

Joint press release of all partners of the European "PowerBase" research project

Press release

Successful conclusion of the EU research project "PowerBase": A new generation of energy-saving chips from Europe reaches the market

Villach – 5 September 2018 – The worldwide demand for energy is increasing and pushing the development of more powerful and more efficient energy-saving chips. They are indispensable for high and sustainable increases in efficiency, for example in the generation, transmission and use of power, in e-mobility applications and for more performant data centers. The European research project "PowerBase" with its 87 million euros project volume and involvement of 39 partners from nine countries has presented promising results after the three-year term. The technology yield includes successful development and pilot production of next generation energy-saving chips. The project was coordinated by Infineon Austria.

These power semiconductors are based on the new semiconductor material gallium nitride (GaN). First components for high-power applications have been developed and their manufacturability demonstrated, and thus the industrial requirements for mass market use have been prepared. These chips are able to convert power more efficiently than silicon power semiconductors; energy losses are reduced by up to 50 percent.

"Innovation, leading expertise in key enabling technologies and a strong industrial basis are essential success factors for Europe in its competition with other economic areas", says Sabine Herlitschka, CEO of Infineon Technologies Austria AG. "Europe can draw on a wide variety of skills and expertise in power electronics that generate significant competitive edge in the global market when pooled in focused cooperation schemes. With PowerBase Europe successfully demonstrates joint research power to increase energy efficiency in electronic applications."

Europe's first pilot line

The fundamental objective of the "PowerBase" project was the successful installation of Europe's first pilot line for GaN-based power components in a high-volume, industrial production environment. This is an important prerequisite for producing these new semiconductors at globally competitive costs.

GaN chips for exacting industrial demands – ready for volume production

It has now been possible to successfully position a 600-Volt GaN power semiconductor, developed as a demonstrator in the research project, in the market. The energy-saving chip has already been installed in some 20,000 devices of project partner Eltek, a full-range provider of secured power supply. They ensure significant efficiency boosts in power supply for energy-intensive server and data centers.

"We always strive to be one step ahead in terms of technology. The use of the pioneering GaN-based technology developed in the PowerBase project makes it now possible for us to achieve this goal. In addition to increased efficiency, this technology provides higher reliability, better manufacturability and other benefits that will allow us to stay the industry leader also in future", says Erik Myhre, Senior Manager Research & Development at Eltek.

Improved quality and extended service life

The thorough research invested in material and reliability to achieve better quality and longer service life of GaN-based semiconductors has paid off: In the challenging production process, the breakage rate was reduced to below 10 percent for GaN wafers, the basic material for the chips. Additionally, the wafers produced on the pilot line had four times fewer defects. The demonstrated 600-Volt GaN chips exceeded the industrial service life requirements. They are extremely robust even in heavy-duty applications and able to withstand short-time breakdown voltage of more than 1000 Volt.

Silicon, the base material of conventional energy-saving chips, was also optimized in the "PowerBase" project and its material utilization ratio significantly improved. This sub-project was carried out at Infineon Technologies Dresden, and the results have already been applied in the production of silicon wafers at Siltronic, one of the project partners. The silicon boules – from which the 300 mm thin wafers (silicon discs with 300 mm diameter) are cut – are now even more exploitable. The effective boule length for IGBT (insulated-gate bipolar transistor) semiconductors has been doubled as a result.

Progress has also been made in terms of packaging, i.e. the installation of the chips in packages in the semiconductor production process. A new packaging approach makes the integration of the 600-Volt GaN chips possible in a system solution with several semiconductor components and excellent thermal properties.

The next step: Mass market for consumer applications

The technologies developed in the EU research project “PowerBase” will soon be put to use in numerous industrial applications, including inverters of solar systems or onboard charging devices of electric vehicles. The first follow-up step in the development of the next-generation energy-saving chips is opening up the mass market for consumer applications, where GaN-based semiconductors will be utilized in smartphones, computers, lighting or power packs. The relevant objectives in all of this are increase of efficiency and continued miniaturization. The basis, i.e. making these new semiconductors mature for industrial mass production, has now been established in “PowerBase”.

Research team: 39 partners from nine countries

In alphabetical order: [ams AG](#), [Baumann GmbH](#), [BESI Austria GmbH](#), [BESI Netherlands BV](#), [CISC Semiconductor GmbH](#), [Carinthian Tech Research AG](#), [Consejo Superior de Investigaciones Científicas](#) — [Instituto de Microelectrónica de Barcelona - Centro Nacional de Microelectrónica](#), [Eltek AS](#), [Epigan NV](#), [4fores - For Optimal Renewable Energy Systems S.L.](#), [Fraunhofer Gesellschaft zur Förderung der Angewandten Forschung](#) consisting of FhG-IWM Halle, FhG-THM Freiberg and FhG-EMFT Munich, [Freiberger Compound Materials GmbH](#), [Fronius Int. GmbH](#), [Greenpower Technologies S.L.](#), [Fabmatics GmbH](#) (formerly HAP GmbH Dresden), [Infineon Technologies AG](#) (with subsidiaries in Germany, Italy and Austria), [Interuniversitair Micro-Electronica Centrum](#), [Ikerlan S. Coop.](#), [Kompetenzzentrum Automobil- und Industrieelektronik GmbH](#), [Max Planck Institut für Eisenforschung GmbH](#), [memsstar Limited](#), [NaMLab GmbH](#), [NanoDesign, s.r.o](#), [NanoFocus AG](#), [PacTech - Packaging Technologies GmbH](#), [Plansee SE](#), [Quantemol Limited](#), [Siltronic AG](#), [Slovenska technicka univerzita v Bratislave](#), [SPTS Technologies Ltd](#), [Technische Universität Dresden](#), [Trymax Semiconductor Equipment BV](#), [University of Bristol](#), [Karl-Franzens-Universität Graz](#), [UiO Universitetet i Oslo](#), [Università degli Studi di Padova](#)

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About Infineon Austria

Infineon Technologies Austria AG is a group subsidiary of Infineon Technologies AG, a world-leading provider of semiconductor solutions that make life easier, safer and greener. Microelectronics from Infineon reduce the energy consumption of consumer electronics, domestic appliances and industrial facilities. They make a major contribution to the convenience, security and sustainability of vehicles, and enable secure transactions in a connected world.

Besides Germany, Infineon Austria is the only subsidiary within the group that pools competencies for research and development, production as well as global business responsibility. The head office is in Villach, with further branches in Graz, Klagenfurt, Linz and Vienna. With around 3,785 employees from around 60 countries (including 1,547 in research and development), in the financial year 2017 (ending in September) the company achieved a turnover of € 2.5 billion. With its research expenditure of 428 million euros, Infineon Austria is one of the best industrial research performers in Austria.

For more information please see www.infineon.com/austria

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