



**Chips**\*\*\*  
JÜ

**HECS 2024**  
**GHENT** BELGIUM  
5-6 December

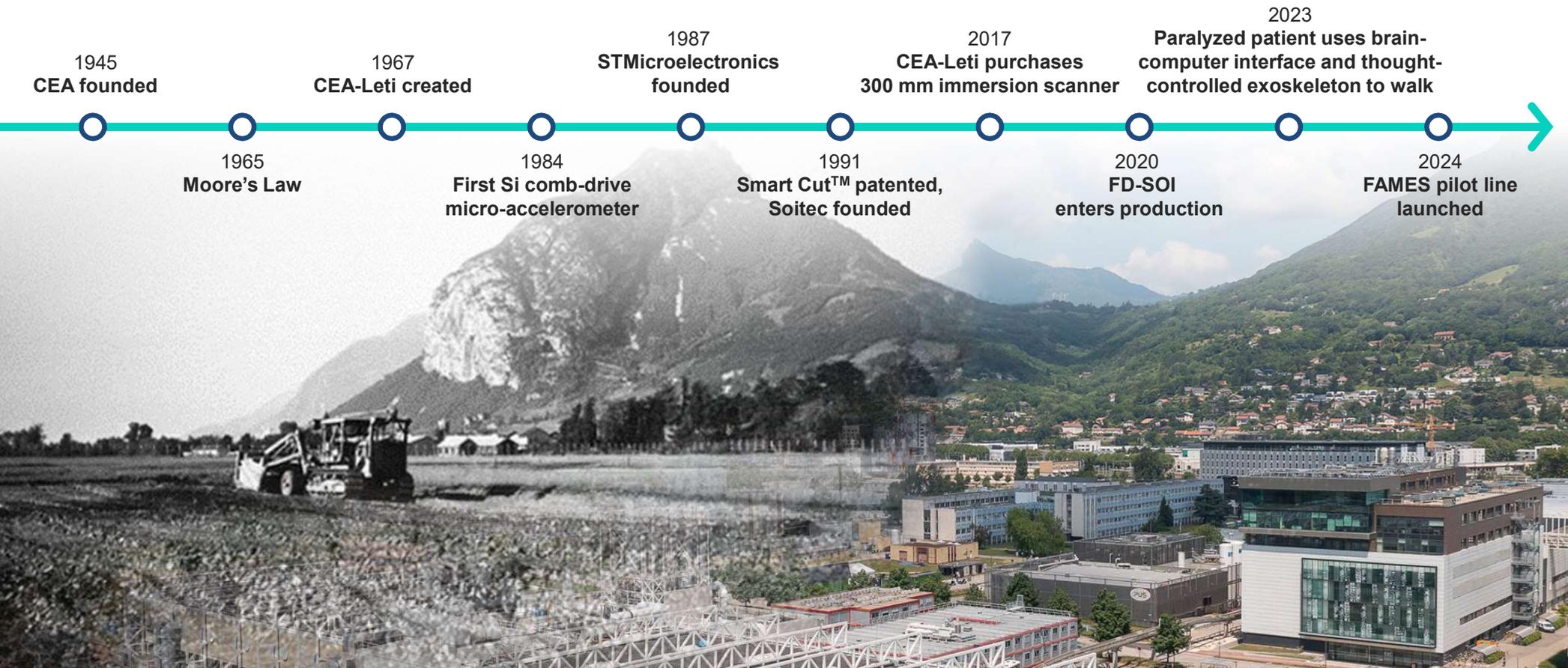
## **FAMES Pilot Line**

Towards energy-saving chips for digital, analog, RF

Dominique Noguet , CEA-Leti, FAMES Pilot Line Coordinator

December 5, 2024

# CEA-Leti and semiconductors, a decades-long history





# CEA-Leti cleanroom capabilities

**World-class facilities**

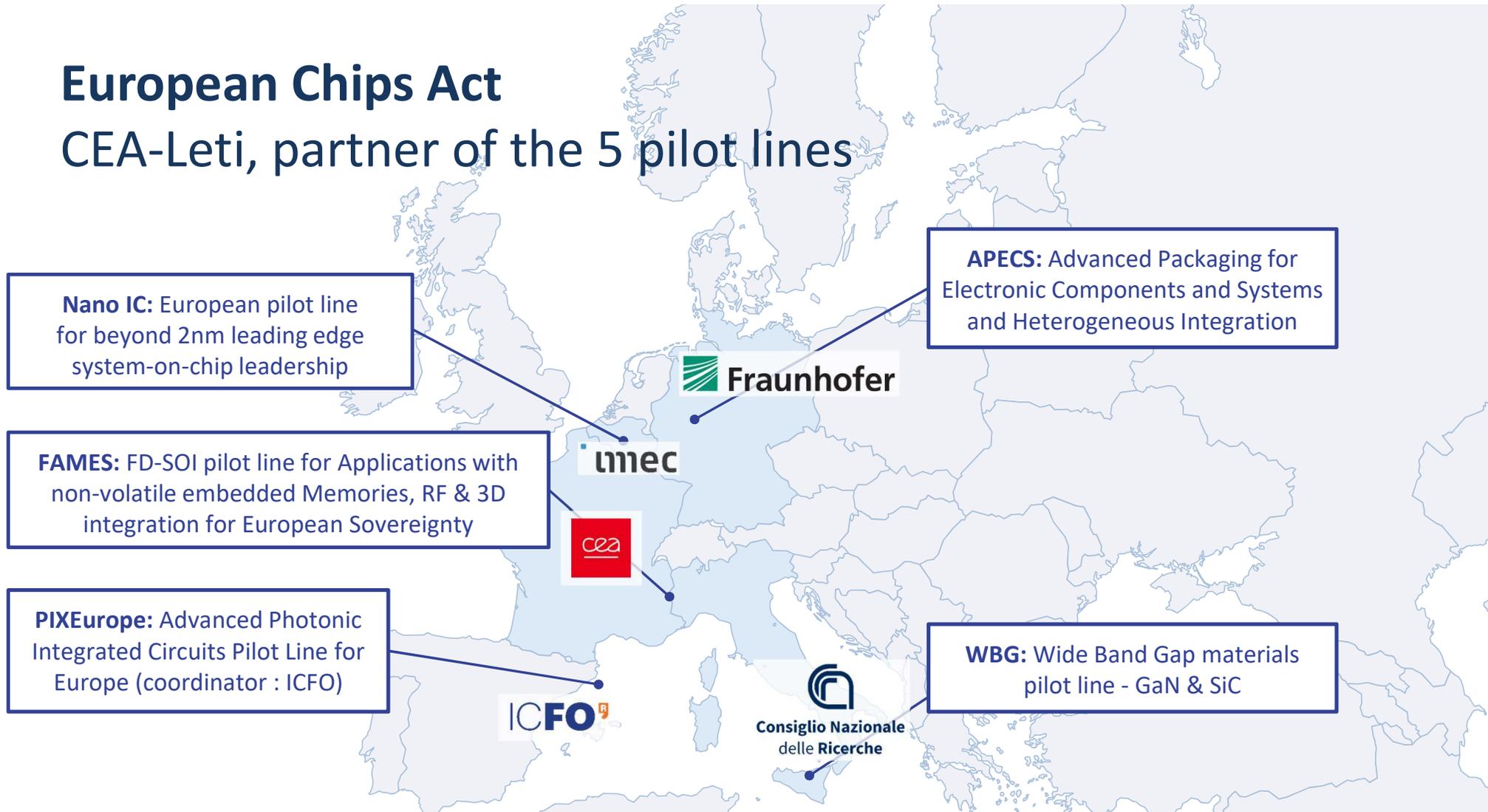
- 700 state-of-the-art tools
- 11,000 m<sup>2</sup> of cleanroom
- 24/7 operations

- 300 mm FD-SOI & beyond CMOS GAA
- 200 mm 300 mm On-chip memories
- 200 mm 300 mm RF (active & passive)
- 200 mm 300 mm Si photonics
- 200 mm 300 mm MicroLEDs
- 300 mm Imagers
- 200 mm MEMS, PMUT, optomechanical systems
- 200 mm 300 mm Power electronics (Si, GaN, SiC)
- 200 mm 300 mm 3D IC & packaging
- 200 mm 300 mm Substrates
- 200 mm II-VI and III-V semiconductors

MORE THAN MOORE

# European Chips Act

## CEA-Leti, partner of the 5 pilot lines



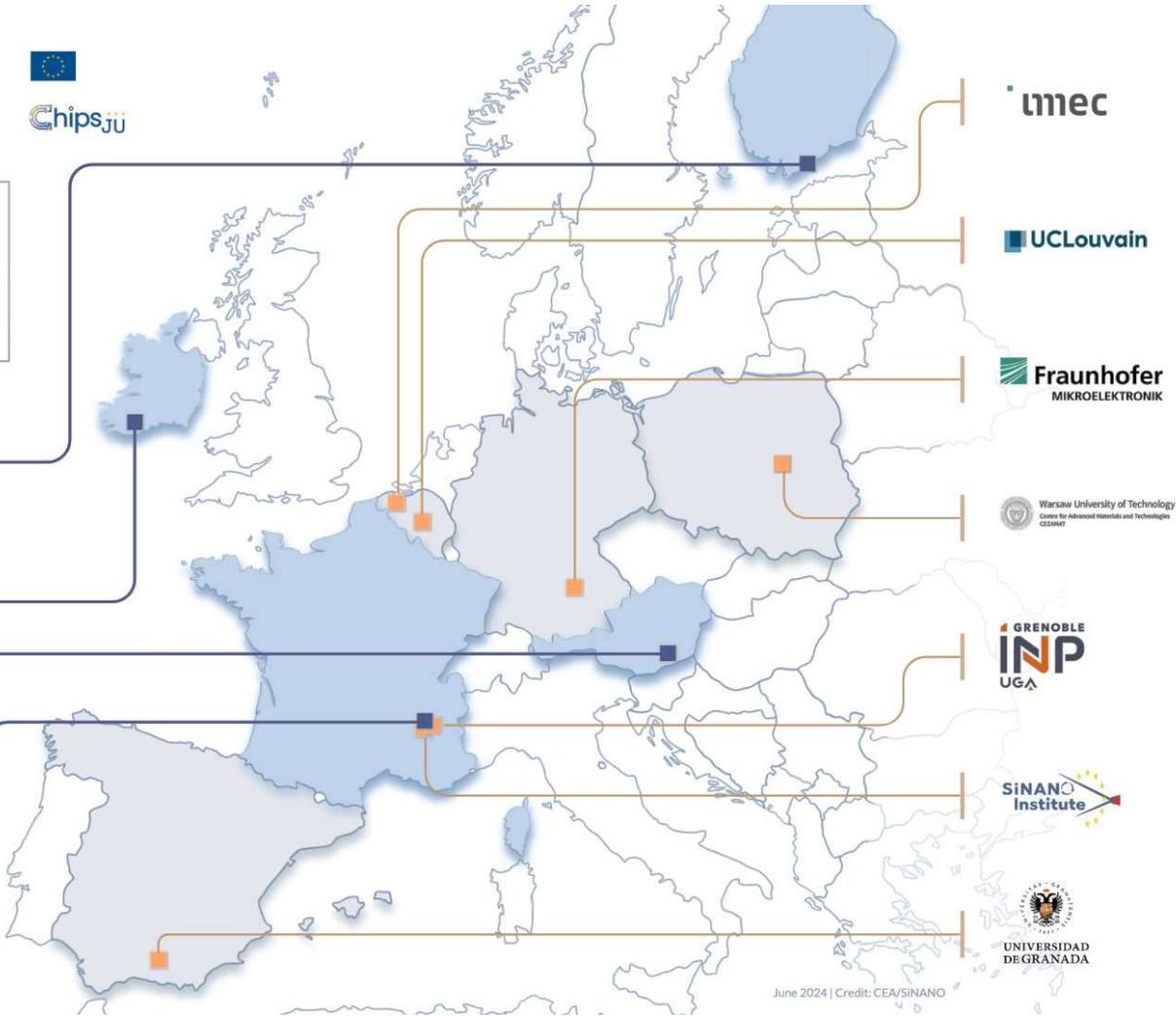


**FAMES Pilot Line Consortium**

- Hosting sites
- Skills contributors



fames-pilot-line.eu



June 2024 | Credit: CEA/SINANO

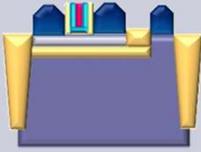
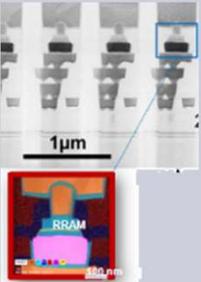
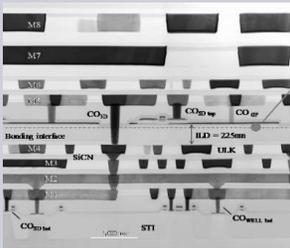
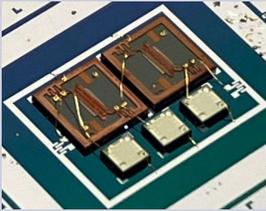
**Budget :** €830 M

- CAPEX: €382 M
- OPEX: €448 M

**Funding mechanisms**

- 50% Chips JU
- 50% Member States

# FAMES Technological Offer

FD-SOI	Embedded non-volatile memories	Radiofrequency components	3D integration	Small inductors for DC-DC converters
<p>10 nm and 7 nm nodes</p>  <p>0,7V 57CPP 48/40MPP</p>	<p>OxRAM, FeRAM, MRAM and FeFET</p> 	<p>Switches, filters, and capacitors</p> 	<p>Heterogeneous and sequential</p> 	<p>Power management integrated circuits (PMIC)</p> 

A wide range of semiconductor technologies, PDKs, testing, demonstrators and manufacturing capabilities.

# FD-SOI is selected by worldwide key players



## Communications

- FD-SOI is ideal for 5G mmWave
- 5G sub-6 GHz
- Mobile infrastructure
- WiFi 6



**November 2021**  
Google Pixel 6 5G mmW  
with Samsung FD-SOI



**August 2022**  
Next gen 5G mmw RFIC  
by Qualcomm will use 22FDX  
technology



**July 2022**  
MediaTek 5G mmWave platform  
uses 22 FDX



**April 2023**  
Nordic redefines its leadership  
in Bluetooth Low Energy with the  
announcement of the nRF54 Serie



## Automotive

- Autonomous cars
- Infotainment



**March 2021**  
Bosch mmW radar ECSEL  
projet OCEAN 12



**March 2021**  
NXP for ultra-low power  
in automotive



ST unveils its new MCU Stellar  
MCU for Auto



## Smart Devices

- Edge computing
- 3D sensing & healthcare
- Smart home & smart cities
- Data centers



**January 2022**  
NXP for ultra-low power  
in automotive



**GNSS**  
Development of 0.7 V RF circuits  
with efficient energy use

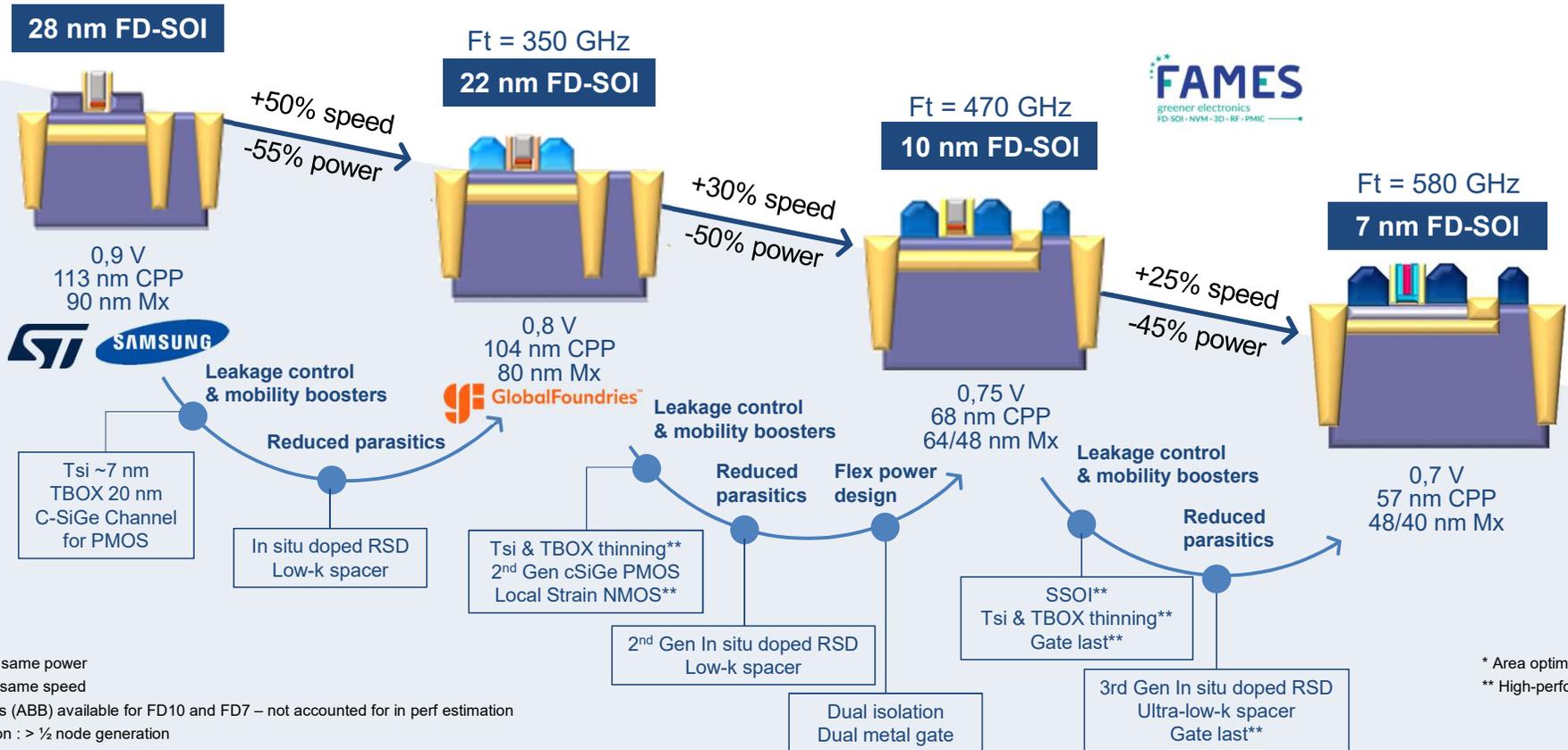


**GPS**  
The watch launched by the  
company Huami features a GPS  
circuit built on FD-SOI

# FD-SOI transistors boosters development in FAMES: The optimal PPAC-E technology for mixed-signals circuits

28 nm and 22 nm FD-SOI industrial solutions

10 nm and 7 nm FD-SOI developed in FAMES Pilot Line



\* Area optimisation  
 \*\* High-performance options

Speed = speed @ same power  
 Power = power @ same speed  
 Adaptive Body Bias (ABB) available for FD10 and FD7 – not accounted for in perf estimation  
 ABB gain estimation : > 1/2 node generation

# Innovative, Differentiated Developments for Key Markets

## Specific developments for key markets

### Computing

- Microcontrollers
- MPU
- Trusted IC
- AI/ML chips

### Sovereignty fields

- Quantum chips
- CryoCMOS chips
- Trusted IC
- New space components

### More Than Moore

- Automotive
- 5G/6G chips
- RF connectivity
- Smart sensors
- Smart imagers
- Smart displays
- IoT devices
- Cybersecurity
- Wearables

# Opening the pilot line to European stakeholders

## 44 letters of support

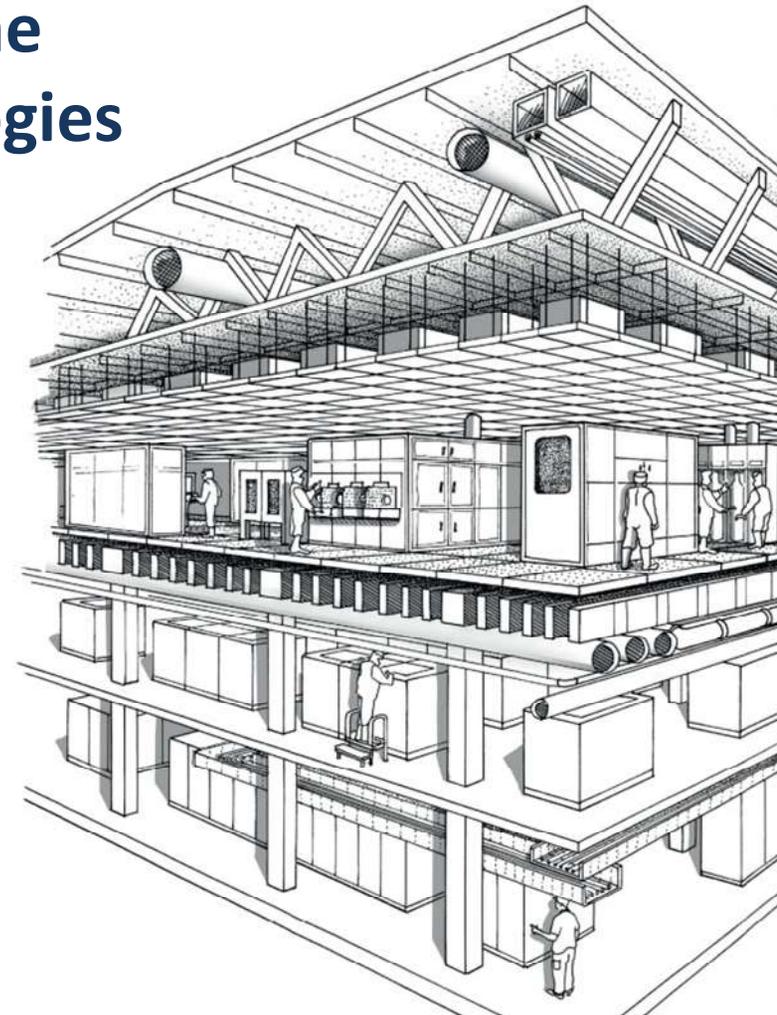


# FAMES European open-access pilot line for advanced semiconductor technologies

- **Submitting a proposal for a custom project** to be reviewed by the FAMES consortium for feasibility, or
- **Responding to annual open calls**

which give users access to:

- Two types of PDKs (multi-project wafer or IC design assessment)
- The FAMES technologies (FD-SOI 10 nm and 7 nm, embedded non-volatile memories, RF components, 3D integration options) for performance evaluation, as they become available
- Specific process steps, modules, integration flows, and demonstrator results
- Education and training on the FAMES technologies



# Forthcoming Key Dates

Mid-March, 2025

**FAMES Pilot Line  
Open Call**  
*Online opening*

 [fames-pilot-line.eu](https://fames-pilot-line.eu)

March 18, 2025

**FAMES Dedicated  
Workshop**  
Launch of the 1<sup>st</sup> open call  
*Brussels, Belgium*

 [fames-pilot-line.eu](https://fames-pilot-line.eu)

June 19, 2025

**FAMES  
School**  
Initial training  
*Grenoble, France*

 [leti-innovation-days.com](https://leti-innovation-days.com)

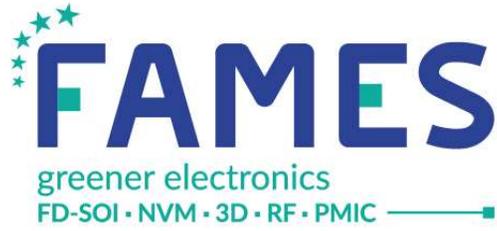


June 2024

# FAMES Kick-off Meeting

Credits: FAMES/C. Morel



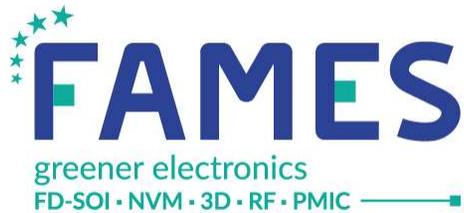


# FAMES

greener electronics  
FD-SOI • NVM • 3D • RF • PMIC



(2023 – 2028)



Follow us  
@fames-pilot-line

The FAMES Pilot Line of the Chips JU is funded by Horizon Europe and Digital Europe Programs and the National Public Authorities of the partners involved.





# Leti Innovation Days

June 17-19, 2025 | Grenoble, France

[leti-innovation-days.com](https://leti-innovation-days.com)