6. Publishable Summary - PowerBase

Coordinator	Herbert Pairitsch
Tel.	+43 51777 2247
Email	herbert.pairitsch@infineon.com

Power Semiconductors are key drivers for the innovation capability of European industries, large and small, **generating economic growth and supporting meaningful jobs for citizens**. They offer solutions to some of the difficult societal challenges addressing European policies for 2020 and beyond. For both reasons, it is vital that investments are made to assure **European collaboration** and the access to the technologies, know-how and capacities, which guarantee **growth potential and strategic independence** in the face of increased globalisation.

The European **semiconductor ecosystem** employs approximately 250,000 people directly and is at the core of innovation and competitiveness in all major sectors of the economy. PowerBase will directly impact the semiconductor production in Europe, aligned with the **electronics strategy of the European Commission**.

The project PowerBase aims to setup and enhance **power semiconductor manufacturing pilot lines** in the area of wafer production **and chip embedding in packages** with special attention on **compact power applications**. Demonstrators and full-scale testing are essential building blocks of the PowerBase project proposal meant to **stepping up Europe's innovation capability** by the development of technologies in the area of **energy efficient systems**. This will provide Europe with reinforced means to significantly **raise its competitive edge** across the economy and to address its **key societal challenges**.

Electronic components and systems (ECS) is a domain with a worldwide fast growing market. European companies have dominant **global positions in key application areas for Europe**, such as **efficient use of limited energy resources**, as well as in equipment and materials for worldwide semiconductor manufacturing. The underlying technology domains are also extremely R&D intensive, with semiconductor industry investments reaching 20% of total revenues.

The key objective of **ECSEL** is: "Ensure the availability of ECS for key markets and for addressing societal challenges, aiming at **keeping Europe at the forefront** of the technology development, bridging the gap between research and exploitation, strengthening innovation capabilities and creating economic and **employment growth in the European Union**. The project PowerBase aims to contribute to the industrial **ambition of value creation** in Europe and fully supports this vision by addressing key topics of both "Strategic Thrusts": "Key applications" and "essential Technologies (capabilities)". By positioning PowerBase as an innovation action a clear focus on the exploitation of the expected result is a primary goal.

To expand the limits in current power semiconductor technologies the following main goals will be targeted by the PowerBase project:

- Development of **advanced carrier substrate technologies** for improved **GaN material quality** and reliability for next generation GaN based power devices

- Setup of a qualified wide band gap **GaN technology pilot line** based on **200mm** wafers for high performance **normally off GaN power transistors** including **GaN-on-Silicon epitaxy** with advanced process control, high manufacturing stability and yield
- **Expanding the limits of today'stoday's 300mm silicon based substrate materials** for power semiconductors in two directions: First on the low ohmic substrates and second at high ohmic substrates by introduction of advanced doping materials and power device processes.
- **Improving manufacturability** in a high volume / high automated fab as being key for cost competitiveness: work on advanced automation
- **Enhance system compatibility** by introducing advanced packaging solutions out of a dedicated **chip embedding pilot line**
- Demonstrate results and reliability in **leading compact power application domains**

The impact of PowerBase will be huge on both paths, the silicon path and the wide band gap path enabling major advancements in the area of MtM and SiP.

PowerBase is a project proposal with a **vertical supply chain involved**. This spans expertise and partners from raw material research, process innovation, pilot line, assembly innovation and pilot line up to various application domains representing enhanced smart systems. The supporting partners consist of market **leaders in their domain, having excellent technological background**, which are fully committed to achieve the very challenging project goals, complementing each other in a well-balanced and structured way avoiding overlaps and missing expertise.

Main application fields have been selected as demonstrators. Amongst many others these are: energy conversion in main's application **where size matters** like portable devices or lighting applications and photovoltaic energy generation as one element in the future energy supply chain, which gets with **technological progress** more and more in focus for **decentralized local energy supply**. The envisioned innovative power components address highest efficiency and reliability in energy generation, transformation and usage. Highest efficiency and reliability at a reasonable price per power unit are the key characteristics for a successful participation in a **global and international market**.

The project PowerBase also aims to have **significant impact on smart regions**. **High tech jobs** in the area of semiconductor technologies and micro/nano electronics in general are expressed core competences of the regions Carinthia and Styria (both Austria), Saxony and Bavaria (both Germany) and many other countries involved.