

Contributions to the APECS Pilot Line: Fraunhofer IAF

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Fraunhofer IAF is one of 14 German research institutes involved in the APECS pilot line and one of 12 Fraunhofer institutes contributing to it. With decades of experience in III-V semiconductor research and development — from wafer epitaxy and component processing to the integration of modules and subsystems — Fraunhofer IAF brings deep technological expertise to a broad range of applications, including:

- Information and communication technology
- Electromobility and energy storage
- Test and measurement
- Sensor technology
- Security technology

In the field of high-frequency electronics, Fraunhofer IAF has specialized in devices and circuits based on indium gallium arsenide (InGaAs) and gallium nitride (GaN), enabling world-leading performances in power, bandwidth and noise at frequencies up to 1 THz.

The role of Fraunhofer IAF in the APECS pilot line

As a Research Fab Microelectronics Germany (FMD) institute, Fraunhofer IAF is developing novel InGaAs and GaN chipllets for high-frequency applications, as well as microbump interposers.

Their outstanding performance in the key parameters noise, output power and efficiency makes these technologies particularly well suited for earthbound as well as spaceborne applications in measurement technology, communications, radar and sensing.

In addition, Fraunhofer IAF is expanding its infrastructure and transitioning its manufacturing processes to wafer sizes of 150 mm, ensuring future industry-oriented technology development and transfer of new technologies into scalable, market-ready solutions.

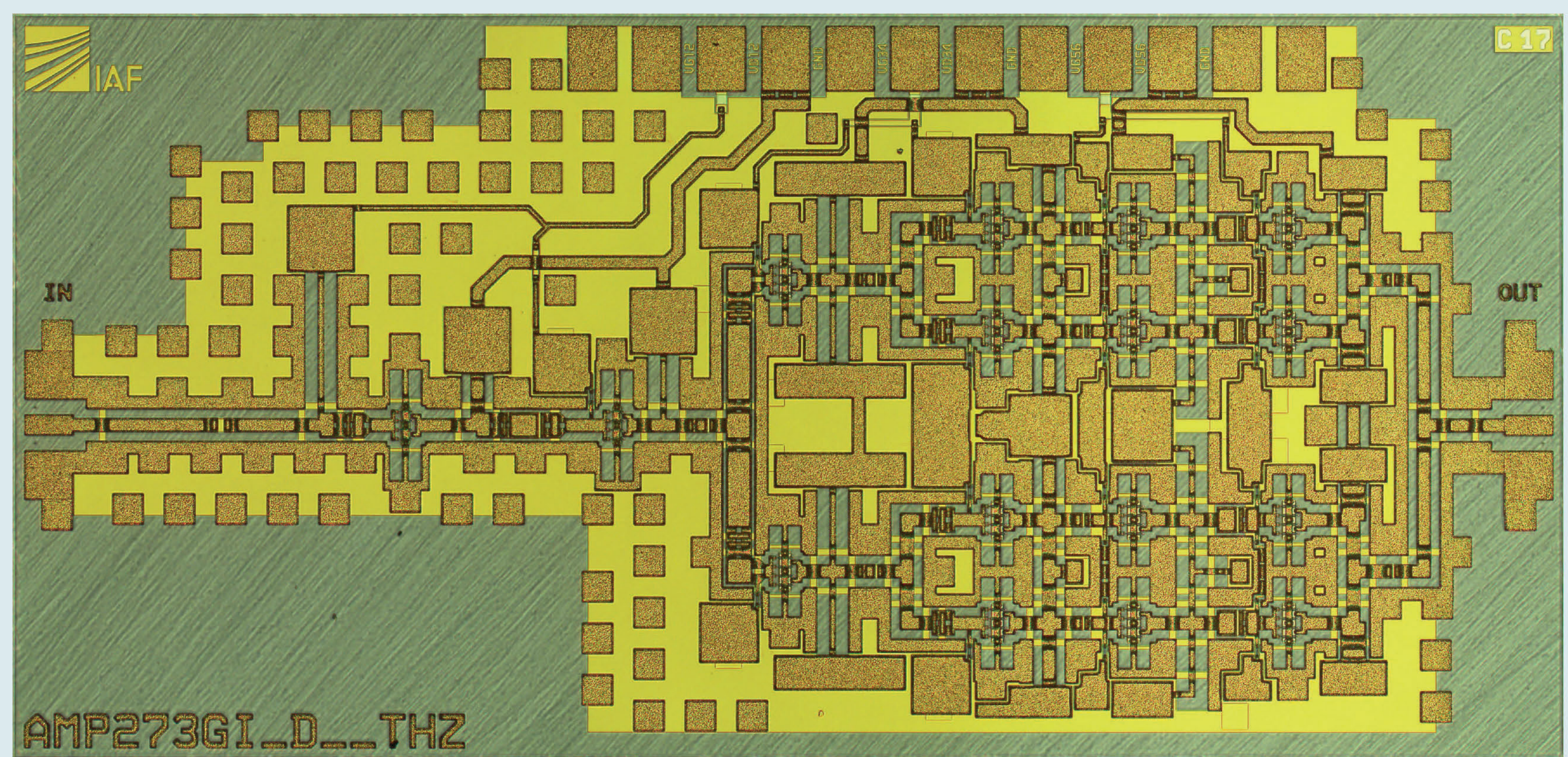
Fraunhofer IAF is transitioning its manufacturing processes to wafer sizes of 150 mm

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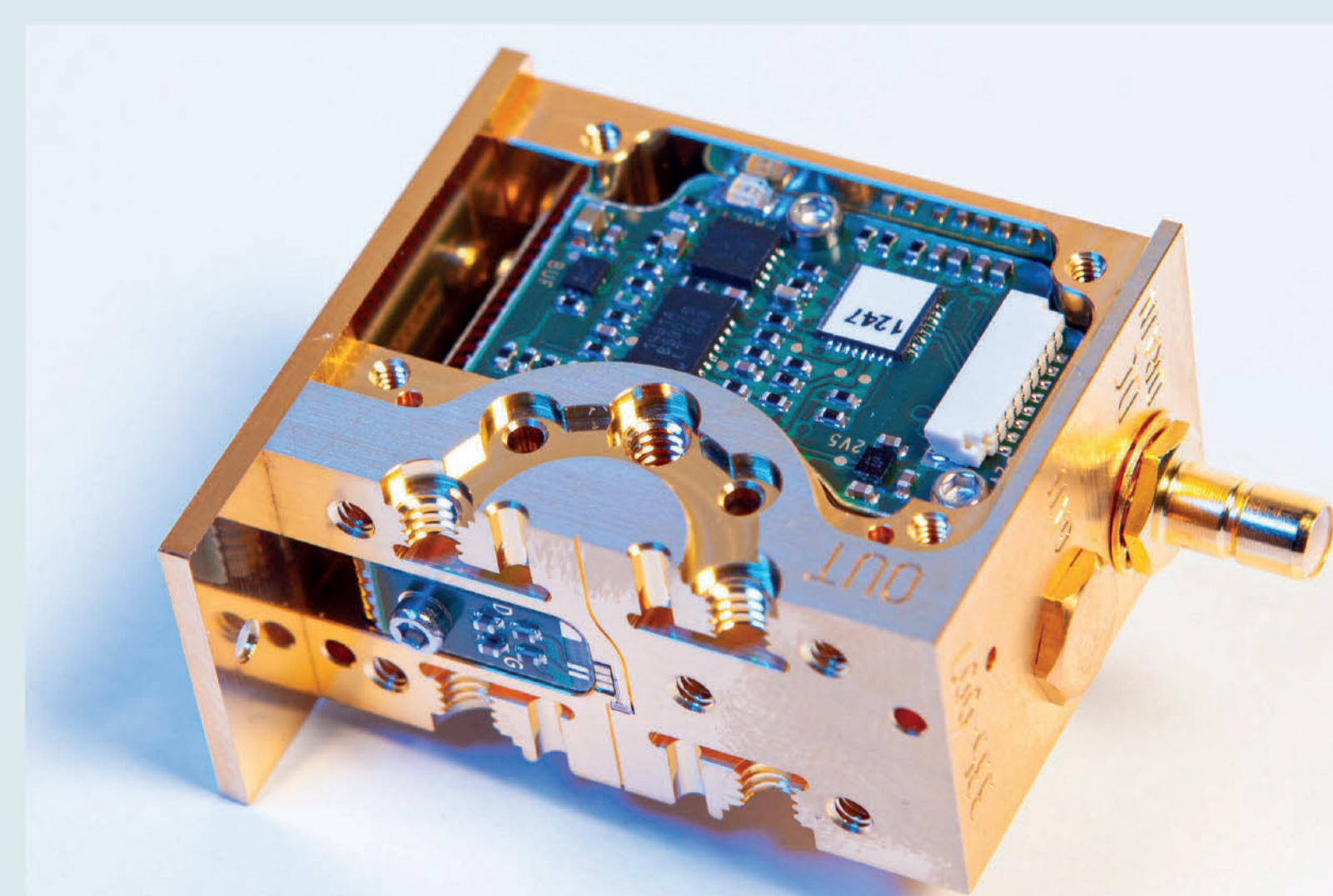
Record-breaking D-band GaN-on-SiC power amplifier with $P_{\text{sat}} = 28 \text{ dBm}$ and $P_{\text{dens}} = 0,2 \text{ W/mm}^2$ (2026)

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664 GHz InGaAs mHEMT low-noise amplifier module

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What is APECS?

APECS (Advanced Packaging and Heterogeneous Integration for Electronic Components and Systems) is one of 5 European pilot lines established under the EU Chips Act. APECS is the foundation for Europe's competitive position in heterogeneous system integration and advanced packaging. It plays a vital role in enhancing Europe's strategic autonomy by reducing dependence on foreign suppliers and strengthening Europe's capabilities in critical technology areas.

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Contributions and impact

Within APECS, Fraunhofer IAF will enable peak high-frequency performance for next-generation chipllets for demanding communication systems, e.g., in data centers or spaceborne sensing:

- Developing novel chipllets based on InGaAs and GaN, optimized for and fitting into the chipllet ecosystem
- Realizing efficient and RF-capable microbump interposers
- Enabling excellent performance in noise, output power and efficiency in heterogenously integrated systems
- Providing industry early access to components by running a 6-inch wafer processing line

With its expertise in III-V semiconductors, Fraunhofer IAF is a key enabler for the heterogeneous integration of world leading RF capabilities in novel chipllets.

Additional information

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