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Power Electronics and Devices Day

Leveraging Exagan’s 200mm GaN-on-Si Process

T. Loch
Technical Marketing Director
Exagan, Munich, Germany

EXAGAN
Accelerate Power Transition

Abstract
GaN on Silicon power devices are recognized as a key technology to sustain future power converter systems roadmaps in the field of IT electronics, renewable solar and emission free automotive applications. Exagan is implementing proprietary 200-mm’s GaN on Silicon technologies into high volume production to enable higher integration and improved efficiency. Users experiences on current silicon solutions set expectations on any new product using new technology introduction. Similar “easy to use”, “predictive FIT in use” and “cost in use” are a given that needs to be part of the key attributes of the new product to meet those expectations. Exagan product portfolio provides GaN on Silicon solutions and leverages on super-fast GaN on Silicon exceptional switching properties. Meeting user’s expectation, required reliability and cost targets, Exagan solutions help innovators to be able to create smaller, more efficient and higher-performing power converter applications than were not possible with traditional silicon-based technology. This paper will present the latest developments achieved and new products to be released using cost effective G-FET™ 200-mm’s GaN on Silicon technology.

Biography
Mr Loch joined Exagan in June 2019 as Director Technical Sales. In his role his focus is on customer application development leveraging GAN technology, a key future component in our industry. Previously, he served as Sales Manager for major automotive accounts at Diodes Inc a supplier of analog and discrete power components and as Sr RSM at Power Integrations, a supplier of analog and mixed signal PSU’s. Main markets Mr. Loch served are Industrial, Consumer, Lighting and Automotive.
He looks back at 20 years of successful technical Sales and Marketing experience in the power semiconductor industry. Mr. Loch has a graduate degree in Electrical Engineering and Industrial Engineering. He is based in Munich, Germany

Technological Challenges for MOS HEMT Power GaN Devices

M. PLISSONNIER
Head of Power device laboratory
CEA, Silicon device division, GRENOBLE, France

Abstract
Wide band gap in power electronics has now demonstrated its ability to intercept next challenges for power conversion system. Silicon carbide is now available and well-established pour high power density needs. Gallium nitride power switches has emerging in the industry during the last two year and it is clear that they will provide solutions for a wide range of power applications. In terms of device technology, E-Mode functionality seems to be the most popular for lateral HEMT GaN switches. PGaN FET architecture of devices is now available on the market for several “end-users” applications. CEA/LETI has develop another approach to meet requirements of power electronics with an isolated MIS GATE HEMT GaN solution. This option is on the path to reach a industrial level of maturity. We will review main technological challenges what has been overcome to reach this level of maturity. Then new challenges will be describes with a perspectives to provide competitive HEMT GaN device compare to state of the art.

Biography
Marc Plissonnier is heading the electronics component for energy laboratory with the **S**ilicon **C**omponents **D**ivision at CEA/LETI since 2013. He focused his work on power GaN development in the frame of French national technological research institute (IRT). Before, he was heading materials for energy laboratory with Nanomaterial Division at CEA/ Liten. He has a Phd in Physical chemistry at Polytechnic University of Grenoble in France.

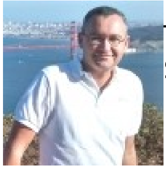
Automotive System Requirements for Power Electronics

L. Steinke
Director Product Management Power Electronics
Robert Bosch GmbH, Power Electronics PS-PE/PRM, Schwieberdingen, Germany

Abstract
coming soon

Biography
coming soon

Smart CutTM Technology Enable Engineering SiC substrate for Power Devices

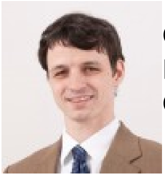


W. Schwarzenbach
Technology Leader
SOITEC, Innovation, Bernin, France

Abstract
Silicon Carbide (SiC) Power Devices is a very fast growing business, serving a wide range of market and application and especially supporting new electrical mobility solutions.
Current technology is based on bulk SiC materials, being limited by the material crystalline quality leading to poor device yield performance.
Soitec's Smart Cut technology, enables high quality SiC layer transfer on top of low resistivity materials, opening path for both higher device fabrication yield and electrical performance.
This talk will present early demonstration of Smart Cut Engineering SiC substrate including material characteristics, test device results and recent update on the newly created pilot line to accelerate Smart Cut SiC substrate development.

Biography
Walter Schwarzenbach (m) has received an Engineer Degree in Physics from the Swiss Federal Institute of Technology in Lausanne in 1994, and a PhD Degree in Physics from the University of Grenoble in 1999. He joined Soitec in 2000 as process development engineer then becomes project leader in charge of SmartCut™ process industrialization for several 300mm Partially-Depleted SOI substrate generations. From 2009 to 2018, he was in charge as Product Leader of Fully-Depleted SOI, Imager SOI and 3D materials definition and introduction. Since 2019, as part of Innovation team, he is Technology Leader for SmartCut SiC engineered substrates. He is author or co-author of more than 45 articles in international refereed journals and conferences and more than 30 patents.

SiC for Power Electronics and More – 150mm and 200mm Technologies on the Move



T. Erlbacher
Group Manager
Fraunhofer IISB, Devices and Reliability, Erlangen, Germany

Abstract

Silicon carbide has turned into an established material for high voltage power semiconductor devices. This talk will start with a brief recap of the SiC device and processing history to date – summarizing the benefits of SiC devices in power converters, the progress in development of such power devices and the tremendous efforts of governments and industry to make SiC economically feasible.

On the basis of this success, the presentation will then focus on chances to further exploit the availability of SiC manufacturing technology in combination with 150mm and 200mm processing lines and recent developments towards new horizons. Present trends in power device fabrication are summarized and discussed. This also includes the utilization of SiC CMOS technology towards integrated circuits for harsh environments. High temperature analog signal amplification will serve as an example. Additionally, some of the challenges involved with doping Silicon carbide and the corresponding modelling will be addressed. Also, the presentation will provide an outlook towards the application of SiC electronics towards quantum computing and sensing. Challenges and chances towards the implementation of quantum dots, magnetic field sensing and quantum logic will be discussed.

Finally, the presentation will include a summary towards SiC fabrication technology and a call to action for tool manufacturers, designers and application engineers to exploit the new capabilities that Silicon carbide device technology offers.

Biography

Tobias Erlbacher received the Diploma in Electrical Engineering (Microelectronics) from the University of Erlangen-Nuremberg in 2004, and his Ph.D. degree in 2008. Since 2009 he is with the Fraunhofer Institute of Integrated Systems and Device Technology IISB in Erlangen, where he is heading the “Devices” Group. His research activities focus on device modelling, design and integration as well as technology development for power electronics. This includes the monolithic integration of passive networks and the optimization of power semiconductor devices in silicon integrated circuits. He has authored a book on lateral power transistors in integrated circuits. Moreover, Dr. Erlbacher is working on design and development of silicon carbide devices for power applications, high-temperature integrated circuits and sensors. He also has expertise with non-volatile memories and device characterization at the nano-scale. He has authored and coauthored over 100 papers in scientific journals and contributed to 10 patents.