ECSEL: REFERENCE

RF Engineered substrates to FostER fEm performaNCE

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ECSEL Joint Undertaking
Electronic Components and Systems for European Leadership

Project Coordinator

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Project Partners

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Background / General Description:

The main objective of REFERENCE program is to leverage a European leading edge ecosystem in the Radio Frequency (RF) communication applications based on Silicon On Insulator (SOI), a disruptive technology addressing performance, cost and integration needs for the next decade.

If mobile phone and cellular historically drove the RF communication performance, the demand for high speed, multi modal connection is now pulled by many markets:

- Internet of Things / cellular : FEM which enables signal reception/emission, transceivers and digital signal conversion, are key elements to move towards 4G+ and 5G standards.
- Automotive : Gartner forecasts by 2020, more than 250 million connected vehicles or self driving cars
- Aeronautics : development of wireless communication system for 4.2-4.4 GHz band with high data rate, reliability and low delay is a major challenge enabling replacement of AFDX switches/cables)

Approach:

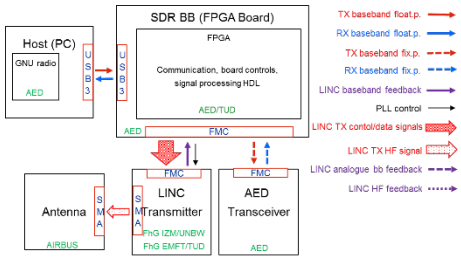
Develop the RF product chain of value

- Substrates : Silicon material and SOI process development, transition to 300 mm substrates
- Devices : RF-transistors fabrication and characterization
- Packaging and system integration : design and fabrication of System in Package (SiP) demonstrators using FOWLP technology.
- Hardware/Software design and architectures : implementation of a new Software Defined Radio (SDR) platform

Societal impact / Results:

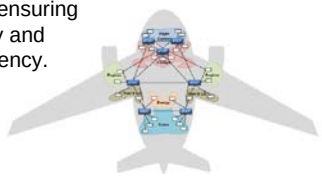
The technologies developed through REFERENCE program addresses major European societal concerns : technology innovation while limiting energy and resources consumption.

Vodafone Chair Contribution:

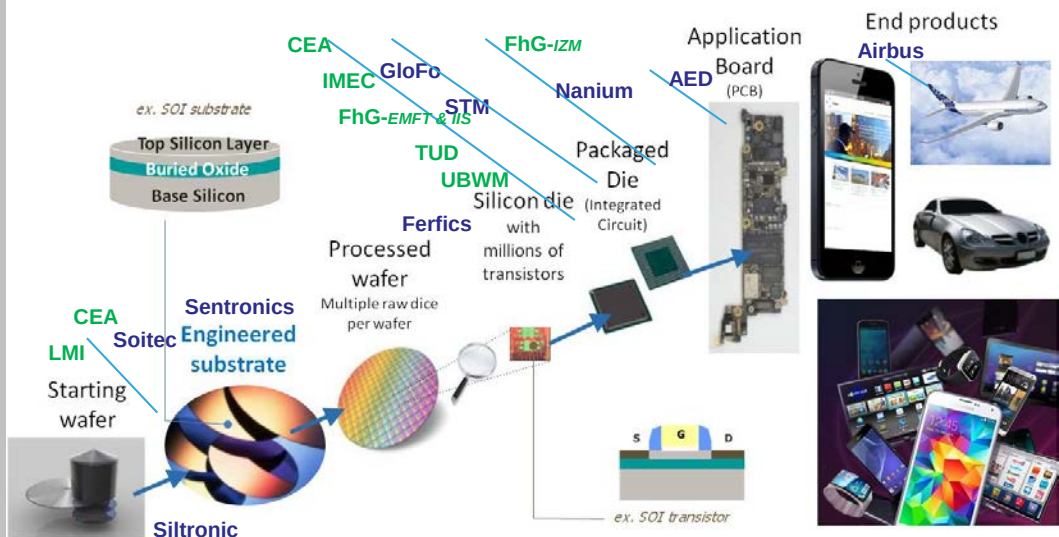


Vodafone Chair is involved in developing algorithms and a hardware description language implementation of algorithms for predistortion of LINC style power amplifier system. This system is to be deployed as part of a wireless aircraft backbone to enable reliable wireless communication for critical non-passenger systems.

In developing the predistortion algorithm a systematic approach is taken and it includes modelling of the whole communication scenario including the digital baseband processing as well as digital front end modules of both the transmitter and receiver side. Special care is taken in reducing the dynamic range of the signals amplified with Class E power amplifiers ensuring both high linearity and high energy efficiency.



Wireless backbone for aircraft



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MOBILE COMMUNICATIONS SYSTEMS

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08/2018