 AM

**IS22.4** **48V Power Bus, New Large and Small Signal Control Loop Assessments**
**Masashi Nogawa, MSEE,** *Qorvo*

8:00 AM – 9:40 AM

## IS23: EV Power Electronics

LEVEL FOUR, A403

SESSION CHAIRS

**Sudhakarababu Chakkirala, Ph. D,** *Power Integrations*
**Kamal Varadarajan, PhD.** *Power Integrations*

8:00 AM

**IS23.1** **Addressing Cost-performance Challenges for EV Powertrains with Si/SiC Hybrid Switch Technology, a Technical Description**
**Sergio Elias, MS,** *Infineon*

8:25 AM

**IS23.2** **Applications of Electrochemical Impedance Spectroscopy on Lithium-Ion Battery Packs for Electric Vehicles**
**Sean Xu,** *Texas Instruments*

8:50 AM

**IS23.3** **Exploiting Benefits of Power Module In Modern PFC Stage for On-Board Charger Applications Through the Evaluation of Thermal and Electrical Performance**
**Domenico Nardo, MD,** *STMicroelectronics*

9:15 AM

**IS23.4** **SuperBox – A Highly Integrated Power Electronics Solution for Dual-Motor Electric Vehicles**
**Yicheng Wang,** *Schaeffler*

8:00 AM – 9:40 AM

## IS24: Core Loss – Making the Data Reliable and Relevant

▸ **PSMA SESSION** ◂

LEVEL FOUR, A404/A405

SESSION CHAIRS

**Matt Wilkowski, MSEE,** *Würth Elektronik*
**Edward Herbert, BEEE.** *PSMA*

8:00 AM

**IS24.1** **Core Evaluation Kit Initiative for the Comparison of Core Loss Measurement**
**Jens Friebe,** *University of Kassel*

8:25 AM

**IS24.2** **HFEMAG European Metrology Labs Correlation Project**
**Massimo Pasquale, Grad School in Atomic and Particle Physics,** *Istituto Nazional Di Ricerca Metrologica*

8:50 AM

**IS24.3** **Triple Pulse Core Loss Testing**
**Jun Wang, PhD,** *University of Bristol*

9:15 AM

**IS24.4** **PSMA Core Loss Data Base**
**George A. Slama,** *Würth Elektronik*

10:10 AM – 11:50 AM

## IS25: Marketing & Technology Trends in Power Electronics

LEVEL FOUR, A411

SESSION CHAIRS

**Ada Cheng,** *AdaClock*

**Stephen Oliver, MBA,** *Navitas Semiconductor*

10:10 AM

**IS25.1** **How 1200V SiC Devices Compete In Performance**
**Amine Allouche, MSc, Eng,** *Yole Group*

10:35 AM

**IS25.2** **Securing Electric Vehicle Charging Stations: A Critical Analysis of Authentication Vulnerabilities and Their Role in Power Electronics Cybersecurity**
**Patrick Rempel, Prof. Dr.-Ing.,** *Harz University of Applied Sciences*

11:00 AM

**IS25.3** **SiC Business Reshaping Will Follow the Surge In Manufacturing Capacity Expansion**
**Milan Rosina,** *Yole Group*

11:25 AM

**IS25.4** **What Changing Data Centers Architectures Means for the Future of Power Semiconductors**
**Callum J. Middleton, PhD,** *Omdia*

10:10 AM – 11:50 AM

## IS26: Test & Measurements

LEVEL FOUR, A402

SESSION CHAIRS

**Edward A. Jones, PhD,** *Infineon Technologies Austria AG*

**Markondeyaraj Pulugurtha,** *Florida International University*

10:10 AM

**IS26.1** **3rd Generation Power Devices (WBG) Measurement Approach Tips and Guidelines**
**Marcus Sonst,** *Rohde & Schwarz GmbH & Co. KG*

10:35 AM

**IS26.2** **A Comprehensive Anti-Islanding Test Model Utilizing Hardware-in-the-Loop Technology for Power Solutions**
**Brian Hsu,** *Rexgear*

11:00 AM

**IS26.3** **Comparing ZVS Losses Distribution of Similar High Performance GaN HEMTS**
**Théo SIMON,** *Wise integration*

11:25 AM

**IS26.4** **Dynamic Characterization of a WBG Power Semiconductor Bare Chip**
**Yu Watanabe, MA,** *Solution Engineering Organization / Keysight Technologies Japan*

10:10 AM – 11:50 AM

## IS27: Power Electronics in Extreme Environments

LEVEL FOUR, A403

SESSION CHAIRS

**Jacob Mueller,** *Sandia National Laboratories*

**Jason Neely,** *Sandia National Laboratories*

10:10 AM

**IS27.1** **Realizing Radiation-Resilient Power Electronics using WBG/UWBG Devices**
**Jason Neely,** *Sandia National Laboratories*

10:35 AM

**IS27.2** **Watts on the Moon: The Electric Moon**
**Jin Wang,** *The Ohio State University*

11:00 AM

**IS27.3** **Enabling Geothermal and other HT Applications using UWBG Devices**
**Eric Leonardo Cruz,** *Sandia National Labs*

11:25 AM

**IS27.4** **Power Electronic Systems for Subsea and Offshore Environments**
**Harish S. Krishnamoorthy, PhD,** *University of Houston*

10:10 AM – 11:50 AM

## IS28: Solid State Solutions

LEVEL FOUR, A404/A405

SESSION CHAIRS

**Bridget O'Gorman,** *PESC Inc*

**Doug Hopkins,** *NC State University*

10:10 AM

**IS28.1** **How B-TRAN™ Technology is Enabling Transition to Solid-sate EV Contactors**
**Mudit Khanna,** *Ideal Power*

10:35 AM

**IS28.2** **Importance of Clamping Circuits for Solid-state Relays used with Unclamped inductive Loads**
**Wolfgang FRANK, Dr.-Ing.,** *Infineon Technologies AG*

11:00 AM

**IS28.3** **SiC JFET for Linear Mode Applications: Pre-Charge, Current Limiting and Active Discharge**
**Shusun Qu, MSEE,** *onsemi*

11:25 AM

**IS28.4** **Toward a Practical Semiconductor Circuit Breaker with SiC JFETs**
**Jonathan L. Dodge, BSEE, MSEE, P.E.,** *Qorvo*

## TECHNICAL DIALOGUE SESSIONS

This part of APEC Technical Program features dialogue presentations from authors of peer-reviewed papers that cover all areas of technical interest for the practicing power electronics professional. The rigorous review process ensures that only the most innovative technical solutions are highlighted to provide the highest quality possible. Papers selected for the Dialogue Session will be presented in a poster format, offering authors the opportunity for in-depth discussions with conference attendees.

11:30 AM – 1:30 PM

### D01: AC-DC Converters II

LEVEL ONE, HALL A3

SESSION CHAIRS

**Jinia Roy,** *University of Wisconsin-Madison*

**Ching-Jan Chen,** *National Taiwan University NTU*

**D01.1 Design and Placement of a Passive Clamp Snubber for Isolated SEPIC and Cuk Converters Working as Automatic Power Factor Correctors**

**Power Factor Correction: CCM, DCM, CRM/BCM Control, Bridgeless**

AUTHORS: Abraham López Antuna, Juan Rodríguez, Duberney Murillo-Yarce, Javier Sebastián, Diego G. Lamar

**D01.2 Current Sensorless Control Strategy for Single-Phase T-Type PFC Converter**

**Power Factor Correction: CCM, DCM, CRM/BCM Control, Bridgeless**

AUTHORS: Che-Yu Lu, Jia-En Zeng

**D01.3 Three-Phase Single-Stage Multiport AC-DC Converter with Integrated DC-DC Conversion Stages**

**Bidirectional AC-DC Converters**

AUTHORS: Asad Hameed, Gerry Moschopoulos

**D01.4 High Efficiency AC-Adapter Realized by Voltage-Clamper with Mid-Voltage AHB Converter using Synchronous Rectification**

**External AC-DC Adapters**

AUTHORS: Shuichiro Motoori, Akihiro Kawano, Toshiyuki Zaitsu, Riku Tatetsu, Kohei Sebata, Kazuki Miyanjou, Kimihiro Nishijima

**D01.5 Active Soft Switching Technique for Single Phase Series Capacitive Link Universal Rectifier**

**Single-Phase and Three-Phase Input**

AUTHORS: Anran Wei, Brad Lehman, Mahshid Amirabadi

**D01.6 A Multi Mode Control Algorithm for Totem-Pole Bridgeless PFC**

**Power Factor Correction: CCM, DCM, CRM/BCM Control, Bridgeless**

AUTHORS: Bosheng Sun, Sheng-Yang Yu, Amir Hussain

**D01.8 Protection Strategy for Flying Capacitor Totem-Pole PFC Under the AC Drop Transient**

**Power Factor Correction: CCM, DCM, CRM/BCM Control, Bridgeless**

AUTHORS: Yanqing Wu, Wending Zhao, Zhenhai Zhu, Xinke Wu

**D01.10 Three-Phase with Three Single-Phase Single-Stage Isolated AC-DC Converters for EV Charging Station Applications**

**Single-Phase and Three-Phase Input**

AUTHORS: Misha Kumar, Peter Barbosa, Juan Ruiz

**D01.11 400V SiC in Next-Generation 3-Level Flying Capacitor Bridgeless Totem-Pole PFC**

**Power Factor Correction: CCM, DCM, CRM/BCM Control, Bridgeless**

AUTHORS: Rytis Beinarys, Seamus O'Driscoll

**D01.12 Extended Smart-Link Quasi-Single-Stage 3-Phase AC-DC Power Supply Module for AI-Driving Data Centers**

**Embedded AC-DC Power Supplies**

AUTHORS: Davide Biadene, Jonas Huber, Johann Walter Kolar, Paolo Mattavelli

**D01.13 A New Three-Phase Multi-Mode AC/DC LLC Converter with Output-Controlled Active Rectifier (with V2G and G2V Functions) for Fast DC Charging Application**

**Single-Phase and Three-Phase Input**

AUTHORS: Xiaoyi Xia, John Lam

11:30 AM – 1:30 PM

## D02: High Voltage DC-DC Converters I

LEVEL ONE, HALL A3

SESSION CHAIRS

**Saad Pervaiz,** *Texas Instruments*

**Boyi Zhang,** *Delta Electronics (Americas) Ltd.*

**D02.1 Capacitorless Notch Resonant Converters for Miniaturized LLCLC Resonant Converters in Electric Vehicle Charging Applications**

**Resonant Converters**

AUTHORS: Haitham Kanakri, Euzeli Cipriano Dos Santos Jr., Maher Rizkalla

**D02.2 Multiple-Core Transformer Design based on Half-Turn Structure in Two-Stage DC-DC Converter for Battery Storage System**

**Resonant Converters**

AUTHORS: Yilei Li, Bima Nugraha Sanusi, Pinhe Wang, Tianming Luo

**D02.3 Bidirectional DC-DC Converter Utilizing Coupled Inductors for Energy Storage System**

**Bidirectional DC-DC Converters**

AUTHORS: Wen-Hsuan Lee, Jiann-Fuh Chen, Hsuan Liao, Kuo Fu Liao

**D02.4 Comparison of 2-Level and Quasi-2-Level Topologies in a Bidirectional Isolated DC-DC Converter for MVDC Networks**

**Bidirectional DC-DC Converters**

AUTHORS: José Andrés Aguilar Croston, Jean-Yves Gauthier, Cyril Buttay, Maryam Saeedifard, Besar Asllani, Piotr Dworakowski

**D02.5 Sling Forward Converter for Offline Operation: Achieving High Efficiency and Wide Voltage Range Performance**

**Hard- and Soft-Switched**

AUTHORS: Nasherul Islam, Guozhu Chen, Honglei Miao, Fuxing Zhang

**D02.6 A Pulse Width Alternating Modulation Strategy for Three-Level Buck-Boost Converter**

**Bidirectional DC-DC Converters**

AUTHORS: Xinlong He, Caifeng Liu, Xudong Zou, Jiaao Zou, Tianyi Zhang, Yong Kang

**D02.7 ZVT Circuit Applied for Wide Input Range Isolated Converters**

**Hard- and Soft-Switched**

AUTHORS: Linguo Wang, Zhongyin Guo, Junjie Zhu, Bing Zhang, Zhiling Zuo, Xiaoguang Gao, Guangji Ma

**D02.8 Impact of Asymmetrical Leakage Inductance on a 380 V-12 V LLC Converter with Synchronous Rectifier for DCX Application**

**Resonant Converters**

AUTHORS: Jinshu Lin, Shan Yin, Chen Song, Honglang Zhang, Minhai Dong, Limei Xu, Hui Li

**D02.9 Start-Up Techniques and Universal Closed Loop Control of Immittance Network Based Resonant Converter**

**Resonant Converters**

AUTHORS: Ripun Phukan, Misha Kumar, Randy Beckemeyer, Juan Ruiz, Peter Barbosa

**D02.10 Multi-Objective Efficiency-Oriented Optimization for DAB Converters Minimizing Current Stress and Backflow Power with Soft-Switching Assurance**

**Bidirectional DC-DC Converters**

AUTHORS: Kun Wang, Ian Laird, Jun Wang

**D02.12 An ISOP-PSFB PWM Converter based on Coupled Output Inductors and Phase-Shifted Modulation with Full ZVZCS Range**

**Hard- and Soft-Switched**

AUTHORS: Kang Hong, Guo Xu, Guangfu Ning, Mei Su

11:30 AM – 1:30 PM

## D03: Low Voltage DC-DC Converters I

LEVEL ONE, HALL A3

SESSION CHAIRS

**David Reusch,** *Texas Instruments*

**Justin Henspeter, MSEE,** *IBM*

**D03.1 Design and Implementation of a GaN-Based Soft-Switched Series-Capacitor Buck Converter Operating at the CCM-DCM Boundary for High-Performance Computing Systems**

**Voltage Regulator Modules (VRM)**

AUTHORS: Ramin Rahimzadeh Khorasani, Kolman Puterman Ghitelman, Madhavan Swaminathan

**D03.2 Intrinsic Feedback Model for Coupled-Damped Self-Balancing of General Multiphase Hybrid Converters**

**Point-of-Load (POL) and Multi-Phase Converters**

AUTHORS: Haoran Xu, Weijia Hao, Desheng Zhang, Run Min, Qiaoling Tong, Xuecheng Zou

**D03.3 A High-Efficiency Switching Oscillation Suppression Strategy based on Damped Oscillation for Synchronous DC-DC Converter**

Hard- and Soft-Switched

AUTHORS: Hao Yuan, Chuan Ni, Zhengyu Ye, Wei Lu, Hui Xue, Ting Qian

**D03.4 Efficient and Streamlined Demodulation Strategy for High-Frequency Talkative DC-DC Converters**

Hard- and Soft-Switched

AUTHORS: Abdelmoumin Allioua, Hendrik Gockel, Gerd Griepentrog

**D03.5 A 90.9% Peak Efficiency KY Single-Inductor Bipolar-Output Converter with Conductance Modulation Controller for Active-Matrix Organic Light Emitting Diode Power Supply**

Voltage Regulator Modules (VRM)

AUTHORS: Sheng-Han Yu, Chieh-Ju Tsai, Hao-Ran Huang, Ching-Jan Chen

**D03.6 Constant-on-Time Control for Zero-Bias Trans-Inductor Voltage Regulators**

Point-of-Load (POL) and Multi-Phase Converters

AUTHORS: Jia Han Zeng, Cheng Dong Lee, Rixin Lai, Hang Shao

**D03.7 An Improved PFM Control Scheme for Three-Level Buck Converter based on Ton Extension Achieving an 810% Frequency Reduction**

Voltage Regulator Modules (VRM)

AUTHORS: Yi-Chun Chang, Chieh-Ju Tsai, Ting-Lun Lee, Ching-Jan Chen

**D03.8 A Concept for Current Ripple or Transient Improvements in Multiphase Converters**

Point-of-Load (POL) and Multi-Phase Converters

AUTHORS: Alexandr Ikriannikov, Alex Gao

**D03.9 System Solutions and Design Trade-Offs to the Input Filter Interactions with Battery Chargers**

Bidirectional DC-DC Converters

AUTHORS: Xigen Zhou, Dan Mavencamp, Kuang-Yao Cheng

**D03.10 Modeling and Implementation of a Zero Bias TLVR**

Point-of-Load (POL) and Multi-Phase Converters

AUTHORS: Lei Wang, Travis Guthrie, Peyman Asadi, Mark Alexander, Kunrong Wang, Brandon Howell

11:30 AM – 1:30 PM

## D04: High Voltage DC-DC Converters II

LEVEL ONE, HALL A3

SESSION CHAIRS

**Branko Majmunovic,** *Texas Instruments*

**Shuang Zhao**

**D04.2 cGANET-Enhanced Voltage Gain Modeling: Elevating CLLC Converter Accuracy**

Resonant Converters

AUTHORS: Yu Zuo, Xiaobing Shen, Fanghao Tian, Jiaze Kong, Hans Wouters, Wilmar Martinez

**D04.3 Capacitive vs Inductive Coupling based DC-DC Converter Operating in MHz Switching Frequency Range**

Resonant Converters

AUTHORS: Saeid Pourjafar, Oleksandr Husev, Parham Mohseni, Oleksandr Matiushkin, Ryszard Strezelecki

**D04.4 LLC Converter Main Transformer Losses: Eliminating Air Gaps and Integrating Parallel External Inductors**

Resonant Converters

AUTHORS: Yu-Chen Liu, Shang-Syun Wu

**D04.5 Comparative Analysis of Modulation Techniques for a Wide Input Voltage Range Dual-Active-Bridge DC-DC Converter**

Bidirectional DC-DC Converters

AUTHORS: Alper Soysal, Enes Çatlıoğlu, Eyyup Demirkutlu, Mehmet Hıdır El, Kübra Uludağ

**D04.6 Small-Signal Phasor Modeling of T-Type Bridge-Based Single-Sided and Double-Sided LCC Resonant Converters for WPT Applications**

Resonant Converters

AUTHORS: Aditya Zade, Shubhangi Gurudiwan, Regan Zane

**D04.7 A Hybrid Three-Port Topology for Urban Charging Stations**

Resonant Converters

AUTHORS: Mohammadreza Khodaparast Klidbari, Naser Souri, Zahra Sadat Habibolahi, Hamid Montazeri Hedeshi

**D04.8 Reconfigurable H5-Bridge based LLC-DAB Sigma Converter for EV Fast Charging Stations**

Bidirectional DC-DC Converters

AUTHORS: Huangsheng Xu, Mingde Zhou, Qishan Pan, Haoyu Wang

**D04.9 A Resonant Reset Forward Converter with Ultra-High Conversion Gain using Differential Transformation Technique (DTT)**

**Resonant Converters**

AUTHORS: Shubham Srivastava, Mandeep Rana, Santanu Mishra

**D04.10 Full-Range ZVS Modulation of Switched Capacitor Converter for Sensorless Voltage Balancing**

**Resonant Converters**

AUTHORS: Md Tanvir Ahammed, Wensong Yu

**D04.12 Dimensional Parasitics Absorption in Capacitively-Isolated Ćuk Converter for Medium-Voltage High Step-Down Converters**

**Hard- and Soft-Switched**

AUTHORS: Aakash Kamalapur, James Bae, Mark Cairnie, Rajaie Nassar, Jack Knoll, Dushan Boroyevich, Guo-Quan Lu, Christina DiMarino, Qiang Li, Khai D. T. Ngo

11:30 AM – 1:30 PM

## D05: Low Voltage DC-DC Converters II

LEVEL ONE, HALL A3

SESSION CHAIRS

**Yicheng Zhu,** *University of California Berkeley*

**Peyman Asadi,** *Renesas*

**D05.1 A 36-to-60V Input Dual-Phase 2MHz 93%-Efficiency ZVT Series-Parallel Hybrid Buck Converter using Single Auxiliary Inductor and Adaptive Time Multiplexing Control**

**Hard- and Soft-Switched**

AUTHORS: Qi Cheng, Hoi Lee

**D05.2 Improved Efficiency in a 10 W Class-$\Phi_2$ Converter Utilizing a Resonant Gate Drive**

**Resonant Converters**

AUTHORS: Malachi Hornbuckle, Katherine Liang, Juan Rivas-Davila

**D05.3 The Analysis and Design of a Resonant Capacitively-Isolated Cockcroft-Walton Converter**

**Resonant Converters**

AUTHORS: Elizabeth Rabenold, Raiphy Jerez, Samantha Coday

**D05.4 SHSC: Non-Isolated High-Density 4:1 IBC for 48 V Applications**

**Resonant Converters**

AUTHORS: Mario Ursino, Roberto Rizzolatti, Simone Mazzer

**D05.5 High-Performance Current Multiplier: A Hybrid Switched Capacitor Solution for High-Current Applications**

**Resonant Converters**

AUTHORS: Kevin Zufferli, Roberto Rizzolatti, Mario Ursino, Simone Mazzer, Gerald Deboy, Stefano Saggini

**D05.6 Representation and Design Methodology for Generalized Switched-Capacitor Converter Topologies**

**Hard- and Soft-Switched**

AUTHORS: Seokwon Choi, Dam Yun, Jung-Ik Ha

**D05.8 A 48-V-to-1-V Gallium Nitride Switching Bus Converter for Processor Vertical Power Delivery with 2.7 mm Thickness and 3048 W/in³ Power Density**

**Point-of-Load (POL) and Multi-Phase Converters**

AUTHORS: Jiarui Zou, Yicheng Zhu, Nathan Ellis, Logan Horowitz, Robert C. N. Pilawa-Podgurski

**D05.9 Ripple Reduction and Efficiency Improvement of Always-Dual-Path Hybrid DC-DC Converter based on Phase Shift Operation**

**Voltage Regulator Modules (VRM)**

AUTHORS: Katsuhiro Hata, Shinsaku Tanaka, Toru Ashikaga, Yasuhiro Rikiishi

11:30 AM – 1:30 PM

## D06: DC-AC Inverters

LEVEL ONE, HALL A3

SESSION CHAIRS

**Matt Woongkul Lee,** *Purdue University*

**Karun Arjun Potty,** *Lucid Motors*

**D06.1 Ultralocal PQ Theory: A New Approach for Model-Free Predictive Direct Power Control of Shunt Active Power Filters**

**Power Quality and EMI**

AUTHORS: Mahdi S. Mousavi, Abolfazl Nassaji, Ibrahim Harbi, Behnam Nikmaram, S. Alireza Davari, Mokhtar Aly, José Rodriguez

**D06.3 Symmetrical Balanced Circuit for Common-Mode Noise Mitigation in LCL-T Resonant Converter**

**Power Quality and EMI**

AUTHORS: Ripun Phukan, Boyi Zhang, Juan Ruiz, Peter Barbosa

**D06.4 A Single-Phase Soft-Switching Buck-Boost Inverter**

**Single and Multi-Phase Inverters**

AUTHORS: Lukas Wipprecht, Burkhard Ulrich

**D06.5 Low-Complexity Model Predictive Control Method for Driving Dual Induction Motors Fed by Five-Leg Inverter**

Single and Multi-Phase Inverters

AUTHORS: Junyoung Lee, Eunwoo Lee, Dongho Choi, June-Seok Lee

**D06.6 Overvoltage Mitigation Filter using High-Frequency Cable Modeling in Long Transmission Lines for Silicon Carbide Inverter Systems**

Power Quality and EMI

AUTHORS: Yun-Jin Lee, Kyo-Beum Lee

**D06.7 Power Delivery Network (PDN) Design and Analysis to Achieve Low Impedance in Fast Edge Rate DC-DC Converters for EMI Compliance**

Power Quality and EMI

AUTHORS: Manraj Singh Ladhar, Sheldon Williamson

**D06.9 Enhancing the Performance of Dual Input Split Source Inverters using an Advanced Modulation Strategy**

Single and Multi-Phase Inverters

AUTHORS: Mustafa Abu-Zaher, Fang Zhuo, Mokhtar Aly, Mahmoud A. Gaafar, Mohamed Orabi, José Rodriguez, Alaaeldien Hassan, Jiachen Tian, Samir Kouro

**D06.12 A Novel GaN-HEMT Single-Phase Single-Stage Buck-Boost Micro-Inverter Topology for PV Applications**

Single and Multi-Phase Inverters

AUTHORS: Pengwei Li, Uiliam Kutrolli, Ali Bazzi

11:30 AM – 1:30 PM

## D07: Power Devices & Components I

LEVEL ONE, HALL A3

SESSION CHAIRS

**Raghav Khanna,** *University of Toledo*

**Sushanta Gautam,** *The University of Toledo*

**D07.1 Influence of Threshold Voltage Temperature Dependency on Junction Temperature Imbalance in Paralleled SiC MOSFETs**

GaN and SiC Devices and Modules

AUTHORS: Andrea Piccioni, Thomas Aichinger

**D07.2 A Dynamic Current Sharing Method using Novel Clip Considering Mutual Inductance Coupling**

GaN and SiC Devices and Modules

AUTHORS: Zexiang Zheng, Jianwei Lv, Yiyang Yan, Baihan Liu, Yifan Zhang, Linhao Ren, Jiaxin Liu, Cai Chen, Yong Kang, Xiong Zhang, Hao Yu, Wei Jiang

**D07.3 Application-Oriented Test Setup for Measuring Dynamic Output and Transfer Characteristics of GaN-HEMTs**

GaN and SiC Devices and Modules

AUTHORS: Philipp Swoboda, Martin Fein, Simon Frank, Andreas Liske, Marc Hiller

**D07.4 Mitigating Gate Voltage Oscillation in Parallel SiC Power Modules for xEV**

GaN and SiC Devices and Modules

AUTHORS: Hideo Komo, Michael Rogers, Mark Steiner, Eric Motto, Koichi Taguchi, Chihiro Kawahara, Junichi Nakashima, Yasushige Mukunoki, Seiichiro Inokuchi, Rei Yoneyama

**D07.5 Switching Performance Comparison of Low-Voltage GaN and Si Devices**

GaN and SiC Devices and Modules

AUTHORS: Tianxiao Chen, Haoyang Liu, Pedro André Martins Bezerra, Eckart Hoene, Sibylle Dieckerhoff

**D07.6 Modeling of Switching Transients for Frequency-Domain CM EMI Analysis in Double Sided Cooling Power Modules**

GaN and SiC Devices and Modules

AUTHORS: Sijia Liu, Liu Yang, Heng Zhang, Yifan Zhang, Zexiang Zheng, Jianwei Lv, Jiaxin Liu, Cai Chen, Yong Kang, Yuebin Zhou, Daming Wang, Shuang Zhao

**D07.7 Leakage Current Detection Scheme for Aging Test of 10kV SiC MOSFET Power Module**

GaN and SiC Devices and Modules

AUTHORS: Peiyang Ding, Hong Zhang, Tianshu Yuan, Qiling Chen, Jiacheng Guo, Dingkun Ma, Peiyuan Sun, Ting Hou, Laili Wang

**D07.9 Physics-Informed Neural Network Approach for Early Degradation Trajectory Prediction of Power Semiconductor Modules**

Power Silicon MOSFETs, BJTs, IGBTs, etc.

AUTHORS: Jie Kong, Yi Zhang, Yichi Zhang, Lukas Wick, Frederik Lillebæk Hansen, Dao Zhou, Huai Wang

**D07.10 Nonlinear Output Capacitance of Bidirectional Gallium Nitride Power Switches**

GaN and SiC Devices and Modules

AUTHORS: Michael Bosch, Jeremy Nuzzo, Dominik Koch, Mathias Weiser, Ingmar Kallfass

11:30 AM – 1:30 PM

## D08: Power Devices & Components II

LEVEL ONE, HALL A3

SESSION CHAIRS

**Raghav Khanna,** *University of Toledo*

**Samuel K. Atwimah,** *University of Toledo*

**D08.3 Novel Approach of Determining and Predicting SiC MOSFET's on Resistance from Device Case Temperature using Machine Learning**

**Power Silicon MOSFETs, BJTs, IGBTs, etc.**

AUTHORS: Paul Bradford, Conner Deppe, Hongjie Wang

**D08.4 Comparison of Static Characteristics in GaN HEMTs Across 50K to 400K Considering Diverse Techniques and Statistical Variation**

**GaN and SiC Devices and Modules**

AUTHORS: Purushottam Khadka, Saumil Chandrakant Shivdikar, Zheyu Zhang, Tian Qiu, Ahmed Shahnewaz Siraj

**D08.5 Compact Model of β-$Ga_2O_3$ Schottky Barrier Diode**

**Ultra-Wide Bandgap Devices**

AUTHORS: Abu Shahir Md Khalid Hasan, Mohammad Dehan Rahman, Tanzila Akter, Md Majharul Islam, Md Maksudul Hossain, Xiaoqing Song, H. Alan Mantooth

**D08.6 DC-Link Capacitor Board Design for Low Parasitic Inductance**

**Capacitors, Supercapacitors**

AUTHORS: Mikayla Benson, Lifang Yi, Kangbeen Lee, Jinyeong Moon, Woongkul Lee

**D08.7 First Demonstration of a Gallium Oxide Power Converter**

**Ultra-Wide Bandgap Devices**

AUTHORS: Joshua Piel, Elizabeth Sowers, Daniel Dryden, Thaddeus Asel, Adam Neal, Brenton Noesges, Shin Mou, Andrew Green

**D08.8 Optimized Integrated EMI Filter Design in SiC Power Modules with Terminal Inductor for Better High-Frequency EMI Suppression**

**GaN and SiC Devices and Modules**

AUTHORS: Yifan Zhang, Wenzhe Xu, Jianwei Lv, Yiyang Yan, Baihan Liu, Sijia Liu, Jiaxin Liu, Cai Chen, Yong Kang, Xiong Zhang, Hao Yu, Wei Jiang

11:30 AM – 1:30 PM

## D09: Magnetics Characterization & Designs

LEVEL ONE, HALL A3

SESSION CHAIRS

**Edward Herbert, BEEE,** *PSMA*

**George A. Slama,** *Würth Elektronik*

**D09.1 Balanced Technique using Integrated Winding Coupled Inductor for High-Power Density Two-Phase Interleaved Boost Converter**

**Winding Techniques**

AUTHORS: Yuta Imaeda, Jun Imaoka, Masayoshi Yamamoto, Hiroyuki Onishi

**D09.2 MagNetX: Foundation Neural Network Models for Simulating Power Magnetics in Transient**

**Magnetics Modeling and Simulations**

AUTHORS: Shukai Wang, Hyukjae Kwon, Haoran Li, Youssef Elasser, Gyeong-Gu Kang, Daniel Zhou, Davit Grigoryan, Minjie Chen

**D09.3 Revisiting Models of Common Mode Inductors to Include the Magnetized Capacitance Effect**

**Magnetics Modeling and Simulations**

AUTHORS: Rafael Bogo Portal Chagas, Marcelo Lobo Heldwein

**D09.4 A High Frequency Coupled Inductor with Distributed Air Gap for High Power DC-DC Converters**

**High-Frequency Magnetics**

AUTHORS: Muhammad Fasih Uddin, Ahmed Ismail, Peyman Darvish, Baher Abu Sba, Yue Zhao

**D09.5 High-Power Planar Transformer Design for Four-Port Converters**

**High-Frequency Magnetics**

AUTHORS: Arya Sadasivan, Behrooz Mirafzal

**D09.6 Optimal Design of Inductors with Aluminum Litz Wire for Inductive Power Transfer Systems**

**Winding Techniques**

AUTHORS: Jesús Acero, Claudio Carretero, Ignacio Lope, Óscar Lahuerta, José-Miguel Burdío

**D09.7 Analytic Design of Flat-Wire Inductors for High-Current and Compact DC-DC Converters**

**Magnetics Modeling and Simulations**

AUTHORS: Sajjad Mohammadi, James Kirtley, Alireza Namadmalan

**D09.8 Insulation Dielectric Loss of High-Frequency Transformer Under Square Voltage Excitation with Edge Oscillation**

**High-Frequency Magnetics**

AUTHORS: Zhanlei Liu, Lingyu Zhu, Yuntian Gao, Yongliang Dang, Cao Zhan, Shengchang Ji

11:30 AM – 1:30 PM

## D10: Magnetics Applications II

LEVEL ONE, HALL A3

SESSION CHAIRS

**Matt Wilkowski, MSEE,** *Würth Elektronik*

**George A. Slama,** *Würth Elektronik*

**D10.1 Improved High-Speed Thermal Analysis based on Two-Step Simulation for High-Frequency Transformers**

Magnetics Modeling and Simulations

AUTHORS: Zheyuan Yi, Kai Sun, Qiang Li, Zengyang Liu

**D10.2 Core Material Characterization Under DC Bias Conditions**

Magnetics Modeling and Simulations

AUTHORS: Jonas Mühlethaler, Fabrice Locher, Frédéric Mathieu, Edward Herbert

**D10.3 A Low-Cost Setup and Procedure for Measuring Losses in Inductors**

High-Frequency Magnetics

AUTHORS: Burkhard Ulrich

**D10.4 Effect of Temperature of Additively Manufactured Cores**

Additive Manufacturing for Magnetic Materials

AUTHORS: Kenneth Johnson, Ali Bazzi

**D10.6 Extreme Temperature Permeability Engineered Soft Magnetics**

Advanced Magnetic Materials and Geometries

AUTHORS: Tyler Paplham, Alex Leary, Paul R. Ohodnicki

**D10.7 An Isolated RF Power Combining Approach with Multiple Decoupled Input Coils**

High-Frequency Magnetics

AUTHORS: Ziyang Xu, Yifan Zhao, Zhan Liu, Alex Hanson, Ming Liu

**D10.8 Simulation of a Custom Core, 15kV Isolated Gap Transformer Optimized for High Power Density**

Magnetics Modeling and Simulations

AUTHORS: Andrew Galamb, Fei Teng, Srdjan Lukic

**D10.9 Low Interwinding Capacitance Design for PCB-Winding based Transformer in Self-Powered Gate Drive Power Supply for High-Voltage SiC MOSFET**

High-Frequency Magnetics

AUTHORS: Yuan Zhou, Li Zhang, Yilun Chen, Tianxiang Yin, Lei Lin

11:30 AM – 1:30 PM

## D11: Power Converter Design, Packaging & Integration

LEVEL ONE, HALL A3

SESSION CHAIRS

**Rafal Wojda,** *Oak Ridge National Laboratory*

**Jason Neely,** *Sandia National Laboratories*

**D11.1 Integrated 4-Level Dual-Phase Superimposed Quadratic Power Converter for High-Density Direct 48V/1V Conversion**

Power Modules / High Density Design

AUTHORS: Prosenjit Ghosh, Jin Woong Kwak, Fei Zhou, D. Brian Ma

**D11.2 Compensation Method for Unbalance of the Multi-Channel Class E Power Amplifier Using the Closed Loop Frequency Control**

Quality and System Reliability Including EMI/EMC

AUTHORS: Kyungmin Lee, Sungku Yeo

**D11.3 High Temperature Operation of Digital Gate Driver Integrated Into a Power Module**

Power Modules / High Density Design

AUTHORS: Kazuma Saiga, Shohei Zaizen, Satoshi Nakano, Shigeru Kusunoki, Kiyoto Watabe, Katsuhiro Hata, Makoto Takamiya, Shin-Ichi Nishizawa, Wataru Saito

**D11.5 Evaluation Index-Based Multiphysics Coupling Model and Analysis Methodology for High-Reliable Power Supply Module**

Quality and System Reliability Including EMI/EMC

AUTHORS: Haoyu Wang, Xuliang Wang, Yan Wang, Xiaosen Liu

**D11.6 Electrical Characterization of Modular 3D Packaging Assembled with Compressed Metal Foams**

Power Electronics Packaging

AUTHORS: Paul Bruyere, Alexis Derbey, Betina Zynger-Capaverde, Yvan Avenas, Eric Vagnon, Jean-Luc Schanen, Jean-Michel Guichon, Omar Sanjakdar

**D11.7 Improvement in Short-Circuit Robustness of SiC-MOSFETs based Power Modules using Two-Level Turn-On (2LTO)**

Power Modules / High Density Design

AUTHORS: Muhammad Muneeb Alam, Saad Khalid, Nisar Ahmed Khan, Ngoc Ho Tran, Sebastian Strache

**D11.8 GaN-Based Two Stage Point-of-Load (PoL) Converter with 2.5D Embedded Substrate Implementation**

**Embedded Technologies, 3D Packaging, and**

AUTHORS: Samuel Defaz, Yang Li, Fang Luo

**D11.9 Near-Field Coupling Mitigation of the Noise from High Voltage DC-Link Decoupling Capacitors in Voltage Source Converters**

**Quality and System Reliability Including EMI/EMC**

AUTHORS: Yuxuan Wu, Kushan Choksi, Samuel Defaz, Fang Luo

**D11.10 Advantages of Paralleling SiC MOSFETs in High-Performance Power Modules**

**Power Modules / High Density Design**

AUTHORS: Steffen Beushausen, Dominik Alexander Ruoff, Wenqi Zhou, Karl Oberdieck

**D11.11 A SiC Half-Bridge Power Module based on Liquid Metal Packaging for High Performance and Low Thermal Stress**

**Power Electronics Packaging**

AUTHORS: Wei Mu, Ameer Janabi, Luke Shillaber, Borong Hu, Teng Long

**D11.12 Analysis and Modeling of Radiated EMI Considering Coupling Between Power Converter and Power Cable with LC-Type EMI Filter**

**Quality and System Reliability Including EMI/EMC**

AUTHORS: Qinghui Huang, Yingjie Zhang, Shuo Wang, Yirui Yang, Zhedong Ma, Yanwen Lai

**D11.13 Simple Prediction Method for Impacts of Switching Characteristics on EMI Noise of a Three-Phase PWM Inverter**

**Quality and System Reliability Including EMI/EMC**

AUTHORS: Shinobu Nagasawa, Toshiya Tadakuma, Keita Takahashi

**D11.14 Coaxially Nested 3.3 kV SiC MOSFET Packages with Uniform Interpackage Electric Field Distribution**

**Power Electronics Packaging**

AUTHORS: Jack Knoll, Mark Cairnie, Christina DiMarino

**D11.15 Thermal Modeling and Performance of a Bare-Die Embedded PCB for High Power Density Converters Design**

**Power Electronics Packaging**

AUTHORS: Shahid Aziz Khan, Feng Zhou, Mengqi Wang, Duc Dung Le, Shivam Chaturvedi

11:30 AM – 1:30 PM

## D12: Control I

LEVEL ONE, HALL A3

SESSION CHAIRS

**Jaber Abu Qahouq,** *The University of Alabama (UA)*

**Nathan Weise,** *Marquette University*

**D12.1 Research on the Voltage Fluctuation Suppression Strategy in Weak Grid Under Pulsed Power Load Integration**

**Control of Power Electronic Converters**

AUTHORS: Xi Chen, Jiazheng Zhang, Mingjun Bao

**D12.2 An Optimized Firmware-Based Cycle-by-Cycle Current Limiting Method for Power Electronic Converters in UPS**

**Control of Power Electronic Converters**

AUTHORS: Teng Wu, Hong Liu

**D12.3 Frequency Stop-Band Management System for DC-DC Converters**

**Control of Power Electronic Converters**

AUTHORS: Alessandro Bertolini, Alberto Cattani, Claudio Luise, Alessandro Gasparini

**D12.4 Multi-Stage Model Predictive Control with Enhanced Discrete-Time Models for Multilevel Inverters**

**Control of Power Electronic Converters**

AUTHORS: Hoang Le, Apparao Dekka, Deepak Ronanki, Abdul R Beig

**D12.5 Direct Effective Power Control (D-EPC) for LLC Resonant Converters Operating in Boost Mode using Event-Driven-Timer based Digital Controller**

**Control of Power Electronic Converters**

AUTHORS: Yuto Yoshimura, Kenji Funatani, Kazuhiro Umetani, Toshiyuki Zaitsu, Akito Nakagaki, Masataka Ishihara, Eiji Hiraki

**D12.6 Mitigation Method of Resonance Between Paralleled On-Line UPS**

**Control of Power Electronic Converters**

AUTHORS: Teng Wu, Zhenguo Huo, Shangxian Ning

**D12.7 An Extra-Element Small-Signal Model for a Current-Fed Resonant Dual-Active-Bridge Converter**

**Control of Power Electronic Converters**

AUTHORS: Paolo Sbabo, Paolo Mattavelli, Giorgio Spiazzi, Andrea Petucco

**D12.8 Concurrent Charge Distribution and Time-Optimal Control for Unordered Single-Inductor Dual-Output Converter**

**Control of Power Electronic Converters**

AUTHORS: Xuliang Wang, Haoyu Wang, Yang Liu, Yunxin Wang, Boran Zhang, Hongru Liu, Yan Wang, Xiaosen Liu

11:30 AM – 1:30 PM

## D13: Control II

LEVEL ONE, HALL A3

SESSION CHAIRS

**Mehdi Farasat,** *Louisiana State University*

**Narayan Kar,** *University of Windsor*

**D13.1 Circulating Current Control with Loss Reduction for Parallel Connected Inverters**

Control of Power Electronic Converters

AUTHORS: Shun Endo, Takae Shimada, Masato Ando, Yuuichi Mabuchi, Masaki Miyamae, Naoki Takayama, Yohei Matsumoto, Naoto Onuma

**D13.2 Analysis of Power and Power Spectral Density for Quaternary Random Pulse Position Modulation**

Control of Power Electronic Converters

AUTHORS: Hung-Chi Chen, Hsiang-Kai Wu, Chih-Chiang Wu

**D13.3 Bidirectional CLLC Converter using a Hybrid Control Method for Wide Voltage Range Applications**

Control of Power Electronic Converters

AUTHORS: Jhih-Cheng Hu, Hong-Xuan Liao, Chien-Lung Liu, Wei Wang, Ming-Shi Huang

**D13.4 Design and Control of a High-Bandwidth Dual Active Bridge DC-DC Converter**

Control of Power Electronic Converters

AUTHORS: Alper Uzum, Syed Imam Hasan, Yilmaz Sozer, Kenneth Loparo

**D13.5 Unified Model Predictive Control for DC-DC Buck Converters: From Start-Up to Steady-State Operation**

Control of Power Electronic Converters

AUTHORS: Zhengchen Guo, Robert M. Nelms

**D13.7 A Novel IPPC Method for Precise Overload Protection and Burst Mode Operation in LLC Resonant Converters**

Control of Power Electronic Converters

AUTHORS: Manikanta Pallantla, Ramkumar S

**D13.8 An Improved Current-Sensorless Model Predictive Voltage Control for Four-Leg Voltage Source Inverters**

Control of Power Electronic Converters

AUTHORS: Heng Guo, Yuxin Wei, Mengmeng Jing, Wenlong Ding, Bin Duan, Chenghui Zhang

11:30 AM – 1:30 PM

## D14: Control IV

LEVEL ONE, HALL A3

SESSION CHAIRS

**Mohamed Gamal Hussien**

**Nidhi Haryani,** *Delta Electronics (Americas)*

**D14.1 A Highly Integrable, Modular and Multi-Functional Fault Monitoring Active Gate Driver with Parallel Buffers for a Global Enhanced Reliability of Gen. 3 SiC Power MOSFETs**

Gate Drive Circuits and Fault Protection

AUTHORS: Mathis Picot-Digoix, Léo Seugnet, Frédéric Richardeau, Jean-Marc Blaquière, Sébastien Vinnac, Thanh-Long Le, Stéphane Azzopardi

**D14.2 A 24 – 16 V to 0.8 – 1.2 V Merged 4-Stage Hybrid-SC-SL Converter with 96.5% Peak Efficiency and Larger Than 50% iL Reduction**

Control ICs

AUTHORS: Chien-Hao Tseng, Cheng-Ta Chuang, Chieh-Ju Tsai, Ching-Jan Chen

**D14.3 Innovation Active Gate Drive Method (Named TriC3™) for MOSFET Heat Reduction and EMI**

Gate Drive Circuits and Fault Protection

AUTHORS: Hisashi Sugie

**D14.4 A KY Buck-Boost Converter with Extended Ramp Control Achieving 1500% Output Variation Reduction for Smooth Mode Transition**

Control ICs

AUTHORS: Yu-Ting Hung, Chieh-Ju Tsai, Ching-Jan Chen, Chun-Yu Hsieh

**D14.5 An USB Cable based Extended Conversion Range L-First Hybrid-Converter using Valley-Virtual-Inductor-Current-Mode Control with Auto-Tracking Slope Compensation Against ±50% Inductance Variation**

Control ICs

AUTHORS: Chun-I Li, Chieh-Ju Tsai, Ching-Jan Chen

**D14.6 Impact of Gate Resistor Configurations on Current Balancing in Paralleled SiC MOSFETs**

Gate Drive Circuits and Fault Protection

AUTHORS: Yifu Zhang, Shashank Karanth, Emanuel Eni

**D14.7 Exploring the Potential of FPGA in High-Frequency Switching DC-DC Boost Converters using Model Predictive Control**

Digital Control-MCUs, DSPs, FPGAs, ASICs

AUTHORS: Qingcheng Sui, Bangli Du, Yu Zuo, Wilmar Martinez

**D14.8 A 7 Bit 5A 6.7 GHz Gate-Shaping Digital Gate Driver with Burst-Sampling ADC for Iterative Switching Optimization of SiC Power MOSFETs**

**Digital Control-MCUs, DSPs, FPGAs, ASICs**

AUTHORS: Tobias Zekorn, Kenny Vohl, Erik Wehr, Leon Weihs, Michael Hanhart, Ralf Wunderlich, Stefan Heinen

11:30 AM – 1:30 PM

## D15: Control III

LEVEL ONE, HALL A3

SESSION CHAIRS

**Qing Ye**

**Brian Johnson,** *University of Texas at Austin*

**D15.1 Decentralized Interleaving of Series-Stacked DC-DC Converters via Extremum-Seeking Control**

**Control of Power Electronic Converters**

AUTHORS: Ivan Petrić, Vignesh Iyer, Shoudong Hu, Chirayu Rajpurohit, Bailey Sauter, Milan Ilić, Luca Corradini, Dragan Maksimović

**D15.2 Online Dead-Time Control for Half Bridges without Preliminary Training based on Switching Transient Steepness**

**Gate Drive Circuits and Fault Protection**

AUTHORS: Lukas Knappstein, Niklas Falkenberg, Martin Pfost

**D15.3 Impedance-Based State-of-Health Estimation for Lithium-Ion Battery Management Systems**

**Control of Power Electronic Converters**

AUTHORS: Mohammad Al-Smadi, Jaber Abu Qahouq

**D15.4 Stability Analysis and Resonance Damping of LC Filter-Based Voltage Source Converter with Single-Loop Voltage Control**

**Control of Power Electronic Converters**

AUTHORS: Aravind G, Divyanshu Bansal, L Umanand

**D15.5 Finite Control Set Model Predictive Control Combined with Online Junction Temperature Estimation for Reliability Enhancement of Voltage Source Inverters**

**Control of Power Electronic Converters**

AUTHORS: Qiang Mu, Jiale Zhou, Zaheen Mustakin, Lucas Pereira, Babak Parkhideh, Tiefu Zhao

**D15.7 Framework for Dynamic Control and Operation of Power Electronics Interfaces**

**Control of Power Electronic Converters**

AUTHORS: Radha Sree Krishna Moorthy, Steven Campbell

**D15.8 Achieving Soft-Charging and Over 20% Input Current Ripple Reduction in a 48-to-6 V Dickson Converter using 3-Phase Split-Phase Control**

**Control of Power Electronic Converters**

AUTHORS: Nagesh Patle, Rose A. Abramson, Sahana Krishnan, Jiarui Zou, Robert C. N. Pilawa-Podgurski

11:30 AM – 1:30 PM

## D16: Modeling & Simulation IV

LEVEL ONE, HALL A3

SESSION CHAIRS

**Adam Skorek,** *University of Québec at Trois-Rivières*

**Cao Zhan**

**D16.1 Experimental Verification of Circuit-Losses Analysis-Model of DC-Output Converter Developed using Approximated Equations from Measurement Data and Datasheet Data**

**Circuits and Systems**

AUTHORS: Ryota Kondo, Tsuyoshi Funaki

**D16.2 Scattering Parameter Measurement System using Probes for Surface Mount Devices Operating in the Frequency Range from 50 kHz to 1 GHz**

**Device and Component Modeling**

AUTHORS: Ryoko Kishikawa, Masahiro Horibe, Tomokazu Shoji, Shigenori Yabuta, Toshi Ohi, Ryo Takeda, Takamasa Arai

**D16.3 Optical Transformer Design with Additional Common-Mode Noise Reduction Winding for Flyback DC-DC Converters**

**Parasitics Extraction and Optimization**

AUTHORS: Yusuke Irie, Shinichiro Eguchi, Yoichi Ishizuka, Toshiro Takeuchi, Akio Iwabuchi, Takahiro Koga, Toshiyuki Tanaka

**D16.4 Enhanced Bus Voltage Stability Through Digital Twin-Enabled Adaptive Controller Tuning**

**Hardware-in-the-Loop and Rapid Prototyping**

AUTHORS: Matthew Belanger, Andy Wong, Kerry Sado, Enrico Santi

**D16.7 Modeling and Performance Characterization of Lithium-Ion Capacitor at Different Temperature and Voltage Values**

**Device and Component Modeling**

AUTHORS: Mohammad Al-Smadi, Jaber Abu Qahouq, Sajad Saberi

11:30 AM – 1:30 PM

## D17: Modeling & Simulation V

LEVEL ONE, HALL A3

SESSION CHAIRS

**Sheldon Williamson, PhD,** *Ontario Tech University*

**Abraham Gebregergis**

**D17.1 Conveniently Identify Coils in Inductive Power Transfer System using Machine Learning**

**Parasitics Extraction and Optimization**

AUTHORS: Yifan Zhao, Mowei Lu, Ting Chen, Heyuan Li, Xiang Gao, Zhenbin Zhang, Minfan Fu, Stefan M Goetz

**D17.2 Accurate Modeling of LLC Resonant Converters with Enhanced Analytical Approach Considering of Parasitic Capacitance**

**Circuits and Systems**

AUTHORS: Dong Jiao, Zhengming Hou, Jih-Sheng Lai

**D17.3 High-Frequency Conditioning Circuits for Power-Related Information Extraction in Non-Sinusoidal Power Electronic Systems**

**Circuits and Systems**

AUTHORS: Haoyu Wang, Yuanxin Zhang, Di Mou, Alex Hanson, Shiqi Ji

**D17.4 Transconductance Model of the Dual Active Bridge Converter Under Single and Dual Phase Shift Control**

**Circuits and Systems**

AUTHORS: Jared Cronin, Andrew Wunderlich, Enrico Santi

**D17.5 Lumped Parameter Modeling for Real-Time Thermal Regulation of Li-Ion Battery Packs**

**Parasitics Extraction and Optimization**

AUTHORS: Utkal Ranjan Muduli, Mohamed Shawky El Moursi, Khalifa Al Hosani, Ahmed Al-Durra

**D17.6 A Physics-Based Temperature Dependent Analytical Model for 2DEG Density in AlGaN/GaN HEMT Devices**

**Device and Component Modeling**

AUTHORS: Kashfia Tajmim Nabila, Jerry L. Hudgins

**D17.7 Comparative Analysis of Stator-PM Machines: Design Optimization and Electromagnetic Performance Evaluation**

**Device and Component Modeling**

AUTHORS: Maryam Salehi, Madhav Manjrekar

11:30 AM – 1:30 PM

## D18: Motor Drives III

LEVEL ONE, HALL A3

SESSION CHAIRS

**Ali Safayet,** *Halla Mechatronics*

**Ziaur Rahman, PhD,** *Booz Allen Hamilton*

**D18.1 Elimination of Deadtime Effect on Resolver Offset Estimation using the Pulsating Current Command for Electric Vehicle Application**

**Modeling and Control Techniques for Motor Drives**

AUTHORS: Yingfeng Ji, Nurani Chandrasekhar

**D18.2 A Generic Load Emulator for Testing Motor Drives of E-Mobility**

**AC, DC, BLDC Motor Drives**

AUTHORS: Qingzheng Zhang, Kaiyuan Feng, Changsheng Hu, Dehong Xu

**D18.3 Design and Implementation of Power Assisted Control System for E-Bikes**

**Modeling and Control Techniques for Motor Drives**

AUTHORS: Che-Yu Lu, Tzu-Ping Cheng

**D18.4 A Hybrid PWM Strategy with Reduced Common-Mode Voltage and Extended Output Voltage Linearity for Adjustable Speed Drives**

**Power Quality and EMI for Motor Drives**

AUTHORS: Zhe Zhang, Kevin Lee

**D18.5 Single-Phase Open-Circuit Fault-Tolerant Control of Three-Phase PMSM Drives**

**Modeling and Control Techniques for Motor Drives**

AUTHORS: Yuichiro Minato, Yuki Nakata, Jun-Ichi Itoh

**D18.6 Multi-Vendor Encoder Position Sensing Interface using Programmable IP based Solution**

**Sensor Integration**

AUTHORS: Rajul Bhambay, Dhaval Khandla, Pratheesh Gangadhar, Thomas Leyrer, Achala Ram, Manoj Koppolu, Archit Dev

**D18.7 Sensorless Control Method at Low-Speed Range using High-Frequency Voltage Injection for Synchronous Reluctance Motors Considering to Nonlinear Characteristic Due to Magnetic Saturation**

**Modeling and Control Techniques for Motor Drives**

AUTHORS: Sota Takizawa, Sari Maekawa

**D18.8 Hybrid Control Scheme for Permanent Magnet Gear Motor**

AC, DC, BLDC Motor Drives

AUTHORS: Bing Li, Takayoshi Matsuo, Ahmed Sayed-Ahmed, Yujia Cui, Jiangang Hu

**D18.9 Cost-Effective Fault Diagnosis for Motor and Inverter using Bootstrap Charging and Single DC Link Current Sensor**

AC, DC, BLDC Motor Drives

AUTHORS: Gyu Cheol Lim, Won Hyo Jeong, Kahyun Lee, Jung-Ik Ha

**D18.10 Improved PWM to Suppress Motor Overvoltage Caused by Voltage Reflection**

Modeling and Control Techniques for Motor Drives

AUTHORS: Sung-Oh Kim, Kyo-Beum Lee

**D18.11 Analysis of Double Pulsing Effect in Motor Drives based on Vector Diagram**

Modeling and Control Techniques for Motor Drives

AUTHORS: Byeong-Woo Kang, Kyo-Beum Lee

**D18.12 A Novel Speed Sensor-Less Control of a Solar-Powered PMSM Drive**

Modeling and Control Techniques for Motor Drives

AUTHORS: Abirami Kalathy, Arpan Laha, Praveen Jain, Majid Pahlevani

11:30 AM – 1:30 PM

## D19: Utility Applications I

LEVEL ONE, HALL A3

SESSION CHAIRS

**Stanley Atcitty,** *Sandia National Laboratories*

**Lingyu Zhu,** *Xi'an Jiaotong University*

**D19.2 Design of a Compact Low-Loss MMC Double Submodule for MVDC and HVDC Applications**

FACTs Devices and HVDC

AUTHORS: Ali Sharaf Addin, Rainer Marquardt, Thomas Brückner

**D19.7 A Series-Type Dynamic Voltage Restorer Control Strategy to Cope with Voltage Swell**

Power Quality, UPS, Active Power Filters

AUTHORS: Jiazheng Zhang, Hongyu Chen, Xi Chen, Mingjun Bao

**D19.9 Machine Learning Approach for Accurate Lithium-Ion Battery Temperature Prediction using Electrochemical Features Independent of Battery SOC and SOH**

Energy Storage Systems

AUTHORS: Vincent Masabiar Tingbari, Isaiah Oluwaseun Ekuewa, Anshul Nagar, Asad Abbas, Jamil Umar, Yuxin Zhang, Woonki Na, Jonghoon Kim

11:30 AM – 1:30 PM

## D20: Utility Applications II

LEVEL ONE, HALL A3

SESSION CHAIRS

**Yuheng Wu,** *John Deere*

**Athar Hanif,** *The Ohio State University*

**D20.1 A Battery Strings Circulating Current Blocking Method for Battery Energy Storage Systems**

Energy Storage Systems

AUTHORS: Haihong Long, Ziang Sun, Yucheng Fan, Xin Wu, Dehong Xu

**D20.6 A Hybrid Multilevel Converter-Based High-Gain Isolated DC/DC Converter for Grid-Tied Energy Storage Applications**

Energy Storage Systems

AUTHORS: Pengyu Fu, Yizhou Cong, Jin Wang, Anant Agarwal

**D20.7 LCL Filter Parameter Selection using Graphical Method for a 13.8 kV ac 1.1 MVA 7-Level Flying Capacitor Grid-Connected Converter Utilizing Variable Switching Frequency**

Distributed Energy Systems

AUTHORS: Arthur Mendes, David Nam, Mingze Gao, Thimothy Thacker, Dong Dong, Rolando Burgos

**D20.8 Online Extraction of Electrochemical Impedance Spectroscopy Pattern based on EV Load Profile and Short Time Fourier Transform for Diagnosis of Lithium-Ion Battery Safety**

Energy Storage Systems

AUTHORS: Miyoung Lee, Dongcheol Lee, Youngmin Bae, Jongchan An, Garam Yang, Woonki Na, Jonghoon Kim

**D20.9 Enhanced Incremental Capacity Analysis for Evaluating Battery Degradation Mechanisms of Optimized Fast Charging Methods**

Energy Storage Systems

AUTHORS: Taehyeon Gong, Jaehyeong Lee, Sungjun Lee, Yura Kim, Bomyeong Ko, Woonki Na, Sungjin Choi, Jonghoon Kim

**D20.10 Co-Estimation of SOC and SOT in Lithium-Ion Batteries using an RLS-Based Heat Generation Model**

Energy Storage Systems

AUTHORS: Seongkyu Lee, Eunjin Kang, Minhyeok Kim, Seunghyun Lee, Minwoo Song, Jaea Lee, Woonki Na, Jonghoon Kim

11:30 AM – 1:30 PM

## D21: Power Electronics for Renewable Energy

LEVEL ONE, HALL A3

SESSION CHAIRS

**Tao Yang,** *University of Nottingham*

**Jingbo Liu,** *Eaton*

**D21.1 Three-Stage Adaptive Control Strategy for Stability Improvement of Grid-Connected Inverter in Weak Grid**

**Photovoltaic (PV) Inverters and Micro Inverters**

AUTHORS: Longxiang You, Sicong Jin, Xin Zhang, Zuoshuai Wang, Sunqing Wang

**D21.2 Degradation Analysis of Offshore Bifacial PV Modules Under Multiple Climatic Stressors**

**Fuel Cells and Other Emerging Renewable Energy Systems**

AUTHORS: Aidha Muhammad Ajmal, Yongheng Yang

**D21.3 A Flexible Energy Management System for Solar Powered Electric-Bus Charging Stations**

**Fuel Cells and Other Emerging Renewable Energy Systems**

AUTHORS: Supun Amarathunga, Pasan Gunawardena, Xiaoting Wang, Yunwei Li

**D21.4 A Vienna Rectifier based Grid-Connected Powertrain for Hydrokinetic Turbine Systems**

**Fuel Cells and Other Emerging Renewable Energy Systems**

AUTHORS: Peidong Li, Md Tariquzzaman, Yue Cao

**D21.5 Condition Monitoring for DC-Link Capacitors and PV Arrays based on the Start-Up Process of the PV System**

**Photovoltaic (PV) Inverters and Micro Inverters**

AUTHORS: Yongjie Liu, Ariya Sangwongwanich, Chen Liu, Xing Wei, Shuyu Ou, Tamás Kerekes, Jiahong Liu, Huai Wang

**D21.6 Electrically and Thermally Efficient Reliable Power Converter Design for Micro–Hydrokinetic Turbine**

**Fuel Cells and Other Emerging Renewable Energy Systems**

AUTHORS: Md Tariquzzaman, Peidong Li, Yue Cao

**D21.7 Comprehensive Evaluation of Cyber Attacks on Grid-Connected Smart Inverters**

**Photovoltaic (PV) Inverters and Micro Inverters**

AUTHORS: Rishabh Singla, Vishwam Raval, Hasan Ibrahim, Jaewon Kim, Prasad Enjeti, Narsimha Reddy

**D21.8 Parallel Operation of Grid-Forming Converters based on Kuramoto Oscillators with Virtual Cable Emulation for Improved Power Sharing**

**Photovoltaic (PV) Inverters and Micro Inverters**

AUTHORS: Vikram Roy Chowdhury, Gab-Su Seo, Barry Mather

**D21.9 Enhancing Hydrogen Production in Hybrid Standalone Microgrids**

**Fuel Cells and Other Emerging Renewable Energy Systems**

AUTHORS: Utkal Ranjan Muduli, Mohamed Shawky El Moursi, Khalifa Al Hosani, Ahmed Al-Durra

**D21.10 LSTM-Based Sub-Synchronous Oscillation Detection Scheme for Type 4 Wind Farm Interfaced with Weak AC Grid**

**Wind Energy Conversion Systems**

AUTHORS: Omar Abu-Rub, Muhammad Farooq Umar, Jana A. Sheikh Ali, Yazan Qiblawey, Abdulrahman Alassi, Maryam Saeedifard, Mohammad Shadmand

11:30 AM – 1:30 PM

## D22: Transportation Electrification I

LEVEL ONE, HALL A3

SESSION CHAIRS

**Rasoul Hosseini, PhD,** *General Motors*

**Antonio J. Marques Cardoso**

**D22.1 A Study of Module Design Method to Suppress the Oscillation Occurs Between Parallel-Connected Power Devices**

**Power Electronics for Hybrid and Electric Vehicles**

AUTHORS: Shinji Yato, Hiroto Sakai, Hideo Araki, Shumei Shimosako

**D22.2 A High-Efficient Hybrid Traction Inverter in Electric Vehicle Applications**

**Power Electronics for Hybrid and Electric Vehicles**

AUTHORS: Yousefreza Jafarian, Omid Salari, Praveen Jain, Alireza Bakhshai, Mohamed Z. Youssef

**D22.3 Dual-Use of Onboard Chargers to Achieve Controllable DC Bus Voltage for Electric Vehicles**

**Power Electronics for Hybrid and Electric Vehicles**

AUTHORS: Anuj Maheshwari, Elie Libbos, Arijit Banerjee

**D22.4 Isolated Single-Phase Onboard Chargers for BEV/PHEV using Active Power Decoupling Technology**

On-board and Off-board Charging Systems

AUTHORS: Yoshiki Amano, Keigo Nishimura, Matsumori Hiroaki, Takashi Kosaka, Kenichi Nagayoshi, Kenichi Watanabe

**D22.5 A Practical Use of xEVCap: The Modular and Standard DC-Link Capacitor Solution for the Main EV Powertrain Inverter**

Power Electronics for Hybrid and Electric Vehicles

AUTHORS: David Olalla, Tomas Wagner, Fernando Rodriguez, Alberto Espinar

**D22.6 Optimized Bidirectional On-Board Charger using a Novel Unfolder-DAB Topology**

On-board and Off-board Charging Systems

AUTHORS: Héctor Sarnago, Ignacio Álvarez, Pablo Briz, Óscar Lucía

**D22.7 Critical Thermal Characterization of Next-Generation Solid-State Batteries for Automotive Battery Management Systems**

Energy Storage Systems

AUTHORS: Chandan Chetri, Sheldon Williamson

11:30 AM – 1:30 PM

## D23: Transportation Electrification II

LEVEL ONE, HALL A3

SESSION CHAIRS

**Dong Cao, PhD,** *University of Dayton*

**Manish Niraula**

**D23.1 Nanocrystalline CMC Inductors for EV Charging: Trade Studies and Testing Standardization**

Vehicular Power Electronic Circuits and Systems

AUTHORS: Christopher Bracken, Mark A. Juds, Paul R. Ohodnicki, Bharadwaj Reddy Andapally, Jose Gato

**D23.2 Predicting Efficiency of On-Board and Off-Board EV Charging Systems using Machine Learning**

On-board and Off-board Charging Systems

AUTHORS: Mohamed Yasko, Fanghao Tian, Wilmar Martinez, Johan Driesen

**D23.3 High-Power and High-Speed Multi-Channel VCSEL Arrays with GaN Driver for Automotive LiDAR**

Vehicular Power Electronic Circuits and Systems

AUTHORS: Yifu Liu, Sichao Li, Junlei He, Changyu Hu, Bill He, Karthik Krishnamurthy, Andy Shen

**D23.4 Double Pulse Test Platform for Hybrid SiC-IGBT Switch Characterization and Optimal Gate Control Strategy for EV Traction Inverters**

Power Electronics for Hybrid and Electric Vehicles

AUTHORS: Rosario Attanasio, Harsha Ademane, Ryan Satterlee, Gianni Vitale

**D23.5 Critical Role of Individual Cell Temperature Monitoring in Mitigating Thermal Runaway and Reducing Accelerated Degradation in Lithium-Ion Batteries**

Vehicular Power Electronic Circuits and Systems

AUTHORS: Mohit Sharma, Akash Samanta, William Locke, Sheldon Williamson

**D23.6 Loss-Optimized Design of a Triple Active Bridge DC-DC Converter for an Electric Vehicle Application**

Vehicular Power Electronic Circuits and Systems

AUTHORS: Sreejith Chakkalakkal, Kyle Kozielski, Wesam Taha, Yicheng Wang, Aniket Anand, Ali Emadi

**D23.7 A Magnetic-Less DC/DC Converter with Pulse Charging for 800 V Powertrains from 400 V DC Fast Chargers**

Vehicular Power Electronic Circuits and Systems

AUTHORS: Duc Dung Le, Shivam Chaturvedi, Shahid Aziz Khan, Mengqi Wang, Mohamed Elshaer

**D23.8 Boosting Charger Efficiency: A GaN-Based Flyback Converter with Energy Recycling**

On-board and Off-board Charging Systems

AUTHORS: Ahmad Nabizadah, Majid Ghasemi Korrani, Babak Fahimi

**D23.9 A Hybrid Three-Level Buck Converter with Flying Supercapacitor for High Load Current Surge Capability using Peak Current Mode Control**

Power Electronics for Aerospace

AUTHORS: Finlay Lodge, Rafael Peña-Alzola, Martin MacFadyen, Patrick Norman, Mark Sweet, Graeme Burt

**D23.10 Supercritical Carbon Dioxide ($sCO_2$)-Cooled Current Source Inverter-based Integrated Motor Drive for MW-Scale Electric Aviation Applications**

Power Electronics for Hybrid and Electric Vehicles

AUTHORS: Hang Dai, John Yagielski, Thomas Jahns, Kum-Kang Huh, Vandana Rallabandi, Libing Wang, Tarak Saha, Wenda Feng, Bulent Sarlioglu

11:30 AM – 1:30 PM

## D24: Wireless Power Transfer I

LEVEL ONE, HALL A3

SESSION CHAIRS

**Reza Tavakoli,** *Tesla*

**Mostak Mohammad,** *Oak Ridge National Laboratory*

**D24.1 The Challenge of Thermal Runaway in Soft Magnetic Materials for Inductive Power Transfer**

Safety and Reliability

AUTHORS: Yibo Wang, Ben Zhang, Weisheng Guo, Tianlu Ma, Sheng Ren, Chaoqiang Jiang

**D24.2 A Capacitively Coupled Alternative Electric Field Control for Freeze-Free based High Quality Food Preservation**

Wireless Charging

AUTHORS: Jaeyong Cho, Junhyeong Park, Sung-Bum Park, Daehyun Kim, Jinsoo Choi

**D24.3 The Characteristics of the Long Length Primary Loop and the Power Supply for the SCMaglev's DWPT System**

Wireless Charging

AUTHORS: Keisuke Yamamoto, Jun Enomoto, Shunsaku Koga, Junichi Kitano

**D24.4 A Wireless EV Charging System with a Double-Sided LCC Network using Variable Switching Frequency and DC-Link Voltage Control**

Wireless Charging

AUTHORS: Chae-Lyn Kim, Hyeonu Jo, Ju-A Lee, Dong Hyeon Sim, Byoung Kuk Lee

**D24.6 Class E/EF Inductive Power Transfer to Achieve Stable Output Under Variable Low Coupling**

Safety and Reliability

AUTHORS: Yifan Zhao, Mowei Lu, Heyuan Li, Zhenbin Zhang, Minfan Fu, Stefan M Goetz

**D24.7 A Motorized Air-Core Variable Inductance Winding Structure**

Wireless Charging

AUTHORS: Xindong Li, Sampath Jayalath, Cheng Zhang

**D24.8 Wireless Power Transfer System with Automatic Tuning Capability in Metallic Environment**

Wireless Charging

AUTHORS: Renjie Zhang, Yue Wu, Delin Zhao, Yaohua Li, Yongbin Jiang, Yi Tang, Huan Yuan, Xiaohua Wang, Mingzhe Rong

**D24.9 Design of Wireless Power Transmitters for Enhanced Transmission Distance and Output Power**

Wireless Charging

AUTHORS: Kaiyuan Wang, Shuang Zhao, Shuye Shang, Eric Ka-Wai Cheng, Siew-Chong Tan, Yun Yang

11:30 AM – 1:30 PM

## D25: Wireless Power Transfer II

LEVEL ONE, HALL A3

SESSION CHAIRS

**Khurram Afridi, PhD,** *Cornell University*

**Weijin Qiu,** *John Deere*

**D25.1 Optimization of Wireless Power Transfer Waveforms and In-Vivo Receivers for Implantable Medical Devices**

Wireless Charging

AUTHORS: Hanbing Liu, Xin Zan

**D25.3 Comparison of Compact Power Amplifier Designs for High Frequency Resonant Wireless Power Transfer Systems at 6.78 MHz using High-Q Resonators**

Wireless Charging

AUTHORS: Manuel Rueß, Kilian Müller, Mathias Weiser, Ingmar Kallfass

**D25.4 Analysis and Design of Capacitive Coupling Wireless Power Transfer System using Load-Independent Class-EF Inverter**

Wireless Charging

AUTHORS: Takumi Kobayashi, Yutaro Komiyama, Akihiro Konishi, Hiroaki Ota, Yuki Ito, Taichi Mishima, Takeshi Uematsu, Kien Nguyen, Hiroo Sekiya

**D25.5 Design and Optimization of a 600 W Wireless Drone Charger for High Gravimetric Power Density**

Wireless Charging

AUTHORS: Arka Basu, Daniel Costinett

**D25.6 Stabilization Method for DC-Bus Oscillation in Dynamic Wireless Power Transfer Systems**

Wireless Charging

AUTHORS: Yuki Ochiai, Keisuke Kusaka

**D25.7 Unveiling Aliasing Effect on Resonant Pole Locations in Wireless Battery Chargers**

Wireless Charging

AUTHORS: Anwesha Mukhopadhyay, Daniel Costinett

**D25.8 Integrated Hybrid Inductive and Capacitive Power Transfer System with Asymmetrical PCB Self-Resonator**

Wireless Charging

AUTHORS: Yao Wang, Zhen Sun, Xiangrong Zhang, Yun Yang, Shu Yuen Ron Hui

11:30 AM – 1:30 PM

## D26: Power Electronics Applications II

LEVEL ONE, HALL A3

SESSION CHAIRS

**Jeffery Nilles,** *Alpha&Omega Semiconductors*

**Nil Patel,** *Concordia University*

**D26.1 High Frequency Noise Reduction Method of the Class E Power Amplifier**

**Energy Harvesting**

AUTHORS: Kyungmin Lee, Sungku Yeo

**D26.2 Single-Stage Three-Phase Buck-Matrix Rectifier with Series-Parallel Connected Transformers for High-Power 48 V Data Center Power Supplies**

**Datacenter/Telecom Power Architecture and System Considerations**

AUTHORS: Yuki Ishikura, Chinmay Bhagat

**D26.3 Sector Transition PWM Modulation Scheme for a Three-Phase Isolated Buck-Matrix Rectifier**

**Datacenter/Telecom Power Architecture and System Considerations**

AUTHORS: Chinmay Bhagat, Yuki Ishikura

**D26.4 Adaptive Capacitance Circuit for Optimal Dynamic Impedance Matching in Variable Reluctance Energy Harvesting Applications**

**Energy Harvesting**

AUTHORS: Alejandro Redondo, Fernando Pérez, Sofía García, Gabriel Mujica, Airán Francés

**D26.5 Gallium Nitride (GaN) based Topology Comparison for Low Power Battery Charging Applications**

**Portable Power**

AUTHORS: Jai Aditya Chaudhary, Rosario Attanasio, Gianni Vitale

**D26.6 Server Motherboard Power Performance Study Under Immersion Cooling Environment**

**Datacenter/Telecom Power Architecture and System Considerations**

AUTHORS: Meng Wang, Haiyan Wang, Pavan Kumar, Haijin Zhang, Xiang Li, Fengwei Bian, Jianting Deng, Jiaqi Zhu, Yiming Lei

**D26.7 Practical PCB Design Considerations for GaN HEMTs based Isolated DC-DC Converter**

**Defense and Military Power Electronics**

AUTHORS: Gaureej Gauttam, Harish S Krishnamoorthy, Sai Sushma Pasupuleti

**D26.8 Data-Driven Characterization and Forecasting of Metal-Oxide Varistor Degradation in DC Circuit Breakers**

**Solid State and Hybrid Circuit Breakers**

AUTHORS: Zhi Jin Zhang, Yang Liu, Lukas Graber, Maryam Saeedifard

**D26.10 A Thyristor-Based Fault Current Bypass Solid-State Circuit Breaker for DC Microgrid Applications**

**Solid State and Hybrid Circuit Breakers**

AUTHORS: Jiale Zhou, Xiuhu Sun, Qiang Mu, Tiefu Zhao

**D26.11 Single-Stage Three-Phase AC-AC Isolated Inertialess Converter (IIC) for Industrial Drives**

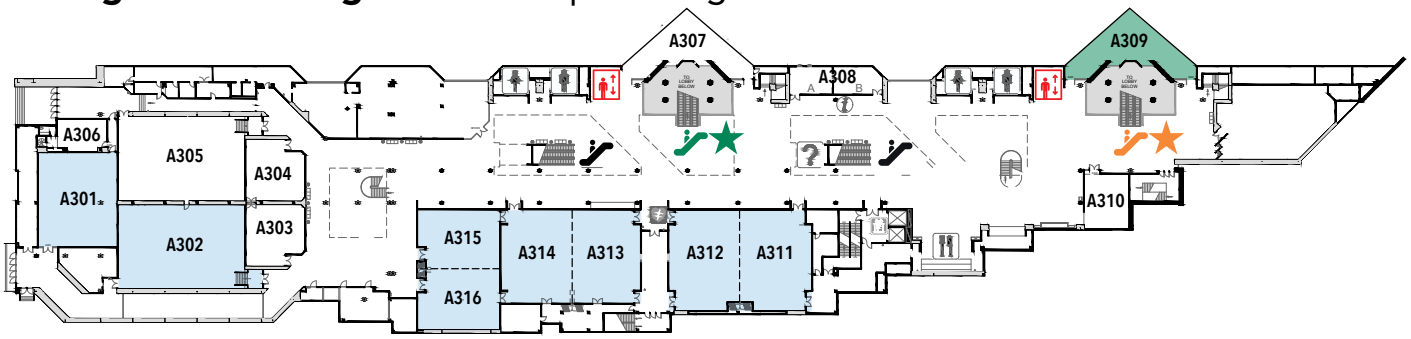
**AC-DC-AC Applications and Matrix Converters**

AUTHORS: Brad Houska, Decheng Yan, Aniruddh Marellapudi, Satish Belkhode, Joseph Benzaquen Sune, Deepak Divan

# GEORGIA WORLD CONGRESS CENTER FLOOR PLAN

## Georgia World Congress Center | Building A: LEVEL FOUR


## Georgia World Congress Center | Building A: LEVEL THREE




Professional Education Seminars,Technical Sessions, & Exhibitor Presentations

Press Room: Room A309

Escalator to Level Four

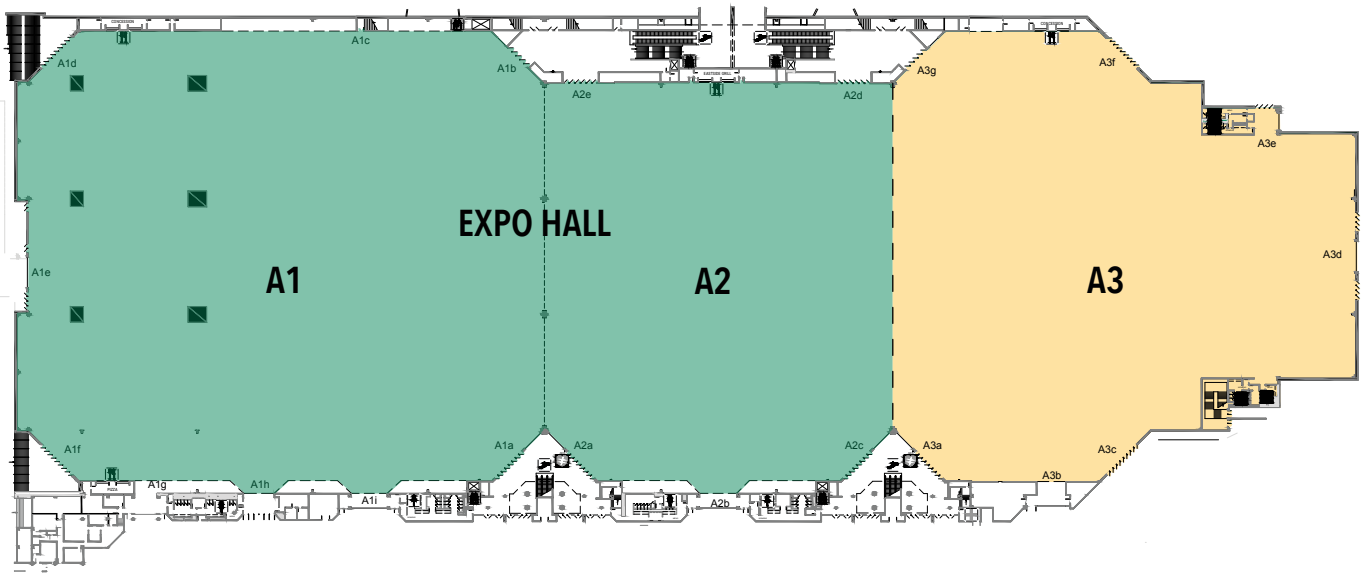
Escalator Entrance/Exit to Expo Hall A1/A2

Escalator Entrance/Exit to Hall A3

Elevators

# GEORGIA WORLD CONGRESS CENTER FLOOR PLAN

## **Georgia World Congress Center** | Building A: LEVEL ONE




**Expo Hall:** Hall A1/A2

**Event Locations:** Hall A3

- **FIRST Robotics:** Monday, March 17, 5:00 PM – 8:00 PM
- **MicroMouse:** Monday, March 17, 7:30 PM – 9:30 PM
- **Student Job Fair:** Tuesday, March 18, 1:30 PM – 5:00 PM
- **Dialogue Sessions:** Thursday, March 20, 11:45 AM – 1:30 PM

## **Area Map** | Outside of Georgia World Congress Center/Omni Hotel

**LOCATIONS TO KNOW**:

- Omni Hotel
- AC Hotel
- Georgia World Congress Center
- Georgia Aquarium

**PUBLIC TRANSPORTATION:**

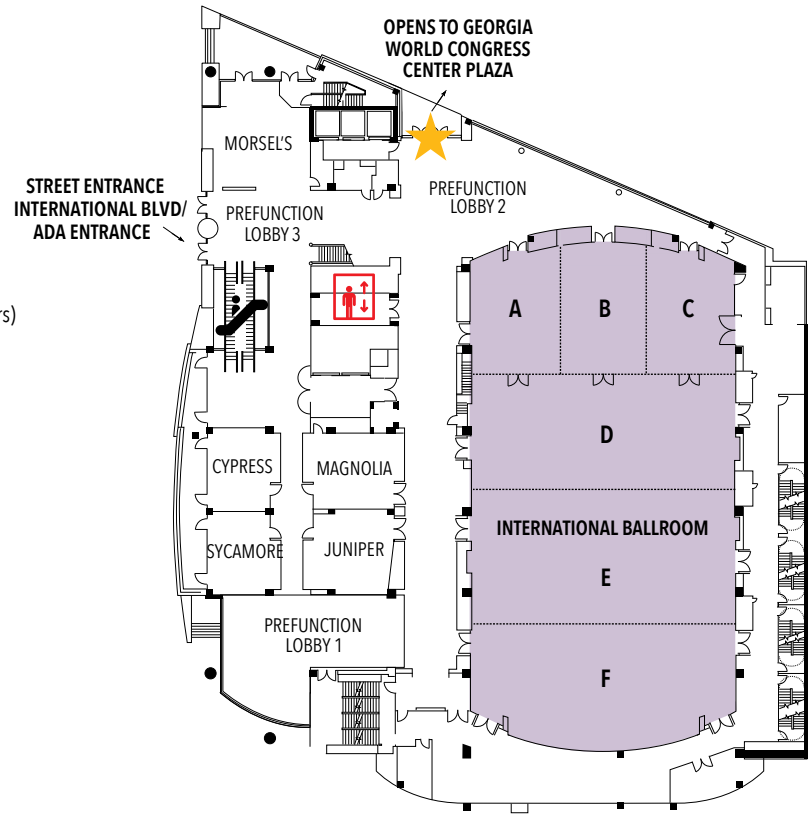
marta

Atlanta Streetcar

# OMNI HOTEL FLOOR PLAN

## **Omni Hotel** | North Tower

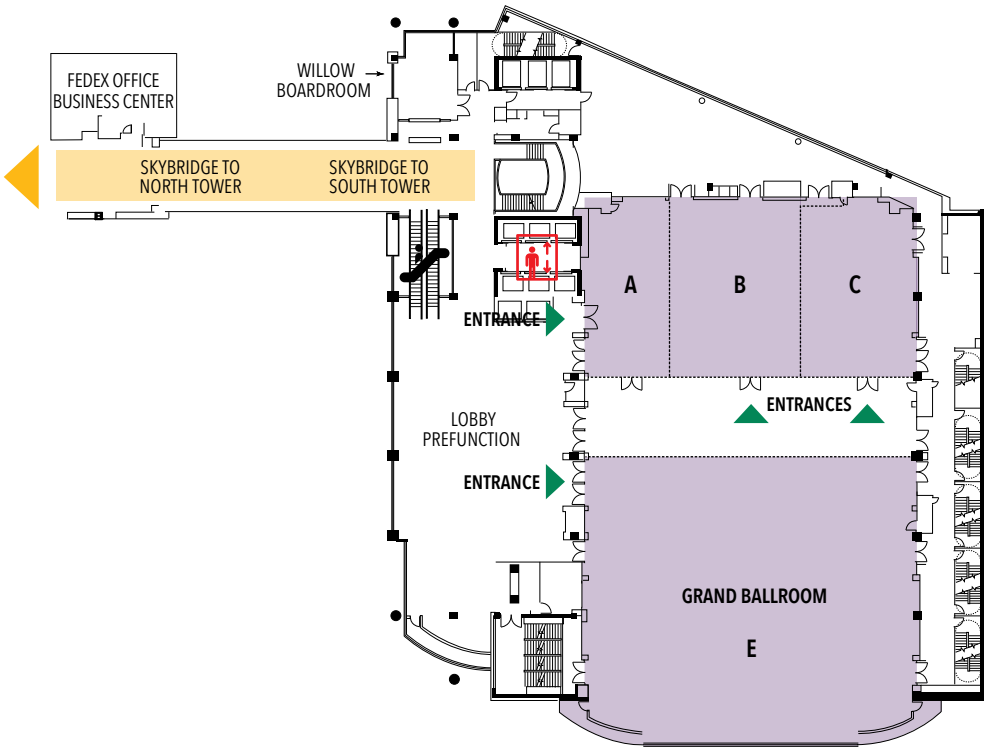
- **International A:** Spouse & Guest Hospitality Room
- **International B & International C:**
  PSMA meetings (Mon)
  PELS meetings (Tues, Wed, Thurs)
- **International EF:** Speaker Breakfast (Tues, Wed, Thurs)
- **Access to GWCC**
- **Escalators**
- **Elevators**




**M2**

**PLEASE NOTE:** *Bathrooms are located on Level M3*

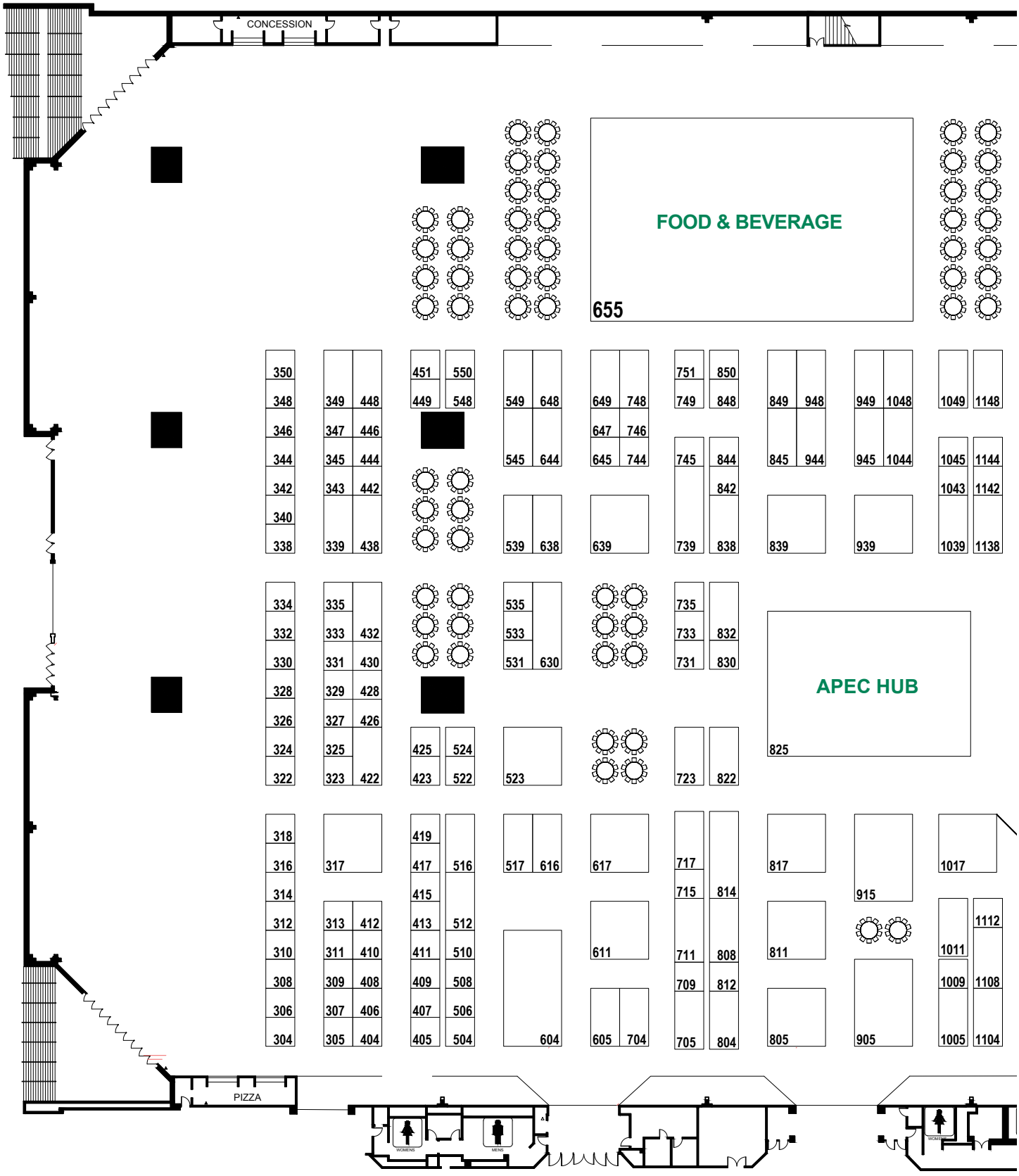
- **PELS Meetings:**
  Grand A
  Grand B
  Grand C
  Grand E
- **Escalators**
- **Elevators**
- **Path to Omni Hotel Check-in**




**M4**

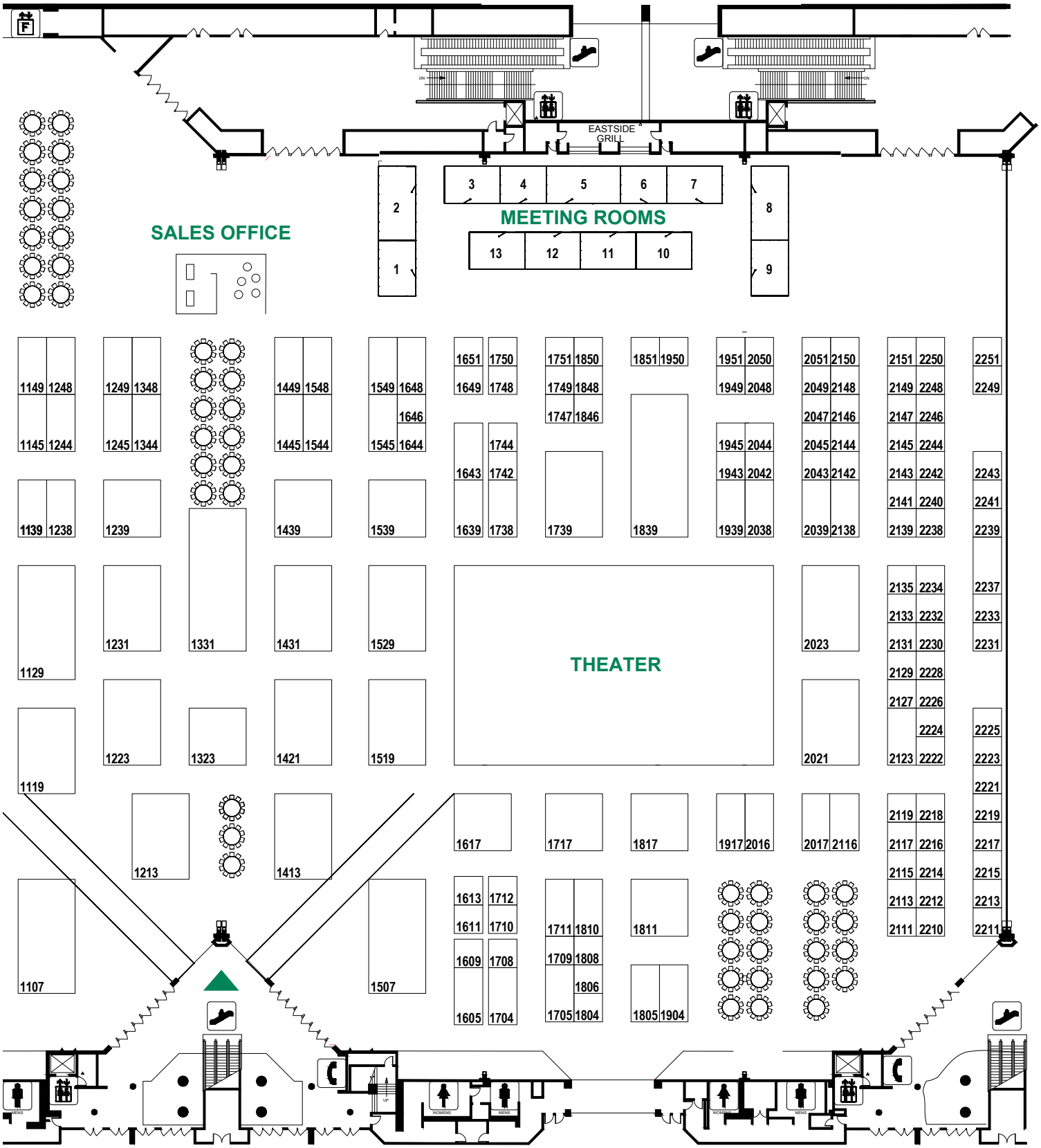
# NOTES

# EXPO HALL FLOOR PLAN *as of February 4, 2025*




## APEC2025 | EXPO FLOOR

# EXPO HALL FLOOR PLAN




Floor plan as of 1/31/25

# EXHIBITOR LISTING *as of February 4, 2025*

| EXHIBITOR | BOOTH # |
|---|---|
| 3D-Micromac AG | 2241 |
| ABC Taiwan Electronics Corp. | 2051 |
| ABIS CIRCUITS CO.,LTD | 349 |
| AC Power Corp.(Preen) | 1711 |
| ACME Electronics Corporation | 425 |
| Acopian Power Supplies | 1145 |
| Advanced Energy | 407 |
| Advanced Test Equipment Rentals | 2113 |
| Aehr Test Systems | 423 |
| Aishi Capacitors | 715 |
| Aismalibar North America | 338 |
| AL TRANSFO TECHNOLOGY LIMITED | 711 |
| AllSpice.io | 329 |
| Allstar Magnetics | 2048 |
| Alltronics Tech Manufacturing Limited | 2050 |
| Alpha & Omega Semiconductor | 814 |
| Altair | 1048 |
| AmberSemi | 517 |
| AMETEK Programmable Power | 448 |
| AMETHERM, INC | 419 |
| Analog Devices | 817 |
| Anbon Semi | 2044 |
| Anhui Tiger Co., Ltd | 2248 |
| Animato Electronics, Inc. | 748 |
| Apex Microtechnology | 1851 |
| Asahi Diamond America | 2211 |
| ATM MATERIAL.CO.LTD | 345 |
| AVL | 339 |
| B&K Precision | 705 |
| Batten & Allen | 318 |
| Berkeley Power and Energy Center (BPEC) | 751 |
| BH Electronics, Inc. | 415 |
| Bosch Semiconductors | 805 |
| Boschman Advanced Packaging Technology | 2123 |
| Bourns, Inc. | 939 |
| Broadcom Inc. | 549 |
| BTCOIL USA LLC | 709 |
| Caerus Power Technology | 2230 |
| CalRamic Technologies, LLC | 2117 |
| Cambridge GaN Devices | 2039 |
| Captor Corporation | 2223 |
| Capxon Electronic Technology Co., Ltd. | 649 |
| Center for Power Electronics Systems | 2151 |
| Central Semiconductor | 1705 |

| EXHIBITOR | BOOTH # |
|---|---|
| Centrotherm International AG | 444 |
| Chang Sung Corporation | 304 |
| Chip-GaN Power Semiconductor | 1421 |
| Chroma | 617 |
| Cleverscope | 1751 |
| Coil Winding Specialist, Inc. | 745 |
| Coilcraft, Inc. | 704 |
| Conquer Electronics Co., Ltd. | 307 |
| CoolCAD Electronics | 343 |
| Cramer Magnetics | 1609 |
| CuNex GmbH | 2215 |
| Danfysik A/S | 331 |
| Datatronics | 405 |
| Dean Technology, Inc. | 1644 |
| Delta Electronics (Americas) Ltd. | 638 |
| DEMAK Group | 311 |
| DEWESoft LLC | 516 |
| DEWETRON Inc. | 2228 |
| DigiKey | 1539 |
| DIOTEC Semiconductor America | 535 |
| dSPACE Inc. | 1939 |
| Ducati Energia SPA | 2146 |
| E&B TECHNOLOGY | 2145 |
| EFC/Wesco | 812 |
| Efficient Power Conversion Corporation (EPC) | 1231 |
| EGSTON Power Electronics | 735 |
| Electro Technik Industries | 605 |
| Electrocube, Inc. | 1808 |
| Electronic Concepts, Inc. | 1605 |
| Electronicon Kondensatoren GmbH | 1712 |
| Elektrisola Inc. | 744 |
| ELKO EP North America LLC | 2232 |
| Elna Magnetics | 1112 |
| ELYTONE ELECTRONIC CO., LTD. | 317 |
| EMcoretech | 645 |
| Empower Semiconductor, Inc. | 1445 |
| ERD | 2141 |
| EXATRON, INC. | 531 |
| EXXELIA SAS | 1544 |
| Fair-Rite Products | 731 |
| Ferric Inc | 2210 |
| Ferrotec (USA) Corporation | 2234 |
| Ferroxcube | 1744 |
| Focused Test, Inc. | 1142 |

# EXHIBITOR LISTING

| EXHIBITOR | BOOTH # |
|---|---|
| Frenetic Electronics, S.L. | 1611 |
| Fuji Electric Corp. of America | 1617 |
| GaNPower International Inc. | 2045 |
| GE Aerospace | 749 |
| GMW Associates | 522 |
| Goldenbamboo Electronics (Zhuhai) Co.,Ltd | 2149 |
| Good-Ark Semiconductor | 1748 |
| Greenconn Technology (Shenzhen) Co. Ltd. | 2212 |
| Hengdian Group DMEGC Magnetics Co., Ltd | 408 |
| Heraeus Electronics | 804 |
| Hesse Mechatronics | 1104 |
| Hind Rectifiers Limited | 2016 |
| Hioki USA Corp. | 717 |
| HMI | 616 |
| Holy Stone International | 413 |
| Hotland International Corp | 1009 |
| HVM Technology | 1742 |
| HVR Advanced Power Components | 406 |
| ICE Components, Inc. | 1043 |
| Ideal Power | 510 |
| iDRC | 308 |
| Impedyme Inc. | 1949 |
| Indium Corporation | 404 |
| Infineon Technologies Americas Corp | 1331 |
| Innoscience Technology Co., Ltd. | 1529 |
| Innovative Thermal Solutions, Inc. | 2049 |
| INPACK | 2244 |
| iNRCORE, LLC | 1710 |
| INSTEK America Corp. | 332 |
| Inter Outstanding Electronics Inc (IOE) | 1749 |
| ITECH ELECTRONICS | 1817 |
| ITELCOND SRL | 1943 |
| ITG Electronics, Inc. | 2111 |
| IWATSU | 1848 |
| JARO Thermal | 449 |
| Johanson Dielectrics, Inc | 504 |
| Jovil Universal LLC | 533 |
| Kendeil srl | 2139 |
| Kewell Technology Co., Ltd | 2225 |
| Keysight | 829 |
| Kikusui America, Inc. | 1738 |
| Knowles Precision Devices | 832 |
| KYOCERA AVX | 1439 |
| Laser Thermal | 2148 |

| EXHIBITOR | BOOTH # |
|---|---|
| LinkCom Manufacturing Co., Ltd | 2147 |
| Lodestone Pacific | 1108 |
| Luminus Devices, Inc., featuring APC-E and Sanan Semiconductor | 512 |
| MacDermid Alpha Electronics Solutions | 314 |
| Maditronics Inc | 1651 |
| Magna-Power Electronics | 1011 |
| Magnetec GmbH | 2023 |
| Magnetic Metals Corporation | 451 |
| Magnetics | 830 |
| Magnetika, Inc. | 2133 |
| Malico Inc. | 2214 |
| Manutech | 1649 |
| Marel Power Solutions | 324 |
| Max Echo Technology Corp | 309 |
| MaxLinear Corporation | 1149 |
| Menlo Microsystems, Inc. | 1249 |
| Mentech | 1431 |
| Mersen | 1017 |
| Metalor Technologies USA | 2219 |
| Methode Electronics | 1613 |
| MH&W International Corp | 1709 |
| Miba Resistors | 1646 |
| Microchip Technology | 604 |
| Microgate Technology Co. LTD | 316 |
| Micrometals, Inc. | 1045 |
| Minebea Power Semiconductor Device | 340 |
| Mission Power | 347 |
| Mitsubishi Electric US, Inc | 1119 |
| MK Magnetics Inc. | 438 |
| Monolithic Power Systems, Inc. | 639 |
| Mouser Electronics | 723 |
| MS Power GmbH | 1449 |
| Murata | 915 |
| NAECO | 305 |
| Nagase America LLC | 312 |
| Nanjing New Conda Magnetic Industrial Co. LTD | 330 |
| Nantong Jianghai Capacitor Co., LTD | 945 |
| National Magnetics Group | 1806 |
| Navitas | 1107 |
| Nayak Corporation, Inc. | 2224 |
| New England Wire Technologies | 944 |
| Nexperia | 1739 |
| Nexustest | 2216 |

# EXHIBITOR LISTING

| EXHIBITOR | BOOTH # |
|---|---|
| Nichicon (America) Corp. | 335 |
| Ningguo Yuhua Electrical Products Co.,Ltd | 849 |
| Nisshinbo Micro Devices | 328 |
| NoMIS Power | 548 |
| NORWE Inc. | 326 |
| Nuvoton Technology Corp America | 2226 |
| OHMINI INC. | 422 |
| OMICRON Lab | 1344 |
| Onics Resistors Private Limited | 2127 |
| onsemi | 523 |
| OPAL-RT Technologies | 733 |
| P. Leo & Co., Ltd. | 346 |
| Pacific Power Source | 1704 |
| Pacific Sowa Corporation; C/O Epson Atmix Corporat | 1144 |
| Parker Overseas Pvt. Ltd. | 428 |
| Payton America Inc. | 838 |
| PCIM | 842 |
| PCT Industries Ltd. | 2231 |
| Peak Nano Films | 409 |
| Pearson Electronics | 1945 |
| Pentamaster Instrumentation Sdn. Bhd. | 2138 |
| Pin Shine Industrial Co., Ltd | 2142 |
| Plexim | 1139 |
| PMK Mess- und Kommunikationstechnik GmbH | 1846 |
| POCO Holding Co., LTD | 611 |
| PolyCharge America, Inc. | 411 |
| Power Electronic Measurements Ltd | 524 |
| Power Integrations | 1519 |
| Power Management Integration Center (PMIC) | 344 |
| PowerAmerica | 508 |
| PowerELab Ltd. | 2047 |
| Powerex, INC | 948 |
| Poweronics | 426 |
| Premier Magnetics | 1545 |
| Premo USA, Inc. | 2250 |
| PRISOURCE Electronics Co.,Ltd. | 949 |
| Proterial America, Ltd. | 808 |
| Providence Electronics Corp. | 1951 |
| PSMA | 825 |
| Pulsiv Limited | 811 |
| Quanding Magneto-Electric Material Co.,Ltd | 2243 |
| Quantic Capacitors and Magnetics | 1039 |
| Reed Semiconductor Corp. | 1804 |

| EXHIBITOR | BOOTH # |
|---|---|
| REMTEC, Inc. | 1747 |
| Renesas Electronics America Inc. | 2021 |
| Resonac America, Inc. | 410 |
| RFMW | 848 |
| Richardson Electronics, Ltd. | 2239 |
| Richardson RFPD | 539 |
| Rico Products Inc. | 333 |
| Rohde & Schwarz USA, Inc. | 1639 |
| ROHM Semiconductor | 1223 |
| Rubadue Wire | 1810 |
| S.C.O.M.E.S. SRL | 1648 |
| SABIC | 313 |
| Sager Electronics | 1049 |
| Samwha USA | 739 |
| SanRex Corporation | 1244 |
| Saras Micro Devices | 2217 |
| Semikron Danfoss | 1323 |
| SemiQ | 1348 |
| Semitel International Ltd | 2240 |
| Shaanxi Shinhom Enterprise Co.,Ltd | 2218 |
| Shanghai Magway Magnetic Co.,Ltd. | 2238 |
| Shenzhen Cenker Technology Group Co., Ltd. | 348 |
| Shenzhen CODACA Electronic Co., Ltd. | 2249 |
| ShenZhen East-Win Technology Co.,Ltd. | 1750 |
| Shenzhen Liron Electronics Co., Ltd. | 342 |
| Shenzhen Sunlord Electronics Co.,Ltd. | 545 |
| Shenzhen Zeasset Electronic Technology Co., Ltd. | 310 |
| Shin-Etsu Silicones of America | 412 |
| Shiv Om Precision USA LLC. | 430 |
| Sichuan Zhongxing Electronic Co., Ltd | 322 |
| Siemens | 2251 |
| Simplis Technologies | 822 |
| Sinomag Technology CO., LTD | 306 |
| Soitec | 2131 |
| Speedgoat | 442 |
| Standex Electronics | 1717 |
| Stellar Industries Corp. | 2042 |
| STMicroelectronics | 1129 |
| Storm Power Components | 1805 |
| STS Spezial-Transformatoren-Stockach GmbH & Co.KG | 845 |
| SUITA Electric Corporation | 1548 |
| Sumida America Inc. | 1917 |
| Sumitomo Chemical Co., Ltd. | 2144 |

# EXHIBITOR LISTING

| EXHIBITOR | BOOTH # |
|---|---|
| Superworld Electronics (S) Pte Ltd | 2237 |
| Synopsys | 327 |
| TAI-TECH Advanced Electronics | 648 |
| Taiwan Semiconductor | 644 |
| Taiyo Kogyo Co., Ltd. | 2221 |
| TAIYO YUDEN USA INC. | 630 |
| Talema Group LLC | 850 |
| Tamura Corp. of America,Tamura Japan | 1904 |
| TCLAD Inc. | 1950 |
| TDG Holding Co., Ltd | 2038 |
| TDK Corporation | 1413 |
| Tektronix Inc. + EA Elektro-Automatik | 1507 |
| Teledyne LeCroy | 1245 |
| Tesec, Inc. | 647 |
| Texas Instruments | 1213 |
| T-Global Technology Co., Ltd. | 550 |
| TJ Assemblies / United Technical Products | 2213 |
| TME US, LCC | 1643 |
| Toshiba America Electronic Components, Inc. | 1549 |
| Tower Semiconductor | 1148 |
| Tran-Tec LLC | 506 |
| Tyndall National Institute | 417 |
| Typhoon HIL, Inc. | 2115 |
| United Chemi-Con | 1138 |
| VAC Magnetics, LLC | 2143 |
| Vincotech GmbH | 1005 |
| Vishay Intertechnology | 905 |
| Vision Technologies Co., Ltd | 2246 |
| Vitrek-High Voltage Test & Measurement | 844 |
| Voltage Multipliers, Inc. | 2119 |
| Wakefield Thermal | 432 |
| Wellascent Electronic (Ganzhou) Co.,Ltd | 350 |
| West Coast Magnetics | 1044 |
| WIMA Capacitors GmbH & Co.KG | 1708 |
| Wise Integration | 1238 |
| Wolfspeed, Inc. | 1811 |
| Würth Elektronik | 1839 |
| Wuxi CRE New Energy Technology Co., Ltd. | 1248 |
| Wuxi Leapers Semiconductor Co., Ltd. | 746 |
| X-FAB Global Services GmbH | 446 |
| Xiamen Faratronic Co. Ltd. | 2129 |
| Xiinergy Systems Inc. | 2135 |
| YAGEO Group | 1239 |
| Yokogawa Test&Measurement | 334 |
| Yueqing Dahe Electric Co., Ltd | 2222 |
| ZES ZIMMER Electronic Systems GmbH | 323 |
| Zhejiang Zuoao Technology Co.,Ltd. | 2233 |
| Zhongshan Competent Automation Equipment Co.,Ltd. | 325 |
| Zhuhai Weihan Wire Co., Ltd. | 1850 |

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Infineon Technologies AG is a global semiconductor leader in power systems and IoT. Infineon drives decarbonization and digitalization with its products and solutions. To learn more, go to www.infineon.com or visit us at APEC 2025 booth # 1331.

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### Mitsubishi Electric

Mitsubishi Electric US, Inc. offers semiconductor and electronic devices that enhance information processing, telecommunications, and energy efficiency.

We provide highly efficient power modules for traditional and renewable energy sources that distribute power effectively and reliably in industrial and automation applications, hybrid and electric vehicles, and home appliances.

### Nisshinbo Micro Devices

Nisshinbo Micro Devices Inc. is the result of the integration of New Japan Radio and Ricoh Electronic Devices, in 2022. We offer an extensive lineup of Op Amps, Comparators, RF ICs, Audio/Video ICs, Motor Drivers, AFE ICs, Optical and Microwave Sensors, Battery Management and Protection ICs, and Power Management ICs.

### ROHM Semiconductor

ROHM, a leading semiconductor component manufacturer, leverages the most advanced proprietary technologies to deliver a broad range of power products and solutions optimized for application needs in the automotive, industrial, consumer and IoT markets.

### Samwha USA

Samwha Capacitor Group is a leading manufacturer of passive components headquartered in Korea, with global supply chains. Specializing in the production of MLCC, Aluminum capacitors, Polymer hybrid capacitors, DC link capacitors, Disc ceramic capacitors, Ferrite cores, Inductors, and more, we offer customizable solutions to meet the requirements of customers.

### Taiyo Yuden

Taiyo Yuden is a company dedicated to the development and mass production of electronic components that align with the needs of the times. It specializes in the research, development, production, and supply of products such as multilayer ceramic capacitors, power inductors, circuit products, RF devices (including SAW/FBAR and ceramic filters), conductive polymer hybrid aluminum electrolytic capacitors, and more. TAIYO YUDEN's products are integrated into various devices across the IT and electronics industries, with its ultra high-end products holding the largest market share in the industry.

### TDK

TDK features a wide range of products including Magnetics, Capacitors (Ceramic, Aluminum Electrolytic and Film), TDK High Density Power Management (uPOL), Piezo Protection Products, Programmable Power Supplies, AC-DC & DC-DC Power Supplies and more.

### West Coast Magnetics

West Coast Magnetics designs best-in-class transformers and inductors and provides manufacturing services for electronic products with high engineering content. Our active R&D has resulted in new patented technology and innovative designs for power and RF magnetic components in many applications. We will continually redefine what is possible with magnetic technology. Our manufacturing facilities are in Stockton, California (ITAR Registered), and in Tecate, Mexico.

# NOTES

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