



ESCCON 2019
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CNES : recent parts development and qualification

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CNES PARTS TRANSVERSE ACTIVITIES

1. Alert System
2. R&D (new radiation effect, derating, ...)
3. Manufacturer Certification (ESCC)
4. Parts development funding
5. Parts Data base
6. Standardization (ECSS)
7. Export control

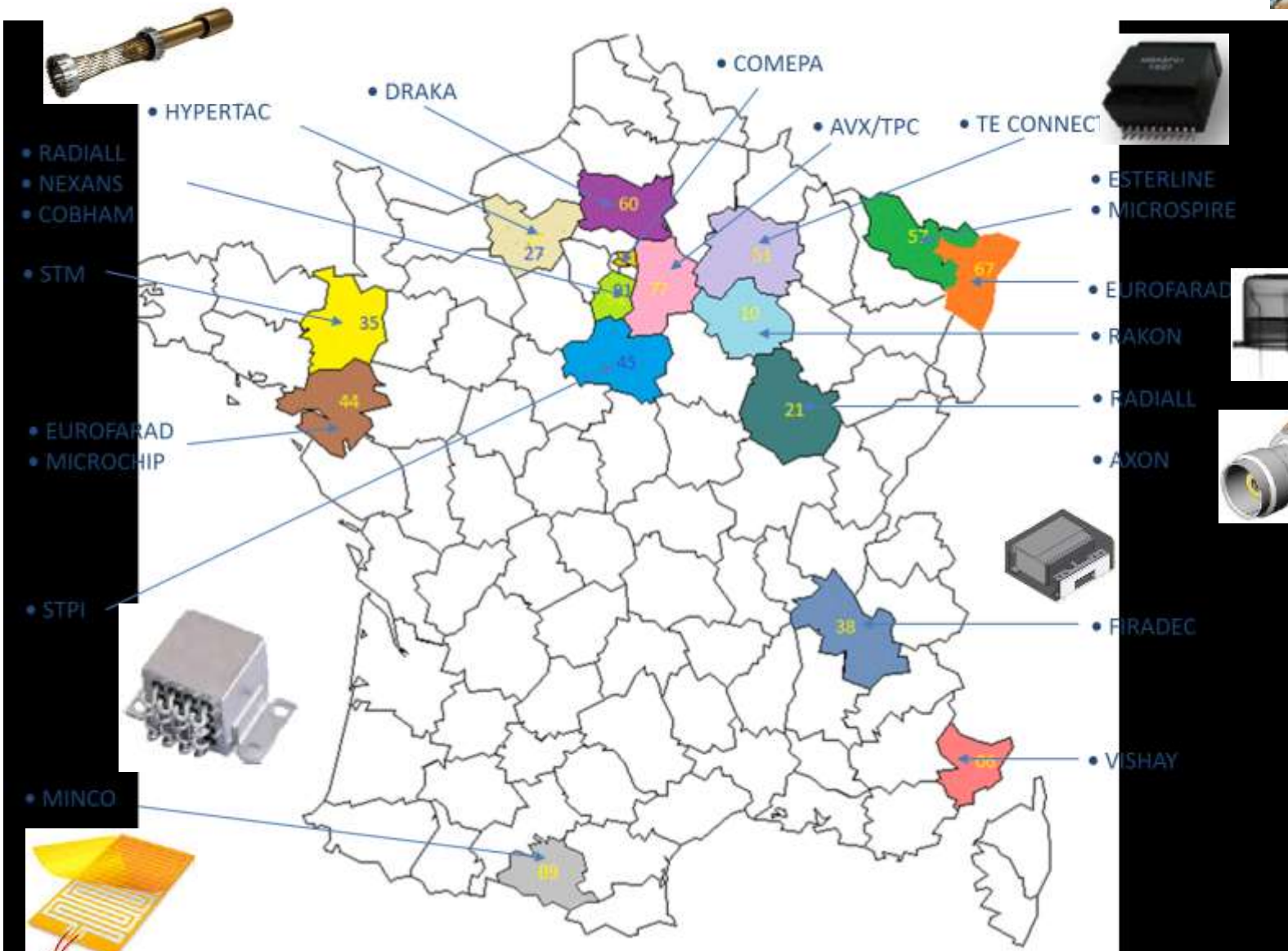
Topic of this
presentation



CNES TRANSVERSE PARTS ACTIVITIES

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3. **Certification**
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CERTIFICATION ACTIVITIES



3 ESCC certificates supported by CNES.

Each manufacturer is visited by CNES between once and twice per year.

22 french manufacturers certified

CNES TRANSVERSE PARTS ACTIVITIES

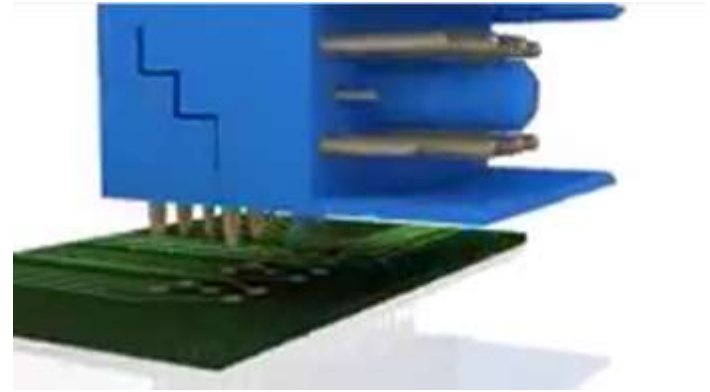
1. Alert System
2. R&D (new radiation effect, derating, ...)
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Cable & Connectors

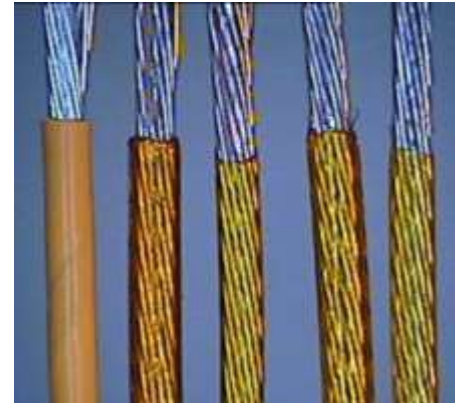
A connector easy to be mounted
(Positronic- pressfit)



Positronic®



A wire easy to be stripped
(Axon)



Each year, one or two innovation projects of French connector manufacturers are supported by CNES

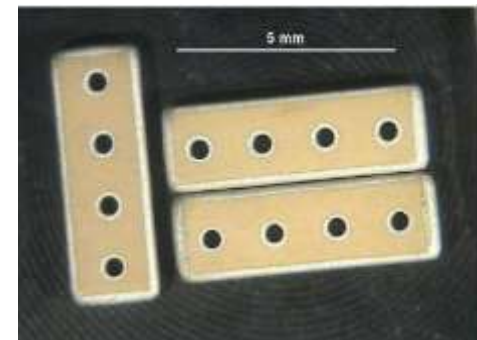
Passive parts



Planar inductor
(Vishay)



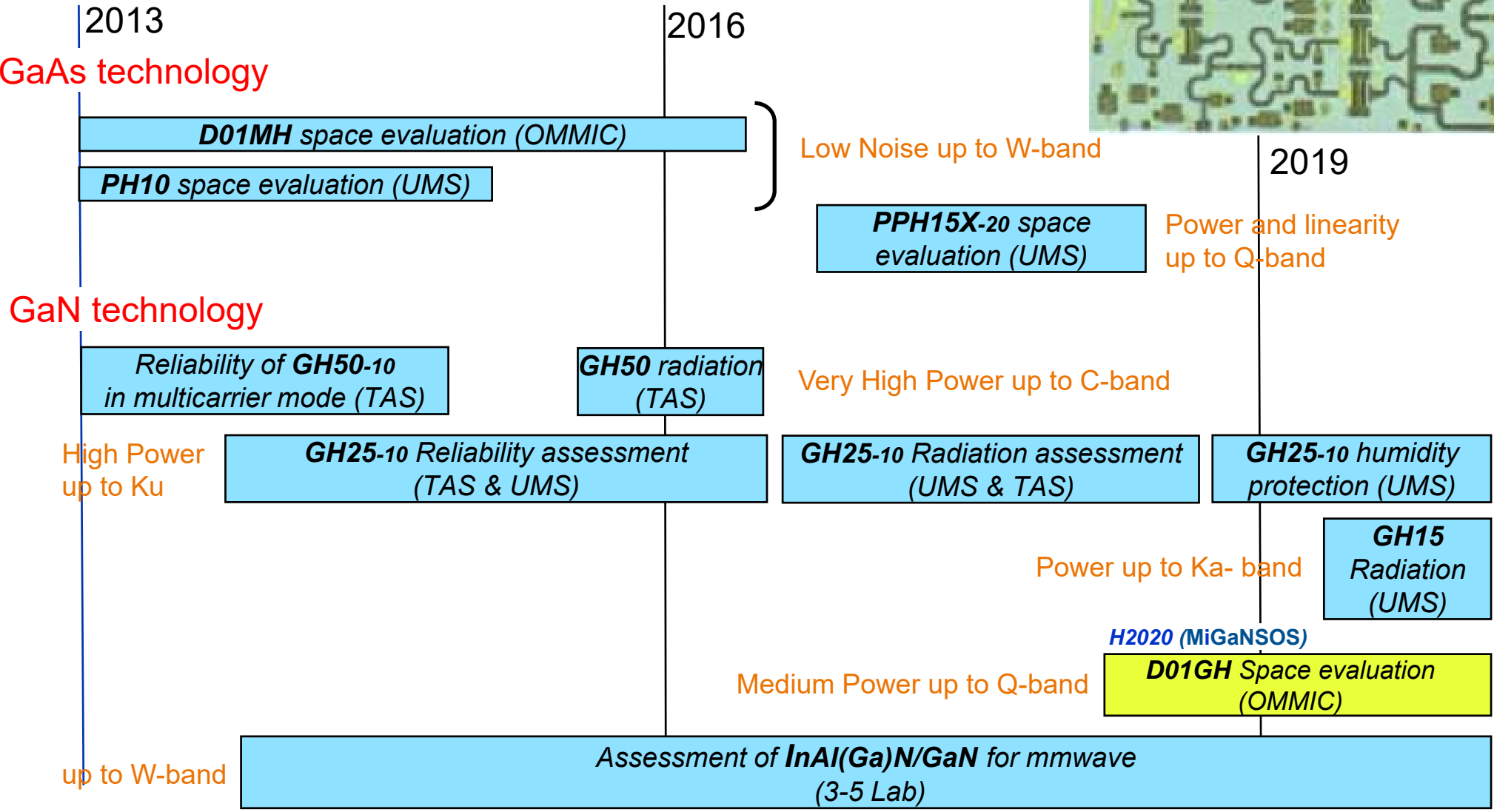
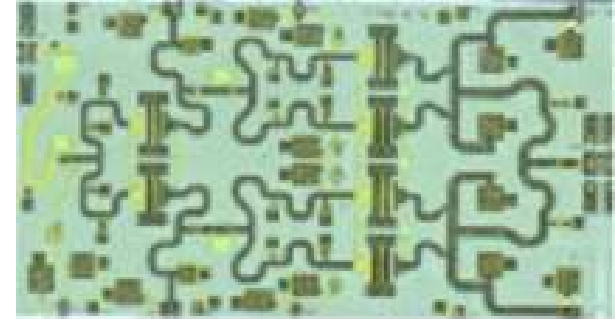
Ceramic capacitor (multi-channel) filter
(Exxelia ceramics)



A few specific passive parts development were supported by CNES during the last 3 years.

RF chain parts

RF



CNES
EC

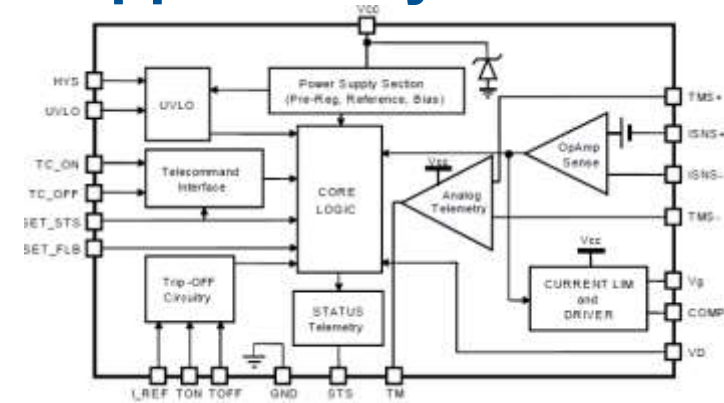
Power and low noise RF parts development are supported by CNES

Electrical Power System parts



Power Parts portfolio recent development supported by CNES

- Rad-hard Point of load RHFPOL01 (STM)
- Rad hard Point of load (3Dplus)
- Rad hard bipolar transistor 600V (STM)
- Diode 600V (STM)
- Rad-hard Current limiter (STM)



Power GANFET activities supported by CNES

- GANfet EPC - Dynamic $R_{DS(on)}$ measurement
- GANfet – SEE measurement

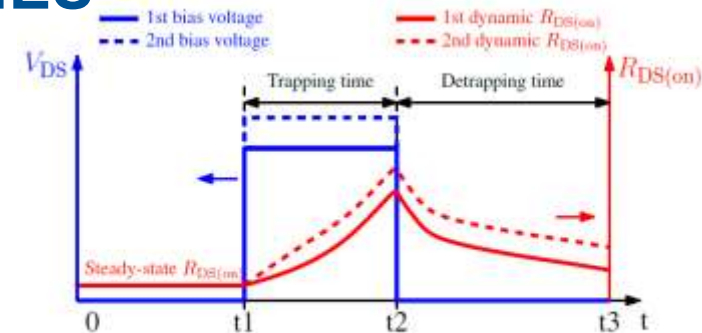


Fig. 1: GaN-HEMT dynamic $R_{DS(on)}$ values due to trapping effects

A rad –hard power parts portfolio development and the introduction of GANFET are supported by CNES

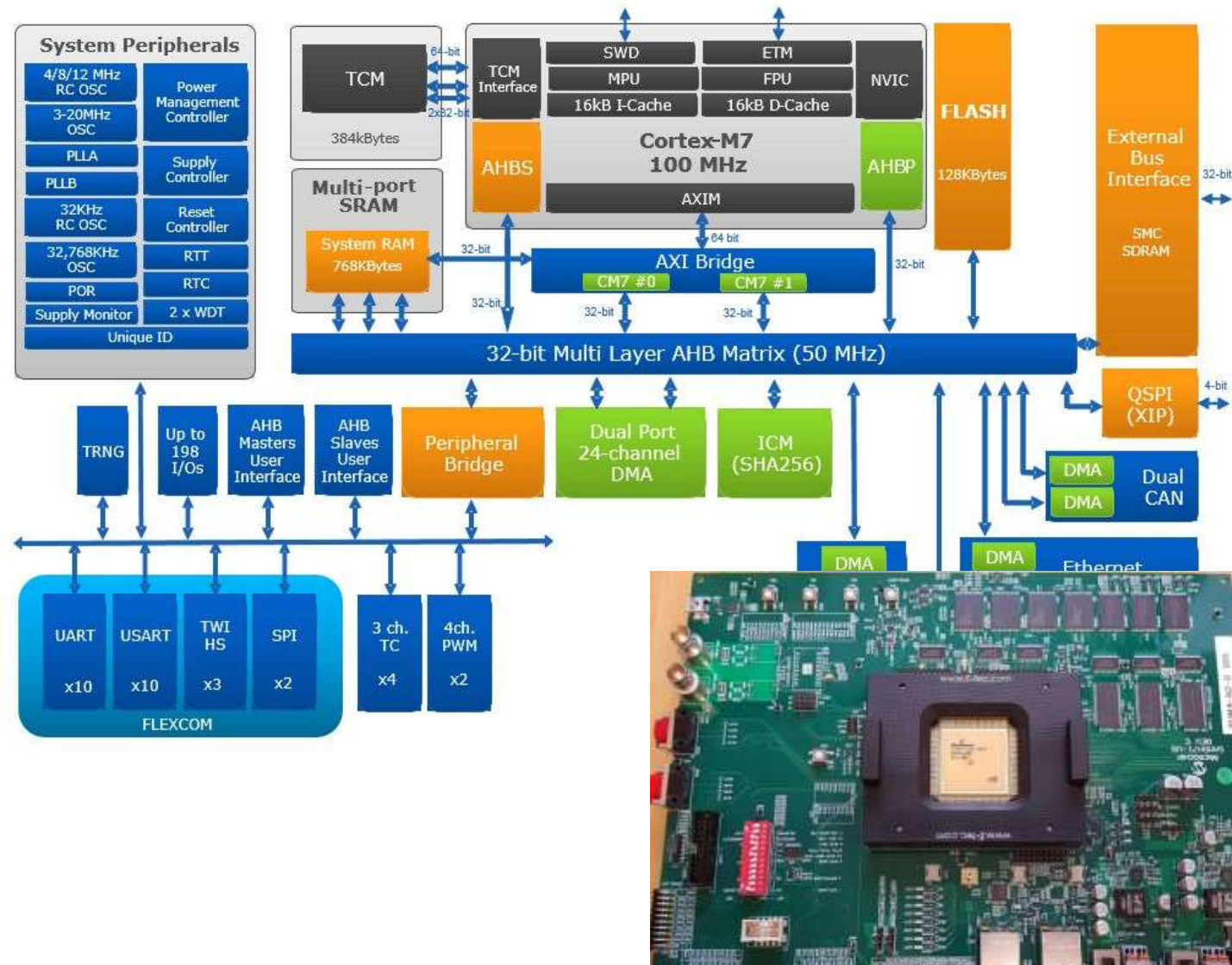
Data-handling parts



Category	Type	Manufacturer
Rad-hard Microcontroller	<ul style="list-style-type: none"> SAMRH71 SAM3XE (rad-tolerant) 	Microchip
Computer core	<ul style="list-style-type: none"> FUSIO RT (Nx SOC + memories) 	3Dplus
Rad-hard FPGA	<ul style="list-style-type: none"> 3 products (Medium, Large, Ultra) : Nanoexplore 	Nanoexplore
Rad-hard ASIC	<ul style="list-style-type: none"> 150 nm CMOS SOI –Digital & mixed 65 nm CMOS Digital ASIC 28 nm CMOS SOI digital Next node and Prospective <28nm 	Microchip, STM, E2V
COTS SoC	<ul style="list-style-type: none"> ZYNQ, US+ 	Xilinx
Rad-hard Data converter	<ul style="list-style-type: none"> Broadband data converters - > 1Gbps Precision data converters (ST) 	E2V, STM
Rad-hard LVDS driver	<ul style="list-style-type: none"> Precision and differential amplifier 	STM
Rad-hard Logic IC	<ul style="list-style-type: none"> High speed Nand gates 	STM

Breakthrough data-handling parts are funded by CNES.

Data-handling parts



SAMR71 : example of rad-hard SoC development funding.

Data-handling parts



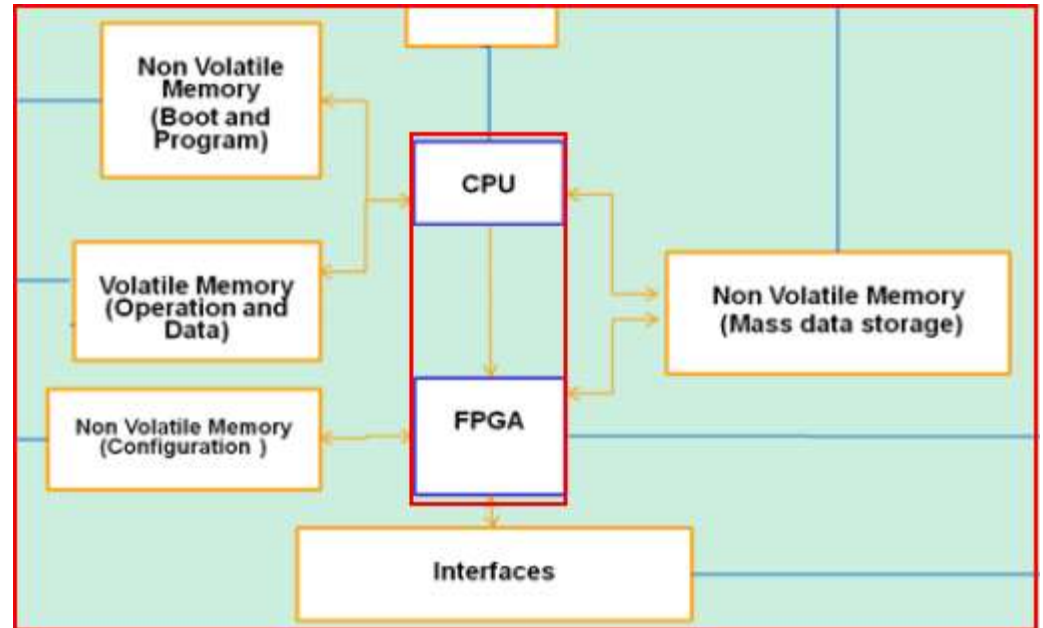
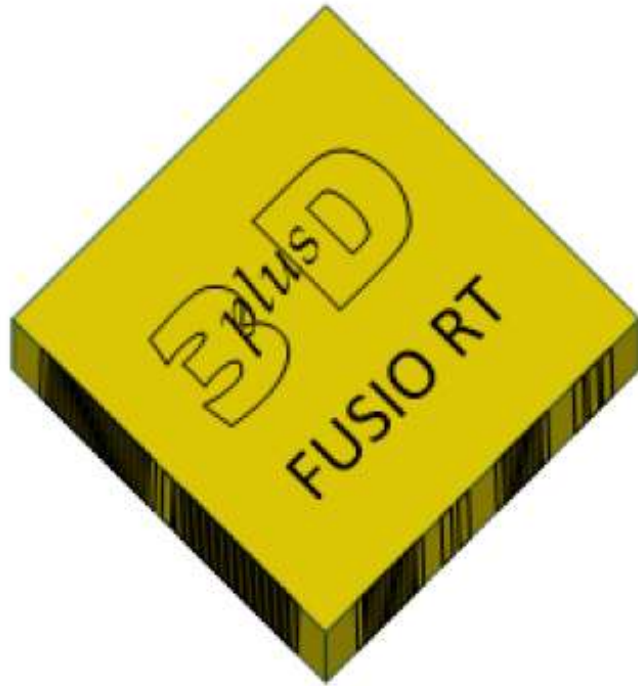
SEE test at board level
done @ CERN



First Flights planned in 2018 and 2019

ZYNQ : example of commercial SoC evaluation.

Data-handling parts



FUSIO RT : rad-hard computer module development

Conclusion and future challenges

- A large diversity of space qualified parts is supported by CNES.
- « Rad hard » ASIC and FPGA : beyond 22 and 28 nm
- COTS evaluation : harmonization and coordination to be organized, especially for very complex System On Chip.