



MICROELECTRONICS - INTEGRATED SYSTEM DESIGN

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OUR CAPABILITIES

Experience in full design of complete ICs of various types and applications

- full design-path: schematics and simulations, HDL language description, synthesis, layout drawing, post-layout analysis

Access to professional CAD-EDA software

- CADENCE, Mentor Graphics, Synopsys, Silvaco, ANSYS

Well-equipped design laboratory

Acquaintance with design-kits of numerous foundries

- UMC, ATMEL, AMS, AMIS, IHP

Long-term international scientific cooperation

Realization of several commercial ICs





COOPERATION WITH CADENCE AND EUROPRACTICE

Membership in Europractice

- Software Service – STFC Rutherford Appleton Laboratory
- IC Service (MPW) – IMEC and Fraunhofer
- Host of IDESA courses



Participation in Cadence Academic Network

- Domain – design of mixed signal and digital integrated circuits
- Platforms for design ideas exchange
 - Symposium Cadence Academic Network at the conference CDNLive!
 - Website devoted to the cooperation with Cadence Academic Network: www.dmcs.pl/cadence.do
- Access to Cadence methodologies
 - Several training at Munich office
 - 2 on-site trainings: Cadence AMS Methodology Kit, Behavioral Modeling with Verilog-AMS (customized)

cadence[®]



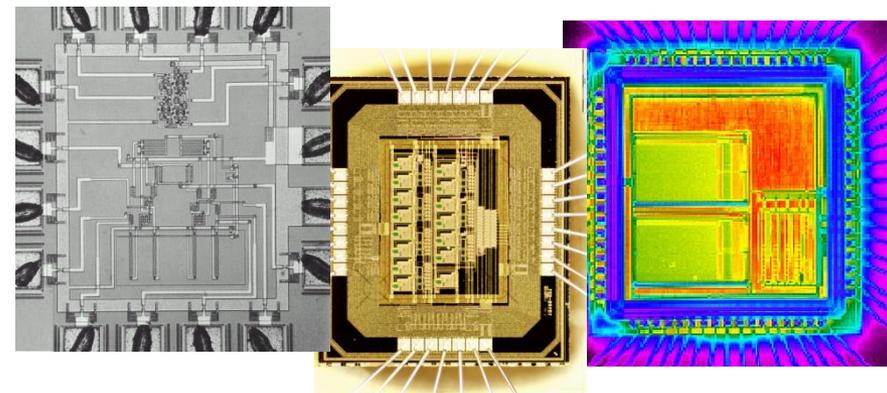
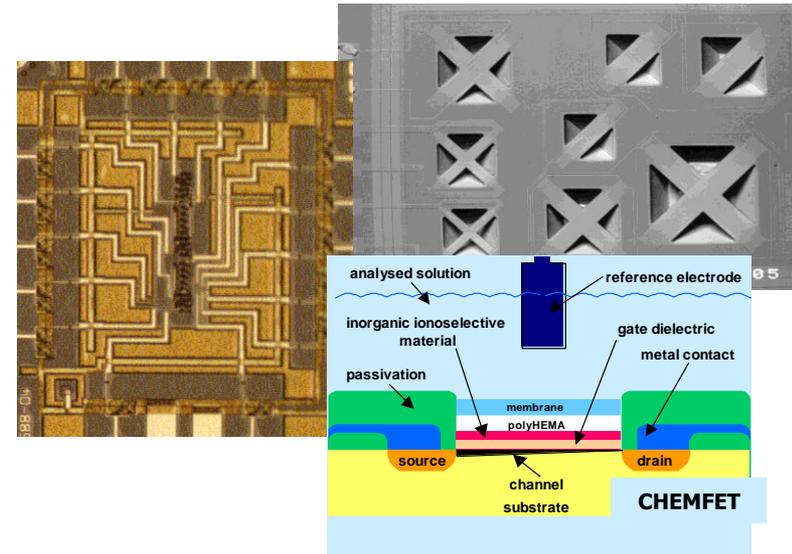
MICROELECTRONIC RESEARCH AREAS

Sensors

- IC (Integrated Circuits)
- MEMS (Micro-Electro-Mechanical-System) chips
- ISFET/CHEMFET devices

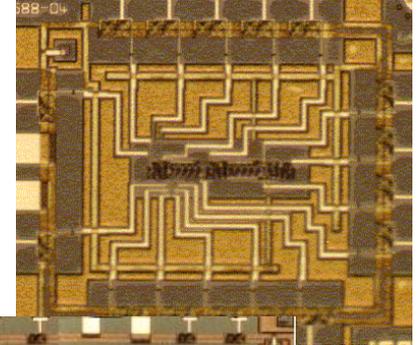
Signal processing ICs

- Analog, mixed-signal and digital systems
- Low- and high-voltage ASICs
- Signal converters
- Smart Power circuits
- Reprogrammable circuits
- Thermal analysis ASICs



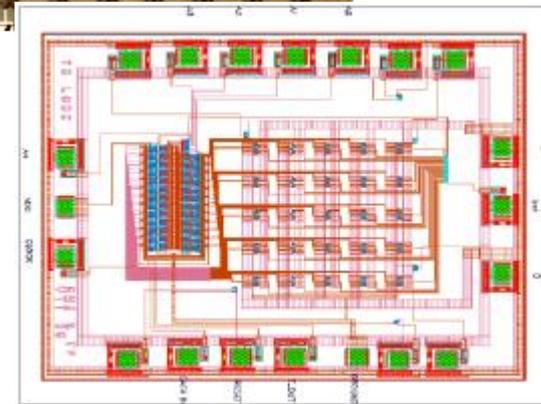
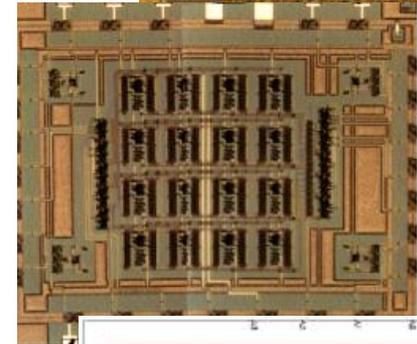
Temperature sensor

- Joint European Project JEP - 4343
"Education of computer aided design of modern VLSI circuits"



Thermal benchmark ICs

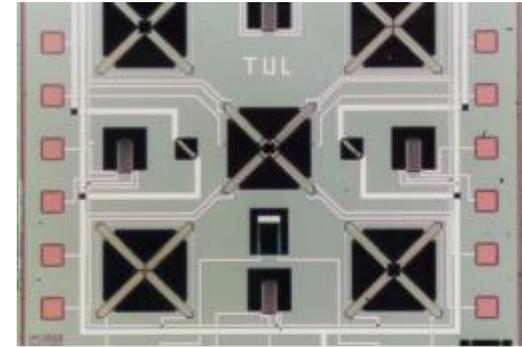
- "New Methods for Thermal Investigation of Integrated Circuits - (THERMINIC)" –COPERNICUS
- Structural Joint European Project SJEP -09159 "Postgraduate education in ASIC design"



MEMS SENSORS

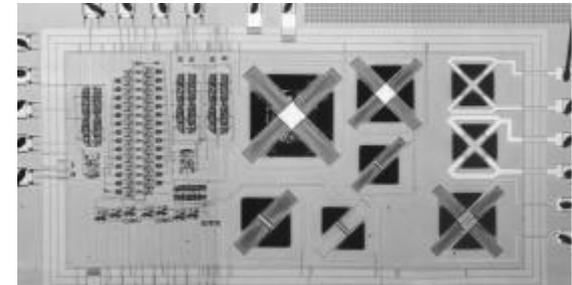
Multi-sensor chip

- Project ESPRIT - European Strategic Programme for Research and Development in Information Technology



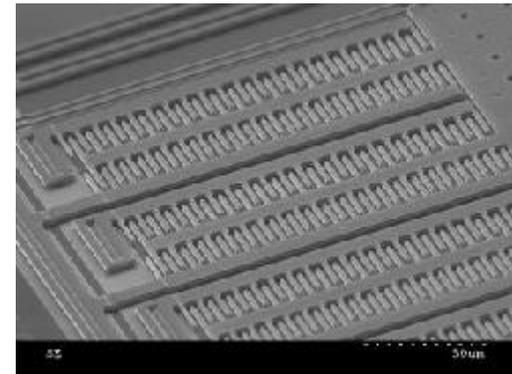
Multi-sensor chip with interface

- Research grant entitled: "Utilisation of VHDL-A language for computer modelling, design and realisation of integrated microsystems"



Accelerometer sensor chip

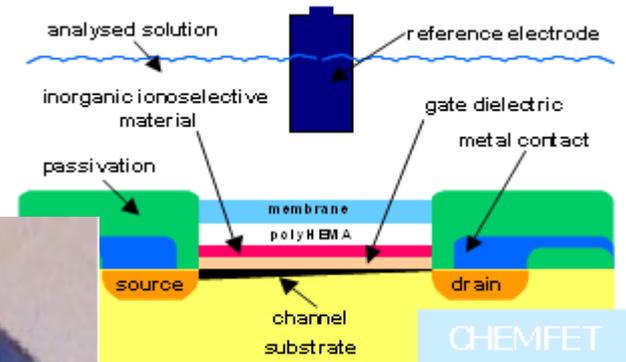
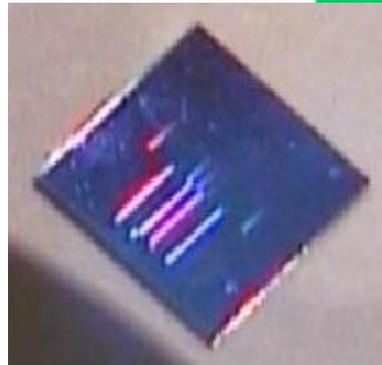
- Research grant entitled: "Integrated methods of silicon Microsystems design and its application to the monitoring of the high power electrical machines vibrations"



CHEMICAL SENSORS

CHEMFET devices

- Measurements of various kinds of sensors
- Modelling of MOSFET based chemical sensors
- Studies and simulation of monolithic microsystems containing ion sensors
- Part of the project SEWING
- System for European Water Monitoring



SIGNAL PROCESSING IC

Switched-Current (SI) Filter IC

- analog current-mode processing

Radio signal processing

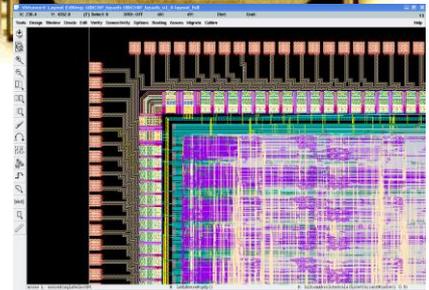
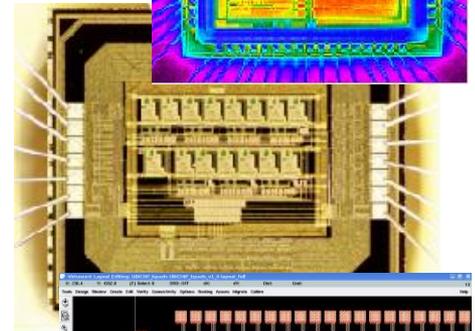
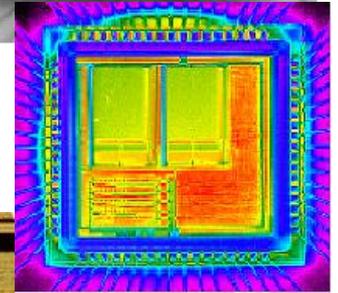
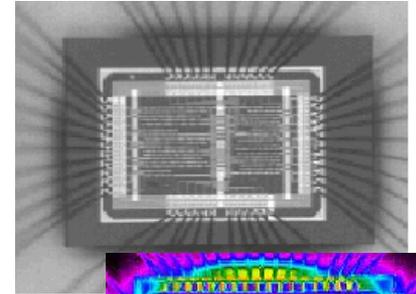
- Digital FM demodulation
- Analog programmable SI matrix

A/D converter

- Σ/Δ modulation with a novel architecture
- Part of project SEWING - System for European Water Monitoring project

Bio-Inspired reconfigurable test chip

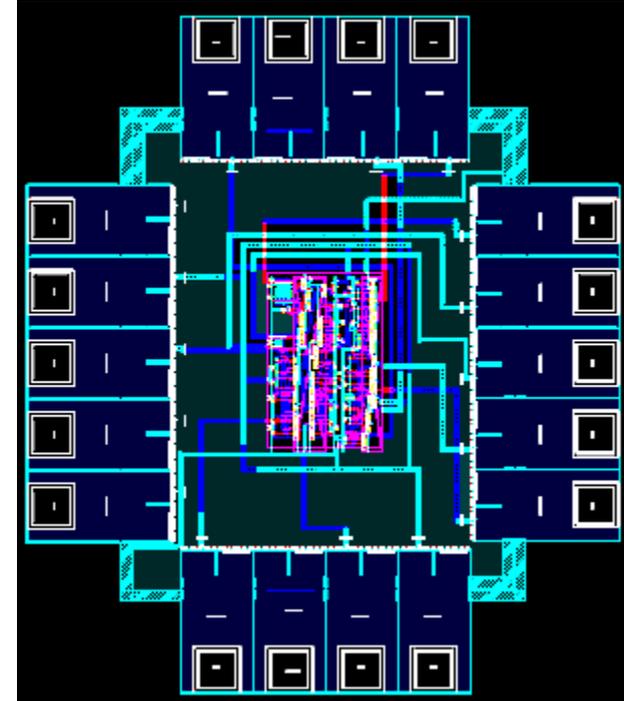
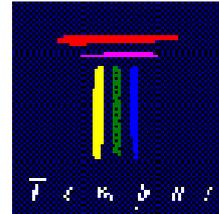
- Project PERPLEXUS – Pervasive computing framework for modeling complex virtually-unbounded systems



SMART POWER CIRCUITS

Thyristor phase controller

- Joint European Project JEP
- - 4343 “Education of computer aided design of modern VLSI circuits”
- Research grant entitled: “Modern methods of specialized circuit design – methods of testing and measurements of specialized circuits and systems”



Modern commercial circuits and systems for Tritem Microsystems GmbH

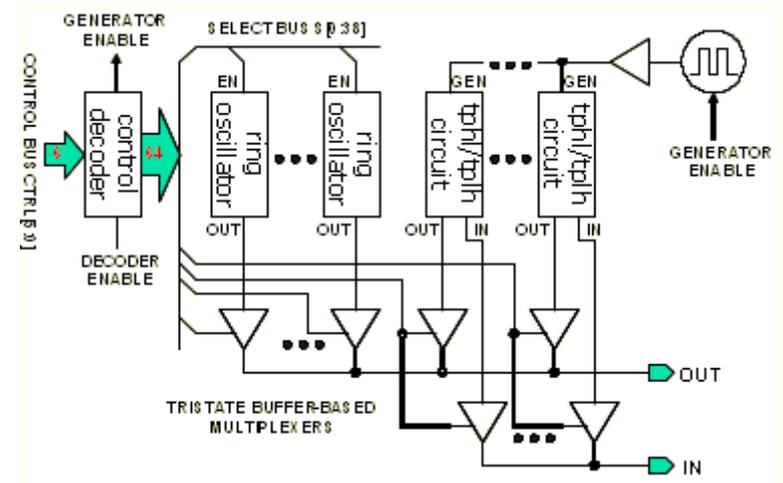
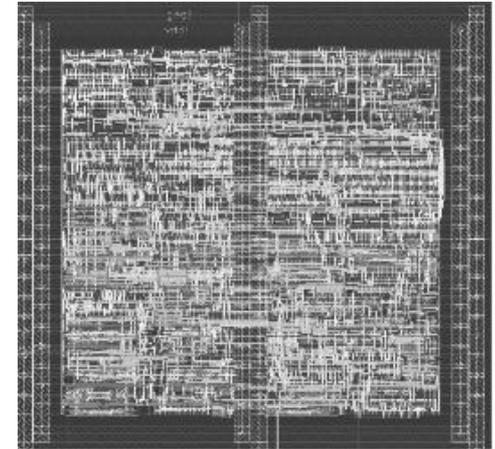
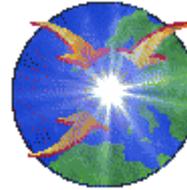
- Several ASICs successfully entered the market



DYDACTIC-PURPOSE IC

Educhip

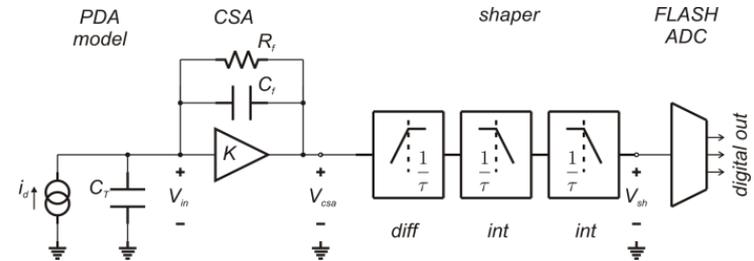
- Coordinated by Warsaw University of Technology
- CMOS technology
- Educational IC
- Inverter, NAND and NOR gate based ring oscillators
- Specially shaped logic gates for propagation delay measurements
- REASON - Research and Training Action for System on Chip Design project



RADIATION-RELATED ASIC PROJECTS

Readout from Multichannel Optical Radiation Sensors

- Development of an IC prototype for reading out short current pulses from 2D photodiode array Funded by Polish National Science Centre

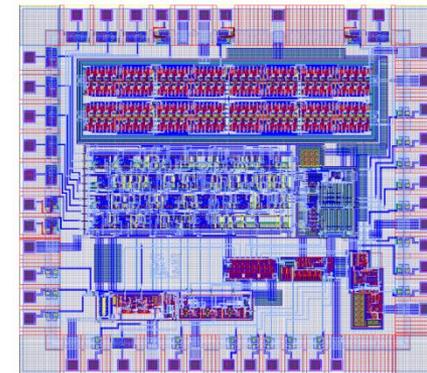
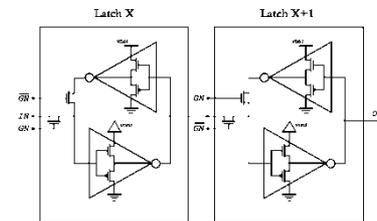


Design and analysis of particle sensors, signal readout and processing circuits for 2D and 3D applications

- Works conducted in cooperation and with use of facilities of Institut Pluridisciplinaire Hubert Curien – IPHC in Strasbourg, France

The multi-project ASIC design used for realization of customized SEU detector

- Internal TUL grant used for funding
- Shift register block based on D-type latch cells implemented

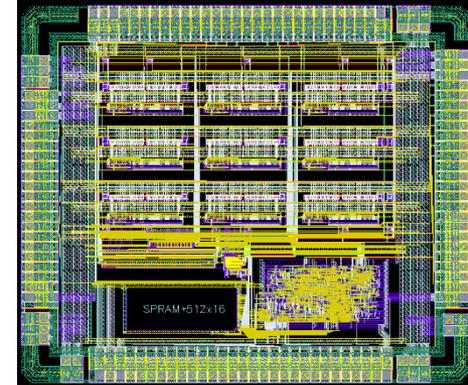




THERMAL PHENOMENA RESEARCH

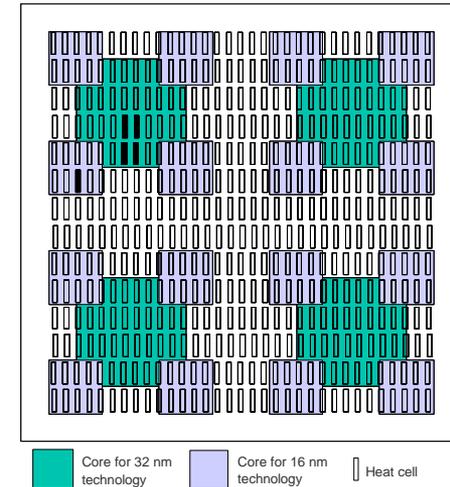
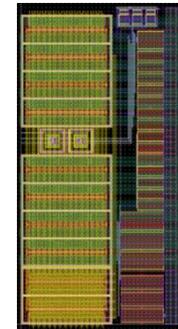
Test ASIC for estimation of heat source temperature based on temperature sensors on chip boundary

- Scientific grant "Thermal modeling of electronic systems based on advanced algorithms for optimization and estimation with particular emphasis on methods of solving inverse problems"



Test ASIC for Investigation of Thermal Coupling in Many-Core Architectures

- Scientific grant "Analysis of multi-core processors using the coupled logical-thermal simulation"

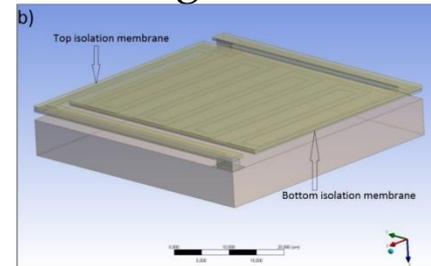




EDUMEMS

Developing Multidomain MEMS Models for Educational Purposes

- Appointment of a team of scientists dealing with modelling and design of MEMS
 1. Development of a MEMS design workflow
 2. Design and modelling of some sample structures
 3. Preparation and publication of scientific papers and books for students about MEMS modelling and design



LAAS-CNRS



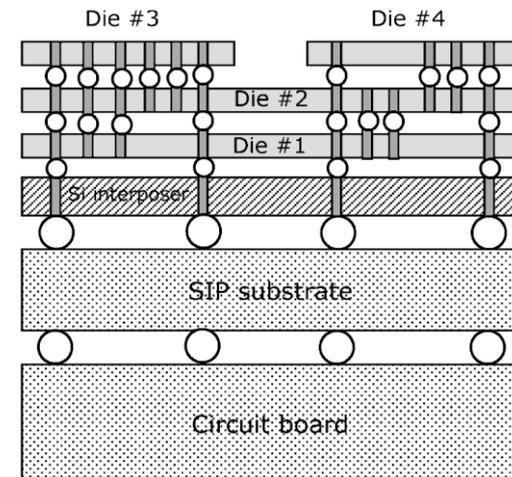
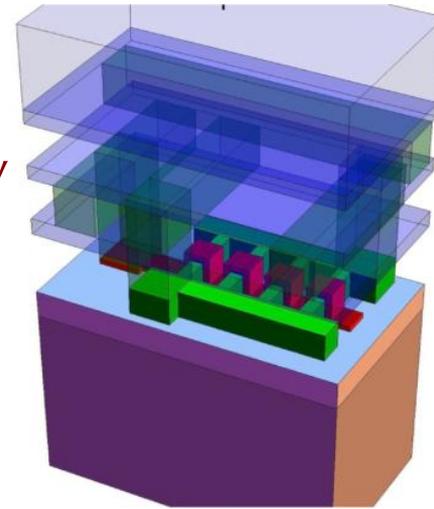
Partner name	Short name	Country
LODZ UNIVERSITY OF TECHNOLOGY	TUL	POLAND
WROCLAW UNIVERSITY OF TECHNOLOGY	WUT	POLAND
UNIVERSITEIT GENT	UG	BELGIUM
CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE	CNRS	FRANCE
LVIV POLYTECHNIC NATIONAL UNIVERSITY	LPNU	UKRAINE
NACIONALNIY TEHNICHNIY UNIVERSITET UKRAINI KIIVSKIY POLITEHNICHNIY INSTITUT	NUKPI	UKRAINE



ELECTROMAGNETIC PHENOMENA

Modeling of Electromagnetic Interactions in Modern (More-Than-Moore) Three-dimensionally Integrated Semiconductor Structures

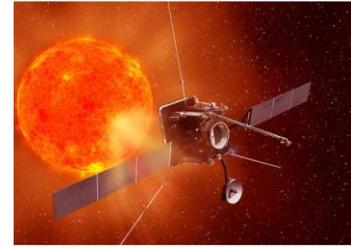
1. Development of an effective modeling and simulation method for electromagnetic (EM) phenomena inside and around semiconductor structures, including integrated 3-D systems
2. Development of a circuit extractor and computational kernel (solver) coupled with electrical simulator
3. Development of EM-focused design rules to form of software tools used during DRC, ERC and SI phases of design verification
4. Verification of developed method and design / verification tools, by their application in design of series of experimental ICs





MISAC

Mixed Signal ASIC Controller for Satellite Medium Power DC/DC converters

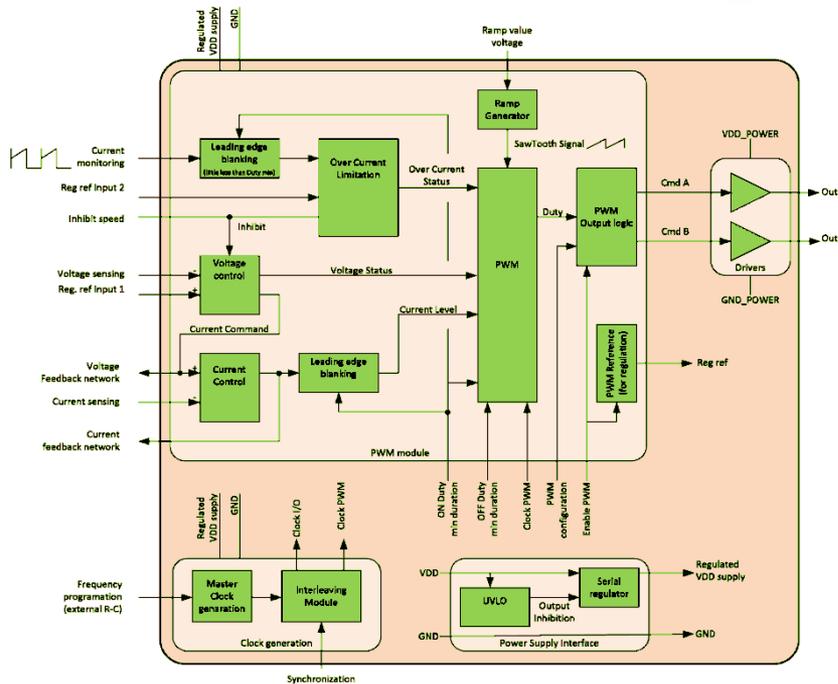
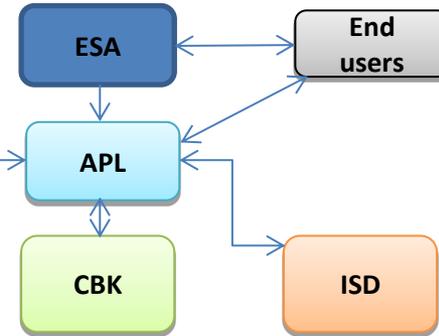


ASTRI POLSKA



European Space Agency
Agence spatiale européenne

TUL
DMCS



Architectures: Possible versions:

- Buck
- Boost
- Buck-Boost
- Flyback
- Forward
- Analog
- Mixed signal
- Digital





**THANK YOU
FOR YOUR ATTENTION**

