Press Release

FBH to present novel developments for 6G communication systems and green ICT at EuMW

The Ferdinand-Braun-Institut (FBH) will present its research results targeting energy-efficient amplifier concepts as well as terahertz (THz) components and systems for broadband communication and imaging at the virtual "European Microwave Week" (EuMW). In addition to its conference contributions, FBH exhibits from January 12-14, 2021 at the joint booth of the "Research Fab Microelectronics Germany" (FMD) in exhibition hall 3 – with FBH scientists available for a virtual exchange.

Berlin, January 5, 2021

The relevance of the internet is even growing in times of pandemics and the digital era. Powerful new communication standards like 5G and 6G form one of the pillars in this development. Pushing carrier frequencies into the sub-terahertz range above 100 GHz is a key enabling technology for high-speed transmission in the future.

At the EuMW, the FBH is presenting results of the ULTRAWAVE project. Within the consortium, a novel wireless communication system architecture with improved area coverage and unprecedented data rates is developed. FBH contributes MMICs with its InP DHBT process. The architecture provides 100 Gbps/sqkm by introducing a point-to-multipoint infrastructure at 140 GHz in the D-band. The system is currently being set up at a test site in Spain. Once successfully demonstrated, this will be the first demonstration of a point-to-multipoint wireless communication system with such high data rates – point-to-point systems in the same frequency band have already been demonstrated in first experiments by other groups. The system will use standard modem access and wireless data transmission with distances up to 1 km.

FBH developments for green ICT

Reducing energy consumption is one of the keys to limiting global warming. The FBH presents two different approaches to improve energy efficiency in information and communication technologies (ICT) at the accompanying trade show.

Envelope tracking is a well-proven technique for increasing the efficiency of solid-state power amplifiers. This is achieved by modulating the supply voltage of the RF power amplifier in accordance to the instantaneous signal envelope. The FBH has developed a 1.62 GHz amplifier with a peak output power of more than 50 W and a modulation bandwidth of 40 MHz. With an 8.6 PAPR (peak-to-average power ratio) signal, the overall efficiency reaches 40 %.

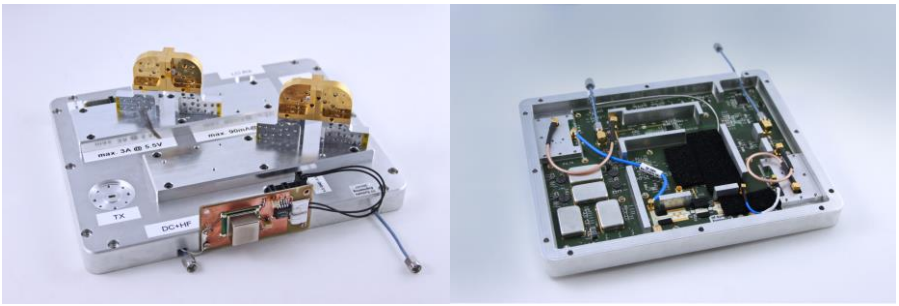
FBH has also transferred the concept of supply modulation to millimeter wave amplifiers. A module with two identical MMICs with integrated switches for discrete level supply modulation has been developed. It operates in the 24-26 GHz range with 14 dB gain. Calculations for a single-chip realization show that 5-15 %-points efficiency improvement can be expected depending on the statistics of the signal.

Another approach to reducing power consumption is being pursued by the concept of a digital power amplifier. Based on FBH's 0.25 µm GaN-HEMT process, the institute has realized the first fully digital transmitter chain that successfully transmits broadband signals with maximum efficiency and linearity (47 % at > 52 dB ACLR). The compact digital transmitter brings the boundary between the digital and analog part of a base station up to directly before the antenna.

Further exhibits at the virtual trade show

In the field of terahertz electronics, FBH will also present THz detectors based on GaN HEMT MMICs that can be arranged into 2D arrays. They are suitable, for instance, for non-destructive testing of plastics for material defects. With best values for noise equivalent power NEP below 25p W/sqrt (Hz) and a highest sensitivity of 100 mA/W at 500 GHz they outperform previous THz detectors in CMOS technology.

Furthermore, the FBH exhibits its integrated GaN-based laser drivers for LiDAR applications, used e.g. for autonomous driving. The design of the output circuit is optimized for high peak current, short optical pulse width, high repetition rate, and power efficiency. It allows unprecedented performance in terms of current and pulse width, from 800 A at 4 ns to more than 30 A at 0.5 ns.



The press pictures are available here for download. All images are copyrighted.

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About the FBH

The Ferdinand-Braun-Institut, Leibniz-Institut fuer Hoechstfrequenztechnik (FBH) researches electronic and optical components, modules and systems based on compound semiconductors. These devices are key enablers that address the needs of today's society in fields like communications, energy, health, and mobility. Specifically, FBH develops light sources from the visible to the ultra-violet spectral range: high-power diode lasers with excellent beam quality, UV light sources and hybrid laser systems. Applications range from medical technology, high-precision metrology, and sensors to optical communications in space and integrated quantum technology. In the field of microwaves, FBH develops high-efficiency multi-functional power amplifiers, and millimeter wave frontends targeting energy-efficient mobile communications as well as car safety systems. The FBH has a strong international reputation and ensures rapid transfer of technology by working closely with partners in industry and research. The institute has a staff of 340 employees and a budget of 40.4 million euros. It is a member of the Leibniz Association and part of »Research Fab Microelectronics Germany«.

www.fbh-berlin.de/en