Soitec’s engineered substrates for edge computing

Paul BOUDRE  
CEO of SOITEC  

Global CEO Summit, November 5th, 2020  
Shenzhen, China
About Soitec

Our mission: we design and deliver innovative substrates to enable our customers’ products shaping everyday life

- **Number 1**
  Largest manufacturer of engineered substrates

- **Global presence**
  1,600 employees worldwide

- **Multi-site industrial footprint**
  France, Belgium, Singapore, China

- **High volume manufacturing**
  of 200 mm and 300 mm wafers

- **Industry standard**
  Our RF-SOI substrate is in 100% of smartphones

- **Total production capacity**
  - 150 mm – 500K/year
  - 200 mm – 1300K/year
  - 300 mm – 800K/year

- **Engineered substrates**
  - Device Layer: Silicon, Strained Silicon, SiC, Germanium, InP, GaAs, GaN, InGaN, LiTaO3, LiNbO3...
  - Buried Insulator: SiO2, ONO...
  - Handle Substrate: CZ Silicon, High-resistivity Si, Sapphire, Glass, GaAs, Ge, SiC

Soitec’s engineered substrates for edge computing
A unique competitive position in the value chain

Soitec’s engineered substrates for edge computing

Soitec proprietary
Soitec engaged in China for over a decade

Since 2005

Since 2010

May 2014

Partnership with Simgui/NSIG
Signature ceremony with Dr Wang Xi

Since 2016

Since 2018
Edge computing: a new semiconductor revolution

"The 4th Tectonic Shift in Computing"

Source – NXP, 2018

Source: Jefferies
Edge computing

› Intelligence analysis with minimal or no interaction with a cloud

› The device evolution enabling smart home/city/industry when combined with AI

**Edge Computing**

- **Sense**
  - Things (devices) with various sensors

- **Think**
  - Intelligence, analysis, management

- **Connect**
  - Wire & wireless, connectivity

- **Act**
  - Thing/user/cloud interaction

Real time analytics + increasing privacy/safety

**Edge IoT device solutions**

Provide new value & experience

Soitec’s engineered substrates for edge computing

Soitec proprietary
Computing trend

[Before: cloud computing]
AI training & inference in cloud = **Cloud Computing**

[Now: edge computing]
AI training in cloud & AI inference in edge = **Edge computing**

[Future: Advanced edge computing]
AI training & inference in edge = **On-device edge computing**

**Cloud**
- Data storage → **Cloud computing**
  - IoT Service Increasing
  - Application + Data Centric

**Gateway** (Edge)
- **Connection between things & cloud**
  - Gateway + edge computing

**Things** (Extreme edge)
- **Sensor**
- **Sensor + on-device edge computing**
**Edge computing segmentation**

**Towards Zero Power**

**Smart sensor**
- **One** sensor / Device
  → Smart sensor for home/industry/city
- **Always-ON** / Small form factor
  → Low power consumption

**Smart device**
- **Multiple** sensors / Device
  → Smart devices like Wearable, Smartphone
- **High performance** / Reliability
  → Power efficiency computing

**Ultimate Energy Efficiency**

Soitec’s engineered substrates for edge computing

Soitec proprietary
Towards balanced amount of Edge and Cloud computing

- Soitec's engineered substrates for edge computing
- Soitec proprietary

Source - IBS, 2020
Edge computing – Mass market opportunity if challenges can be overcome!

<table>
<thead>
<tr>
<th>5 Key Challenges</th>
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<tbody>
<tr>
<td>Low latency</td>
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<tr>
<td>Data privacy</td>
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<td>Reliability</td>
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<td>Energy efficiency</td>
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<td>Scalability</td>
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FD-SOI
A power efficient & flexible digital technology with easy analog/RF integration for edge computing

FD-SOI substrate

Value proposition

Better Energy Efficiency
Higher Reliability
Digital / Mixed Signals Integration
RF – Best CMOS mmWave
Fastest eMemory
Lower manufacturing cost

Markets

Wired infrastructure
AIoT
Automotive
Connectivity

Ultra-thin top silicon & box enabling fully-depleted transistor operation
FD-SOI – powering the Edge Computing already today!

Next Human Machine Interface **based on 22FDX**

Home Security Camera **based on 28FDS**

Built with 28 and 22nm FD-SOI technology

Toybrick USBn an AIoT **based on 22FDX**

New Renesas R7F0E embedded energy harvesting chipset, opening a self-powered future for IoT devices **based on SOTB (65nm FD-SOI)**

New Nest Mini **based on 22FDX**

Soitec’s engineered substrates for edge computing
FD-SOI – a platform with flexibility and long run

<table>
<thead>
<tr>
<th>Technology nodes</th>
<th>65nm</th>
<th>28nm</th>
<th>22nm</th>
<th>18nm</th>
<th>12nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Power</td>
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<td>eMemory</td>
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<td>RF integration</td>
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<td>Advanced mmW</td>
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- **Body Bias / Adaptive Body Bias**
- **MRAM / PCM**
- **Fundamental value of FD-SOI technology**
- **Customers prototypes**

<table>
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<tr>
<th>Industrial status</th>
<th>Prod</th>
<th>Prod</th>
<th>Prod</th>
<th>Dev</th>
<th>Dev</th>
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</thead>
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What about China – the biggest market and ecosystem in the world?

Source - IBS, 2020

Soitec’s engineered substrates for edge computing

Soitec proprietary
Semiconductor value chain in China

End Customers and Markets

System Companies

Semiconductor Fabless Companies

Foundry with FD-SOI offering

Design IP & Services

Wafers Materials

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Key messages

› Edge computing is one of the pillars of digital transformation, becoming one of the biggest markets in next decade

› FD-SOI is a “perfect” technology platform to address Edge Computing mass adoption

› China can play a leadership role in creating Edge AI standards in 28-22nm planar technology only if China has in place a full domestic ecosystem including a competitive foundry
Soitec’s engineered substrates for edge computing

Wanpeng Zhang
Head of China - Strategic Development

Global CEO Summit, November 5th, 2020
Shenzhen, China
FD-SOI case studies
FD-SOI 案例

› Low Power AloT Processor (瑞芯微)
  › Built-in high performance (3TOPS) NPU
  › Low power consumption
  › Cost-effective in terms of NRE and die

Source: Rockchip, CES 2019

› Vision Processor for ADAS (英特尔)
  › Most advanced vision computing ASIC on the market
  › Multi-camera (up to 8) sensor processing plus radar and LiDAR
  › Intel EyeQ®4 shipping in automobiles since late 2017

Source: Mobile Eye, 2020

› Automotive radar
  › FD-SOI yields state-of-the-art radar (RF) performance
  › Embedded radar (DSP) at lower-power footprint
  › Enhances detection via highly-linear data conversion

Source: Arbe Robotics, 2020

› Ultra Low Power Application Processor
  › Feature and performance scalable multi-core platform
  › FD-SOI improves system reliability and robustness

Source: NXP, Oct 2019

Rockchip
RK1808
22nm FD-SOI

Source: Rockchip, CES 2019

Mobileye EyeQ®4
Vision processor
28nm FD-SOI

Source: Mobile Eye, 2020

Arbe Robotics
4D imaging radar
22nm FD-SOI

Source: Arbe Robotics, 2020

NXP
i.MX8
28nm FD-SOI

Source: NXP, Oct 2019
Soitec’s strategic role in China
Soitec在中国的战略地位

› Soitec’s business in China is increasing year after year. We are reinforcing our local organization and presence with sales, field support and communication. We are engaging with direct customers but also with end customers to help solve the ecosystem problems.

› Soitec业务在不断增长，我们不断强化本地的技术和销售团队，不仅与直接的客户合作，也帮助终端和系统设计客户解决生态问题。

› Soitec has already one strategic partner in China - NSIG and one business partner - Simgui. In coming years Soitec will continue to develop its business in China to support our customers.

› Soitec和沪硅产业集团建立了战略合作关系，和新傲科技是商业合作伙伴。未来我们会继续在中国深化业务发展，持续服务我们的客户。

› 5G, AI, EV are the key drivers of growth of semiconductor industry - engineered substrates play strategic role and China is playing leadership role.

› 5G、人工智能和电动汽车是未来半导体产业发展的主要驱动力。优化衬底具有战略性地位，我们相信中国正在领导这场变革。
Thank you

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