GRACE

Gallium Nitride Radar Components Embedded

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The GRACE project is aiming at cost-effective surface-mounted radar components for the enhanced flight vision systems (EFVS) of the future. The EFVS systems contribute to more effective air traffic management systems (ATMs) that have been identified as a technology able to reduce the aviation industry's climate impact with 10%.

We are now in the final year of the project with a lot of interesting experimental results coming out. Semiconductor ICs from the first design run in OMMIC's 60 nm GaN HEMT technology demonstrate state of the art performance for power amplifiers and signal sources. The power amplifiers, designed by MC2 technologies demonstrate output power in excess of 500 mW and gain on the order of 10 dB for the frequency band 93-100 GHz. In concern of signal sources, designed by Chalmers, fully integrated VCOs have demonstrated phase noise on the order of -155 dBc/Hz @ 10 MHz off-set from an 11-12 GHz carrier signal. Furthermore, reflection amplifiers have been demonstrated with 5-10 dB in the frequency bands 12-18 GHz and 20-27 GHz, respectively.

The ICs from the first design run are now shipped for encapsulation in Fraunhofer IZM's fan-out-wafer-level (FOWLP) packaging technology. The power amplifiers are encapsulated in packages with custom-designed heat sinks to manage thermal dissipation. Another customized package with integrated high-Q resonator is designed for reflection amplifiers. This approach is a candidate for the ultra-low far-carrier phase noise requirements aimed in the project.

While circuits from the first MMIC design run are being packaged, a second design run with iterated ICs are in the process line at OMMIC's foundry. In this design run, gain and output power of power amplifiers are optimized as well as the integration level for the signal sources. VCOs and reflection amplifiers are integrated together with multipliers and frequency dividers. The manufacturing of the second run MMICs is to be finished by end of November, with five months left before the project is concluded by end April 2021.

The GRACE project started in November 2018 and is funded by the EU's research and innovation program Horizon 2020 for two years with a total of SEK 18.7 million. The project has been prolonged 6 months, partly due to Covid-19, which forced fabrication in Berlin to close for several months and OMMIC MMIC process line in Paris to run at reduced pace.

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Read more about the GRACE project >>>
https://www.chalmers.se/sv/projekt/Sidor/GaN-mm-wave-Radar-Components-Embedded-QGRACEQ.aspx

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