AGAPAC

Advanced GaN Packaging

POWER AMPLIFICATION IN A SPACECRAFT

Reducing size and, in parallel, increasing power capabilities of electronic devices in a spacecraft is of immense importance for the overall performance of any satellite. Recent developments have brought Gallium Nitride devices to maturity. As the power density increases it is of critical importance to have packaging technologies available which can transport the generated heat to the surrounding environment and keep the temperature of the device within its specified limits.

For power packages, it is compulsory to provide at the same time minimized thermal resistance and high protection to all devices and circuits with respect to contaminations, mechanical aggressions, radiations and electromagnetic perturbations.

Gallium Arsenide (GaAs) technologies have been introduced in the 80's and are currently operated at about 0.5 W/mm including space application de-rating rules. Gallium Nitride (GaN) has emerged as **the technology of choice for the next generation high power electronics**. Its ability to handling high power also makes it the perfect technology candidate for highly survivable receiver components.

With power transistors providing 5W/mm the GaN devices can be decreased in size, allowing a power density increase of about 10 times compared to existing Galium Arsenide technologies.

AGAPAC contributes to achieving European strategic non-dependence in an area of critical technologies. Frelon © Fotolia

According to recent assessments, GaN will lead to a revolution in space-borne electronics.

The project **AGAPAC stands for "Advanced GaN Packaging"**.

The ultimate goal of the project is to have a space compliant power micropackage able to dissipate up to **100 W of power with a maximum junction temperature of 200°C**. This new micropackage technology based on innovative high thermal conductivity diamond or nano-composites will be available as an industrial supply chain for European space industry by 2010. It will cover the need for GaN based High Power Amplifiers (HPA) for space applications but also with different designs for other sectors such as base stations.

OLIVIER **VENDIER**
IS PROJECT COORDINATOR

One of the missions of AGAPAC is to put together actors and industry from material science (in Spain and Austria), thermal and mechanical analysis (UK and France), with the packaging industry (France), and GaN device manufacturing (Germany) around the needs of major space actors in Europe.

The expected impact is to progress towards the sustainable provision of packaging technologies suitable for GaN technologies needed by the European space community to become independent from non-EU manufacturers.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

In this project, AGAPAC, which stands for "Advanced GaN Packaging", we endeavour to establish a space compatible European supply chain for packaging solutions of GaN discrete transistors and GaN monolithic microwave integrated circuits by 2010.

Why is this project important for Europe?

The market for GaN transistors is expected to have a strong growth, with main turnover in 3G base station, satcom, and military. This project targets packaging for space applications to enable Europe to maintain a strong position in the highly competitive space industry.

How does your work benefit European citizens?

Involvement of "High tech" SMEs together with large industrial groups will trigger innovation at European level. In addition, it will ensure new employment opportunities for Europe, as AGAPAC targets enable technologies for next generation space systems.

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LIST OF PARTNERS

- Thales Alenia Space France (TAS-F), France
- EGIDE, France
- Plansee SE, Austria
- United Monolithic Semiconductors GmbH, Germany
- Fundación Inasmet, Spain
- Centre National d'Etudes Spatiales (CNES), France
- University of Bristol, United Kingdom

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PROJECT INFORMATION

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SUPPORTING SPACE FOUNDATIONS