ECSEL Pilot Lines Success Stories & Impact

François BRUNIER, SOITEC
Partnership Program Manager
Francois.brunier@Soitec.com
Introduction: Soitec at a glance

DESIGNER & MANUFACTURER OF INNOVATIVE SEMICONDUCTOR MATERIALS

We design and deliver innovative substrates & solutions to enable our customers’ products shaping everyday life.

1,450 Employees Worldwide

GLOBAL PRESENCE

4 High-growth Markets
SMARTPHONES, AUTOMOTIVE, CLOUD & INFRASTRUCTURE, IOT

2 Unique Technologies
SMART CUT, SMART STACKING

Core expertise
Epitaxy, Compound semiconductors

6 Wafer fabs
300-mm – France (Bernin II) + Singapore*
200-mm – France (Bernin I) + China (via Simgui)
150 mm – France (Bernin III)
150 – 200-mm GaN Epitaxial wafers – Belgium (EpiGaN)

1 Largest manufacturer of engineered substrates
LEADER

Strengthen the European supply chain of Electronic Components and Systems
REFERENCE: RF ENGINEERED SUBSTRATES TO FOSTER FEM PERFORMANCE (Dec ‘16 / 48M)

GOAL

Develop innovative **RF-SOI substrates** & technologies (Including move to 300mm) enabling realization of **integrated Front End modules**, and system level **demonstrators** for **cellular, Aeronautics**, paving the way to 5G.
Background: Soitec RF-SOI in 100% of SmartPhone
A success story based on innovation

- Soitec Smart Cut™ SOI with CEA-LETI
- HR-SOI for RF with UCL

- Trap Rich SOI UCL and Soitec IP

- 1st commercial RF switch on SOI (Skyworks, RFMD...)

- Soitec HR-SOI: 100 thousands wafers (8” eq)
- Soitec Trap Rich 'RFesil' Ramp

- RF switch on SOI becomes industry mainstream
- 3rd Gen Soitec HR-SOI

- Soitec 300mm ramp

- Soitec RF-SOI: moving to 1 million wafers (8” eq)
- FEM global development plateform

Soitec
Strengthen the European supply chain of Electronic Components and Systems
Value Chain in REFERENCE

Strengthen the European supply chain of Electronic Components and Systems
SOI technology – SOI Foundry – System design

New Trap rich Materials

300mm EPI trap rich layer over HR bulk (> 15 kΩ•cm) for RF-SOI

300mm Specific HR Base for FDSOI (1st trial)

200mm RF-SOI
100dBm HD2

130nm RF-SOI (ST)

300mm RF-SOI 4K BOX and 2K BOX

1st FD-SOI HR

Aeronautic high-speed gate link 4.2-4.4 GHz

22 FD-SOI with HR Base (GF)

FEM integration

FOWLP materials

RF-SOI IC packaging ATEP / Leti

Strengthen the European supply chain of Electronic Components and Systems
REFERENCE Impact

Revenue Soitec

- 233M€
- 850 persons WW
- RIA: First 300mm RF-SOI and RF/FDSOI
- 444M€
- 1450 persons WW
  ➔ 1100 in Bernin

- > 60% of growth related to RF-SOI
- Majority of RF-SOI growth in 300mm
- 150+ additional jobs only in RF-SOI
REFERENCE: a dynamic base to grow SOI ecosystem in Europe

REFERENCE: 2015 – 2019
- 15 partners
- Topic: RFSOI for 4G+ / 300mm Proof of Concept

OCEAN12: 2018 – 2021
- 28 partners
- Topic: FDSOI automotive

New ECSEL program (submitted Sept 2019)
- Topic: RFSOI pilot lines for 5G
- 22FDX/RF Functions
Conclusions

- **Innovation** in Microelectronics starts at **substrate and material level**

- REFERENCE proved that:
  - RF-SOI and FD-SOI design platform can aggregate Automotive, IoT, Air and Space fast growing markets
  - European eco-system is well positioned to win those business

- REFERENCE demonstrated that “**Value chain model**” is a motorway
  - To accelerate co-innovation and market adoption
  - To strengthen demand in Europe and attract manufacturing capabilities

- ECSEL JU is critical to structure this collaborative ecosystem