WiPDA 2021 – Technical Program at a Glance

WiPDA 2021

IEEE

The 8th IEEE Workshop on Wide Bandgap Power Devices & Applications

Day 1, November 7, 2021 (Tutorials)

	Track 1		Track 2	
	Speaker	**Topic**	**Speaker**	**Topic**
8:00 AM	**Peter Friedrichs**	SiC Technology	**Vamsi Putcha**	RF GaN
9:30 AM	**Victor Veliadis**	MV SiC - Devices	**Sandeep Bahl, Jungwoo Joh**	GaN Technology
11:00 AM	Break			
1:00 PM	**Subhashish Bhattacharya**	MV SiC - Circuits	**Srabanti Chowdhury**	Vertical GaN
2:30 AM	**Fang Luo**	Packaging/Modules	**Burak Ozpineci**	WBG for Automotive

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Day 2, November 8, 2021

	Plenary				
8:00 AM	**Opening**				
8:30 AM	**Keynote 1**				
9:00 AM	**Keynote 2**				
9:30 AM	Break		**Room 1**		**Room2**
9:50 AM		**SiC Devices 1: Device Reliability & Robustness**	**6066 -** Comparison of Gate Oxide Lifetime Predictions with Charge-to-Breakdown Approach and Constant-Voltage TDDB on SiC Power MOSFET, **Shengnan Zhu**	**GaN Power 1: Performance, Trapping, Robustness**	**6070 -** 650V/780A GaN Power HEMT Enabling 10kW-Class High-Efficiency Power Conversion, **Carl Neufeld**
10:10 AM			**6092 -** Impacts of Area-Dependent Defects on the Yield and Gate Oxide Reliability of SiC Power MOSFETs **Tianshi Liu**		**6077 -** Evaluation of 650V, 100A Direct-Drive GaN Power Switch for Electric Vehicle Powertrain Applications**, Qihao Song**
10:30 AM			**6087** - A Static, Switching, Short-Circuit Characteristics of 1.2 kV 4H-SiC MOSFETs: Comparison Between Linear and (Bridged) Hexagonal Topology, **Dongyoung Kim**		**6049 -** Quick Estimation of Chip Scale Package GaN Fets Thermal Performance Using a Simple Circuit Model**, Assaad El Helou**
10:50 AM			**6091** - Excellent Static and Dynamic Scaling of Power Handling Capability of the BaSIC(DMM) Topology with 1.2 kV SiC Power MOSFETs, **Ajit Kanale**		**6108** - On-Wafer Investigation of Avalanche Robustness in 1.3kV GaN-on-GaN P-N Diode Under Unclamped Inductive Switching Stress, **Bhawani Shankar**
11:10 AM			**6044 -** Investigation on the Accuracy of the VSD-Method for Different SiC MOSFET Designs Considering Different Measurement Parameters**, Felix Hoffmann**		**6006 -** Extreme GaN – What Happens When eGaN® Fets Are Exposed to Voltage and Current Levels Well Above Data Sheet Limits, **Alex Lidow**
11:30 AM	Break				
11:45 AM	**Panel**				
12:45 PM	End of the session				

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Day 2, November 8, 2021 (details on Panel Session)

Title of Panel: Wide Bandgap (WBG) devices and their application to automotive, industrial, aerospace, defense, and energy systems

Moderator: Dr. Brij N. Singh (Deere & Company) and Dr. Babak Parkhideh (UNC Charlotte)

This panel has drawn experts from a variety of industries including automotive, defense, aerospace, industrial, and energy sectors. The panelists share and discuss their views on current and emerging applications of SiC and GaN power devices. An hour-long panel will have brief opening comments from the panelists followed by interactive and thought-provoking discussions on questions asked by WiPDA attendees. Panel discussions will uniquely cover similarity and differences between SiC and GaN power devices and their applications in automotive, industrial, aerospace, defense, and energy systems.

Panelists:

- Dr. Jing Xu, Senior Principal Scientist at ABB
- Dr. Shengyi Liu, Technical Fellow and Chief Architect of Platform Subsystems at Boeing
- Thomas Byrd, Senior Fellow, Power electronics and Power Systems at Lockheed Martin
- Dr. Sriram Chandrasekaran, Engineering Fellow at Raytheon
- Dr. Sanjeev Naik, Advanced Systems Dev, Electric Drives, Electronics, & Applications Engineering at GM
- Cory Combs, Ampaire Co-founder and TED Fellow
- Michael Harrison, Power Electronics Architect, Enphase Energy, USA

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Day 3, November 9, 2021

Tuesday	Plenary				
8:00 AM	**Keynote 3**				
8:30 AM	**Keynote 4**				
9:00 AM	Break		**Room 1**		**Room2**
9:20 AM		**ITRW**	**6045 -** Switching Behavior and Dynamic on-Resistance of Lateral β-Ga2O3 MOSFETs Up to 400 V, **Carsten Kuring**	**GaN RF**	**6002** - Low Contact Resistance CMOS-Compatible RF GaN-on-Silicon HEMTs, **Hao Lu**
9:40 AM			**6089 -** Reverse Recovery and Rectification Characteristic of β-Ga2O3 Schottky Barrier Diode, **Inhwan Lee**		**6058** - Microstructural Degradation Investigations of OFF-State Stressed 0.15 µm RF AlGaN/GaN HEMTs: Failure Mode Related Breakdown, **Prabha Sana**
10:00 AM			**6028 -** Study of Voltage Balancing Techniques for Series-Connected Wide-Bandgap Semiconductor Devices, **Alinaghi Marzoughi**		**6106** - Best Practices to Quantify Linearity Performance of GaN HEMTs for Power Amplifier Applications, **Rafael Perez Martinez**
10:20 AM			**6051 -** Diamond Integration on GaN for Channel Temperature Reduction, **Mohamadali Malakoutian**		**6107** - Detrapping Kinetics in N-Polar AlGaN/GaN MIS-HEMTs, **Francesca Chiocchetta**
10:40 AM	Break				
11:00 AM		**SiC Devices 2: Novel Device Designs**	**6078 -** Demonstration of High Voltage (15kV) Split-Gate 4H-SiC MOSFETs, **Justin Lynch**	**GaN Applications 1**	**6026 -** Compact GaN Power Modules with Direct Bonded Liquid-Cooled Heat Exchanger Suitable for EV Applications, **Wei Jia Zhang**
11:20 AM			**6064 -** Increased 3rd Quadrant Current Handling Capability of 1.2kV 4H-SiC JBS Diode-Integrated MOSFETs (JBSFETs) with Minimal Impact on the Forward Conduction and Blocking Performances, **Stephen Mancini**		**6038 -** Online Junction Temperature Monitoring of Wide Bandgap Power Transistors Using Quasi Turn-on Delay As TSEP, **Kanuj Sharma**
11:40 AM			**6082 -** Analytical Method to Optimize Dynamic Performance of the Cascaded SuperCascode Power Switch, **Utkarsh Mehrotra**		**6016 -** Switching Performance in a GaN Power Stage at Extreme Temperature Conditions, **Martijn Duraij**
12:00 PM			**6083 -** Comparison of the Capacitances and Switching Losses of 1.2 kV Common-Source and Common-Drain Bidirectional Switch Topologies, **Ajit Kanale**		**6009 -** A Generalized Circuit for Measuring GaN Dynamic Resistance, **Michael Willhoff**
12:20 PM			**6088 -** Development of Isolated CMOS and HV MOSFET on an N-epi / P-epi / 4H-SiC N+ Substrate for Power IC Applications, **Sundar Babu Isukapati**		**6050 -** Design and Performance Analysis of High Density Universal Charger Featuring GaN Based Integrated Power Stage, **Robert Vartanian**
12:40 PM	End of the session				

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The 8th IEEE Workshop on Wide Bandgap Power Devices & Applications

Day 4, November 10, 2021

	Plenary				
8:00 AM	**Keynote 5**				
8:30 AM	**Keynote 6**				
9:00 AM	Break		**Room 1**		**Room2**
9:20 AM		**GaN Applications 2**	**6037 -** GaN Devices for Motor Drives Applications, **Marco Palma**	**SiC Applications 1: Circuits and systems**	**6021 -** Design and Fabrication of SiC MOSFET Based Stepper Motor Driver for High-Temperature Environments**, Ashwin Chandwani**
9:40 AM			**6095 -** Paralleling GaN Devices in a 13.56MHz Class Φ2 Inverter for high-Power Applications, **Keerti Palanisamy**		**6040 -** Highly Integrated 200 Kw SiC Three-Phase Dual-Active-Bridge Converter with 3D-Printed Fluid Coolers**, David Bündgen**
10:00 AM			**6055 -** A Capacitor-Based Multilevel Gate Driver for GaN HEMT Only with a Single Voltage Supply, **Takehiro Takahashi**		**6047 -** SiC-Based dv/dt Generator for Insulation Testing with Fast and Adjustable Switching Transients**, Vivien Grau**
10:20 AM			**6060 -** Optimization of Self-Oscillating Power Converter Based on GaN-HEMTs for Wireless Power Transfer, **Dominik Koch**		**6063 -** High Frequency Injection Sensorless Control for a Permanent Magnet Synchronous Machine Driven by an FPGA Controlled SiC Inverter**, Jared Walden**
10:40 AM			**6079 -** An Isolated Bidirectional DC-DC Converter with High Voltage-Conversion Ratio and Reduced Output Current Ripple, **Zhining Zhang**		**6084 -** Development of a 1 kV, 500 a T-Type Modular Dc Circuit Breaker (T-Breaker)**, Yue Zhang**
11:00 AM	Break				
11:20 AM		Virtual posters 1, November 10, 2021, 11.20 am			
1:00 PM	End of the session				

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The 8th IEEE Workshop on Wide Bandgap Power Devices & Applications

Day 5, November 11, 2021

	Plenary				
8:00 AM	**Keynote 7**				
8:30 AM	**Keynote 8**				
9:00 AM	Break		**Room 1**		**Room2**
9:20 AM		**GaN Power 2: Technology**	**6105 -** Analysis of ALD Dielectric Leakage in Bulk GaN MOS Devices, **Caleb Glaser**	**SiC Applications 2: Device Characterization**	**6007 -** Switching Behavior of a Hybrid Si-IGBT and SiC MOSFET Based ANPC Topology, **Srikanth Lakshmeesha**
9:40 AM			**6062 -** Dynamic and Capacitive Characterization of 3D GaN n-p-n Vertical Fin-FETs, **Thomas Bordignon**		**6032 -** Balancing Unequal Temperature Distributions of Parallel-Connected SiC MOSFETs Using an Intelligent Gate Driver, **Christoph Lüdecke**
10:00 AM			**6022 -** Deep-Level Characterization of GaN-on-GaN Current Aperture Vertical Electron Transistors, **Matthias Sinnwell**		**6033 -** An Integrated Active Gate Driver for SiC MOSFETs, **Dongwoo Han**
10:20 AM			**6012 -** High Mobility in GaN MOSFETs with AlSiO Gate Dielectric and AlN Mobility Enhancement Layer, **Matthew Smith**		**6042 - Liquid Metal Based Cooling for Power Electronics Systems with Inductor Integrated Magnetohydrodynamics Pump (MHD Pump), Junchong Fan**
10:40 AM			**6025 -** Etched and Regrown Vertical GaN Junction Barrier Schottky Diodes, **Andrew Binder**		**6100 -** Characterization of Electrical Parameters for Health Monitoring in SiC MOSFETs During AC Power Cycling, **Kevin Muñoz Barón**
11:00 AM	Break				
11:20 AM		Virtual posters 2, November 11, 2021, 11.20 am			
1:00 PM	End of the session				

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Virtual posters 1, November 10, 2021, 11.20 am

6003	Modulation Strategy Comprising TCM with Frequency Limit and DPWM for Fast Switching GaN-Inverters **Benedikt Kohlhepp**
6050	Design and Performance Analysis of High Density Universal Charger Featuring GaN Based Integrated Power Stage **Robert Vartanian**
6056	An Asynchronous Buck Converter by Using a Monolithic GaN IC Integrated by an Enhancement-Mode GaN-on-SOI Process **Shumpei Noike**
6086	Modeling, Simulation and Hardware Implementation of the GaN Based Resonance Current Source for the Ultra-Fast MVDC Circuit Breaker, **Md Rakib-Ur Rahman**
6110	Three-Phase three-Level GaN-ANPC Inverter with a 1 MHz Switching Frequency, **Heikki Järvisalo**
6004	Effect of Trap-Filling Bias on the Extraction of the Time Constant of Drain Current Transients in AlGaN/GaN HEMTs, **Nicolò Zagni**
6014	Evaluation of the High Performance 650 V Cascode GaN FET Under Low Temperature, **Yuqi Wei**
6068	Humidity Capability of Enhancement Mode GaN High Electron Mobility Transistors, **Alexander Brunko**
6073	Dynamic ON-Resistance Characterization of GaN HEMT Under Soft-Switching Condition, Tianyu Zhao, Rolando Burgos, **Jing Xu**
6076	Integration of β-Ga2O3 on Si (100) for Lateral Schottky Barrier Diodes, **Manoj K Yadav**
6024	Commercially Available N-Polar GaN HEMT Epitaxy for RF Applications, **Davide Bisi**
6031	TCAD Simulations Study on Drain Leakage Current and its Correlation with Gate Current for AlGaN/GaN HEMTs, **Cristina Miccoli**
6104	Design of Ka-Band Doherty Power Amplifier Using 0.15 µm GaN on SiC Process Based on Novel Complex Load Modulation, **Xinyu Zhou**

Virtual posters 2, November 11, 2021, 11.20 am

6005	Impact of Soft- and Hard-Switching Transitions on VTH and RON Drifts in Packaged SiC MOSFETs, **Marcello Cioni**
6013	Real-Time FPGA Simulation of Silicon Carbide MOSFETs, **Gard Lyng Rødal**
6030	Critical Design Considerations for Static and Dynamic Performances on 6.5kV 4H-SiC MOSFETs Fabricated in a 6-Inch SiC Foundry, **Nick Yun**
6041	Peformance Evaluation of 3.3 kV SiC MOSFET and Schottky Diode for Medium Voltage Current Source Inverter Application, **Sneha Narasimhan**
6046	Smart Universal Parameter Fitting Method for Static SiC Power MOSFET Behavior Modeling, **Daniel Philipps**
6057	Online Junction-Temperature Extraction Method for SiC MOSFETs Utilizing Turn-on Delay, **Sven Kalker**
6067	Comparison of Short Circuit Failure Modes in SiC Planar MOSFETs, Trench MOSFETs and Cascode JFETs, **Erfan Bashar**
6071	Development and Thermal Characterization of a Low Resistance SiC Module, **Xiaoqing Songi**
6094	Thermal and Thermomechanical Analysis of a 10 kV SiC MOSFET Package with Double-Sided Cooling, **Mark Cairnie**
6098	Defects in 4H-SiC Epilayers That Affect Device Yield and Reliability, **Robert Stahlbush**
6099	Demonstration of Cell-to-Cell Integrated 4H-SiC Lateral Bi-Directional Junction Field Effect Transistor (LBiDJFET), **Seung Yup Jang**
6015	Experimental Validations of the SiC MOSFET Based LLC Converter Circuit and Power Loss Models, **Yuqi Wei**
6019	A Balanced Current-Source Inverter and its dc-Link Shunted Variant for Common-Mode Voltage Cancellation, **Hang Dai**
6027	Design and Development of SiC MOSFET Based DC-DC Converter for High-Temperature Space Application, **Saikat Dey**
6035	Hardware Design of Medium Voltage SiC-Based Modular Multilevel Converters for Grid-Tied Applications, **Ke Wang**
6080	Submodule Design for a 2 kV 1 MW Integrated Modular Motor Drive for Aviation Applications, **Yizhou Cong**