PowerBase in numbers	
Partners	39
Countries	9
Project start	01 May 2015
Project duration	3 years
Total costs	EUR 87,613,740.00
Total EC contribution	EUR 19,196,548.95
Person months	6028
Work packages	8

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Acknowledgement:
The project PowerBase is co-funded by grants from Austria, Belgium, Germany, Italy, Norway, Slovakia, Spain, the United Kingdom and the Netherlands as well as the ECSEL Joint Undertaking and is coordinated by INFINEON Technologies Austria AG

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ECSEL JU

ECSEL Joint Undertaking
Electronic Components and Systems for European Leadership

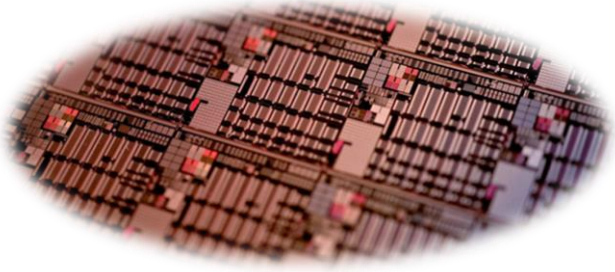
PowerBase

The energy-saving chips of the future

PowerBase stands for Enhanced substrates and GaN pilot lines enabling compact power applications.

PowerBase will setup and enhance power semiconductor manufacturing pilot lines for wafer production and chip packaging, with special attention for compact power applications. Within the project, the next generation of “energy-saving chips” are developed preparing them for mass industrial use in communication servers, lighting, renewable systems and many other applications. Demonstrators and full-scale testing are essential building blocks in PowerBase, stepping up Europe’s innovation capability by developing technologies specifically addressing energy efficient systems.

The innovative power components envisioned, address the highest efficiency and reliability in energy generation, transformation and usage, providing these at a reasonable price per power unit. PowerBase addresses the “silicon path” and the “wide band-gap path” enabling major advancements in the area of “More-than-Moore” and System-in-Package.



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ECSEL JU

PowerBase pushes efficiency: Eltek Flatpack2 SHE - the coolest conversion module ever - reducing wasted energy and heat dissipation to a minimum.

The new Eltek Flatpack2 SHE rectifier has taken conversion efficiency one step further, into the 98% range. With PowerBase, a new type of GaN power transistors has been developed, tested and extensively verified, helping to increase efficiency from high to super high, without driving cost through the roof. The previous HE version has already saved an estimated reduction in operating cost of some 800 million Euro, and more than 5 million tons of CO2. SHE can do even more.

PowerBase enables high volume manufacturing of advanced GaN power devices

After many years of university and institutional research, PowerBase has realized a full scale industrial manufacturing line for GaN power technologies on large wafer diameters including GaN-on-Si hetero epitaxy. Process lines were installed for producing normally-on and normally-off power and RFP transistors with a wide range of voltage classes up to 600V based on the most advanced technology and device concepts. Starting from a lab scale epitaxy with vertical breakdown voltage of less than 500V, an advanced GaN-on-Si epi was developed with V_{BD} >1000V and a low defect density of <2 defects/cm^2. The 200mm line was set up including all learnings with respect to wafer handling and cross-contamination control from 150mm line installation. For realization of normally-off GaN power HEMTs all unit processes for a pGaN gate module were developed. This technology consists of a fully recessed first AlGaN barrier followed by the epitaxial regrowth of a second barrier and the pGaN layer. By taking advantage of this concept, excellent stability of the threshold voltage has been achieved.

Since the output current capability of advanced GaN power HEMTs is limited by electro-migration resistance of power metallization, the aluminium power metal must be replaced by high-performance metals. Therefore, the development of advanced metallization schemes is underway.