

## Project description

ICT and telecom sectors will go through another major evolution with the development of new visionary concepts in the higher millimetre-wave (mm-wave) frequency band to support various applications such as sensing and security, IoT, autonomous driving, e-health, cloud computing, and virtual reality.

This project stems from a successful application approved by the European Organization CELTIC NEXT “Energy-Efficient Radio Systems at 100 GHz and beyond: Antennas, Transceivers and Waveforms” and includes in total around 30 industrial and academic partners from 3 different countries with the aim to develop a highly efficient integrated antenna module and RF front-end solution with adaptive waveform generation in spatial, temporal, and frequency domains for beyond 5G (B5G) wireless communication infrastructure at 100GHz band and support other application sectors such as security & sensing, imaging, industrial IOT, automation etc. There are plenty of technological factors and mechanical challenges in designing RF hardware and modules around 100 GHz. These factors include cost pressure, higher level of integration, component sharing with current systems and increased system density, and high RF power generation with lower DC power consumption. As an industrial PhD student in this project, you will conduct research on high power front-end Monolithic Microwave Integrated Circuits (MMICs). Your research will address innovative PA and switch circuit topologies that enhance energy efficiency and at the same time achieve significant output power utilizing state-of-the-art GaAs and GaN semiconductor technologies.

### Your research will include:

- Energy efficient circuit topologies for 100+ GHz operation.
- Design, characterization and verification of integrated circuits for mm-wave applications
- Circuit integration

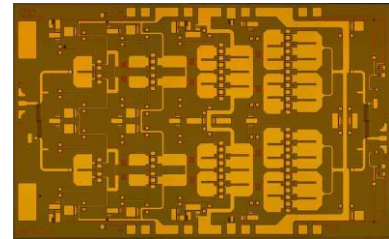


Figure 1. Photograph of a class AB PA

## Applicant

The PhD candidate must have a relevant background from Electrical Engineering, Engineering Physics or similar corresponding to at least 240 higher educational credits. It is beneficial and a merit if you have experience about microwave electronics and microwave measurements. For pursuing a PhD, it is important that you are motivated of the research topic and that you can take on responsibility of your own research and take initiatives. It's also expected that you can work independently and being a good team player. Furthermore, since communication of research results is a central part of the work, communicative skills in English (oral as well as in writing) are vital.

As an industrial PhD student you will be employed by the industrial partner (Gotmic) but will follow the PhD educational programme at Chalmers University of Technology. The student has the same obligations and opportunities as a University employed PhD student but also the industrial support and influence. As an Industrial PhD student, you are also given the benefits of full access to world-class labs for millimeter wave measurements at Gotmic and Chalmers [<https://www.chalmers.se/en/researchinfrastructure/kollberg-laboratory/Pages/default.aspx>]. Both industrial and academic supervision and, large academic and industrial contact network. Gotmic considers the student a long term investment, and our hope is that the



Göteborg Microwave Integrated Circuits



**CHALMERS**  
UNIVERSITY OF TECHNOLOGY

# Industrial PhD Student Position

HIGH POWER FRONT-END MMICs

student brings added value for us in terms of knowledge and ideas with the long-term vision of a continued career with the company.

A Swedish PhD is respected worldwide and takes normally five years to pursue. Within this time-frame, publications in high impact journals are expected, equivalent to one-year full-time study of courses is required for a PhD degree and one year of departmental work (teaching and other duties). More information about Chalmers' Doctoral Student program can be found here [<https://www.chalmers.se/en/research/doctoral-programmes/Pages/default.aspx>].

## Partners

Gotmic AB was founded in 2008 with the vision to bring competitive high-performance mm-wave (50-300 GHz) integrated circuits (MMIC and packaged MMIC) to the market and to lower the cost barrier associated with such technology. Gotmic is today positioned as a leading mm-wave component supplier and sells annually around 100,000 ICs, the majority used for telecommunication at the E-band, where Gotmic presently holds 20% of the global market. The high level of R&D and close collaboration with Chalmers in particular and other partners have created a technological edge towards competitors. Gotmic employs 14 people and had a revenue of 25 MSEK in 2019.

At [Chalmers](#) we perform world-class research on high-speed electronic components, circuits, and systems in the frequency range from 1 GHz to 500 GHz, and beyond. A major part of our research is targeting the need for higher capacity and improved energy efficiency in future wireless communication and sensor systems. Our research is supported by access to state-of-the art semiconductor technologies and [measurement lab facilities](#).

## Application Procedure

Please send your CV, a personal letter where you introduce yourself, describe your previous experience of relevance for the position (e.g. education, thesis work and, if applicable, any other research activities) and your future goals. Please also include a copy of your bachelor and/or master's thesis accompanied by attested copies and transcripts of completed education, grades and other certificates, e.g. TOEFL test results.

Applications should be sent by email to [marcus.gavell@gotmic.se](mailto:marcus.gavell@gotmic.se). For questions and further information about the position and project please contact Marcus or Christian. Dead-line for submitting your application is February 14<sup>th</sup> 2021. Incoming applications will be reviewed continuously until the last effective date for submission.

## Contacts

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