
imec
EMBRACING A BETTER LIFE

IMEC IS THE PRIME SEMICONDUCTOR LAB OF THE WORLD

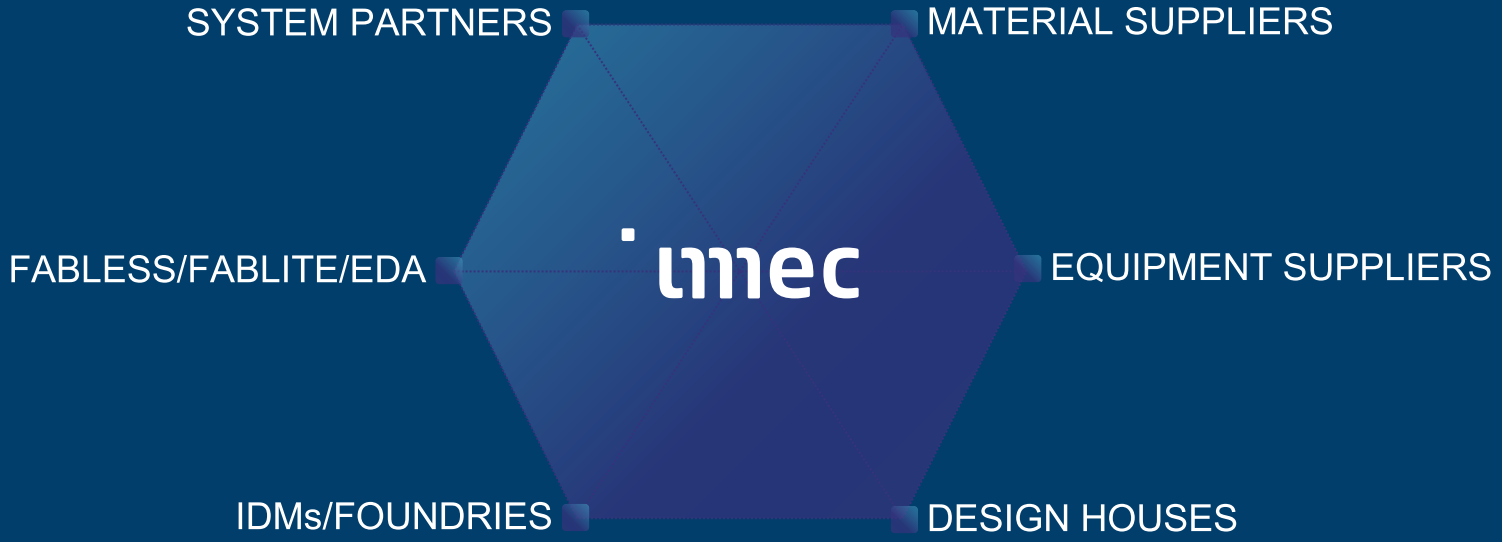
skilled
people

world-class
infrastructure

global
ecosystem


WE ARE A GLOBAL TEAM OF OVER 6,000 TALENTED EMPLOYEES
FROM MORE THAN 100 NATIONALITIES.
imec

WITH AN ECOSYSTEM OF OVER 600 PARTNERS, THAT WORK TOGETHER IN AN OPEN INNOVATION MODEL



WITH THE MOST ADVANCED SEMICONDUCTOR R&D INFRASTRUCTURE

€3,5B investment

~12,000m^2 cleanroom

over 250 tools

24/7 operation

6,000m^2 cleanroom expansion
€2,5B investment

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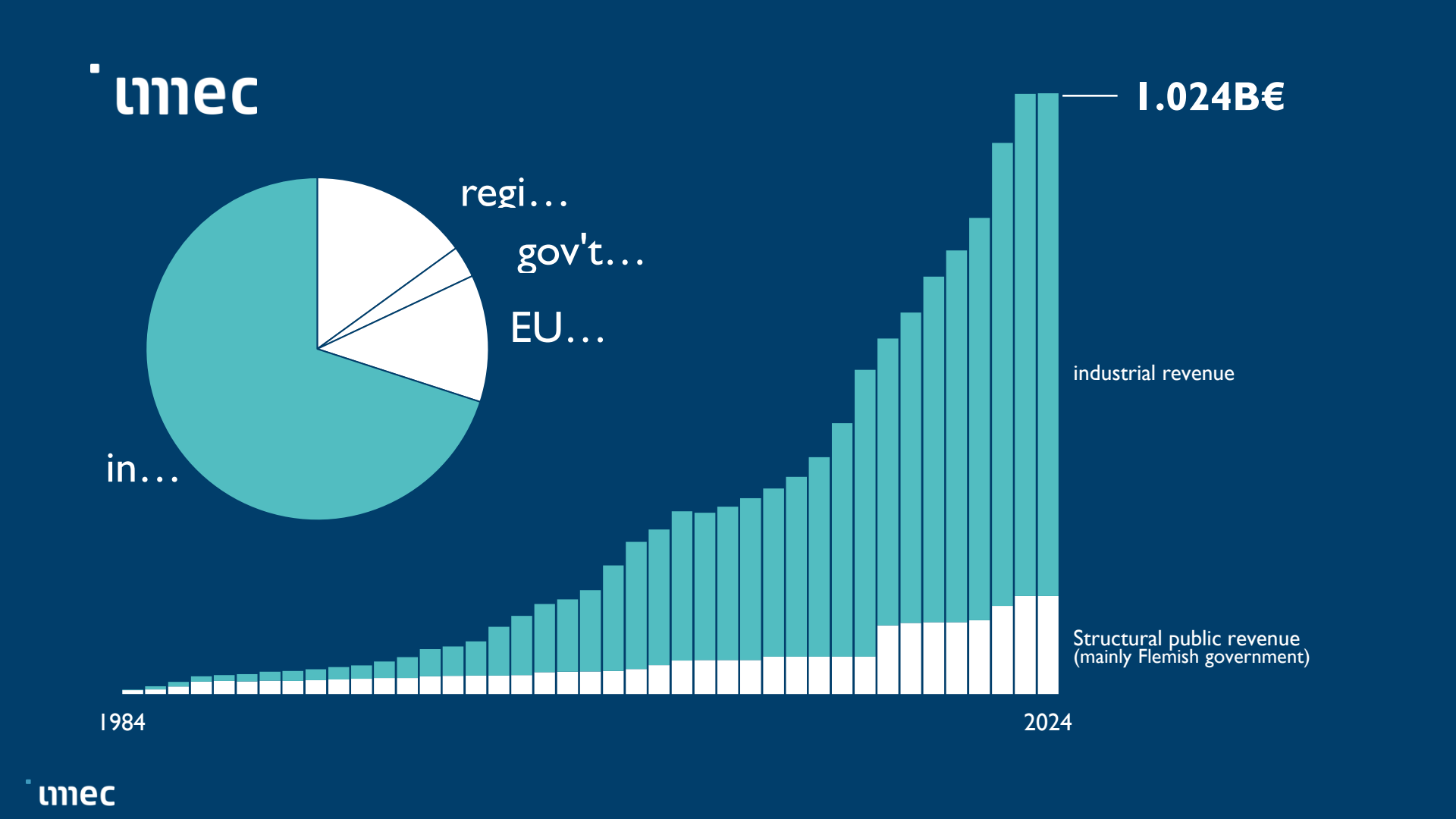
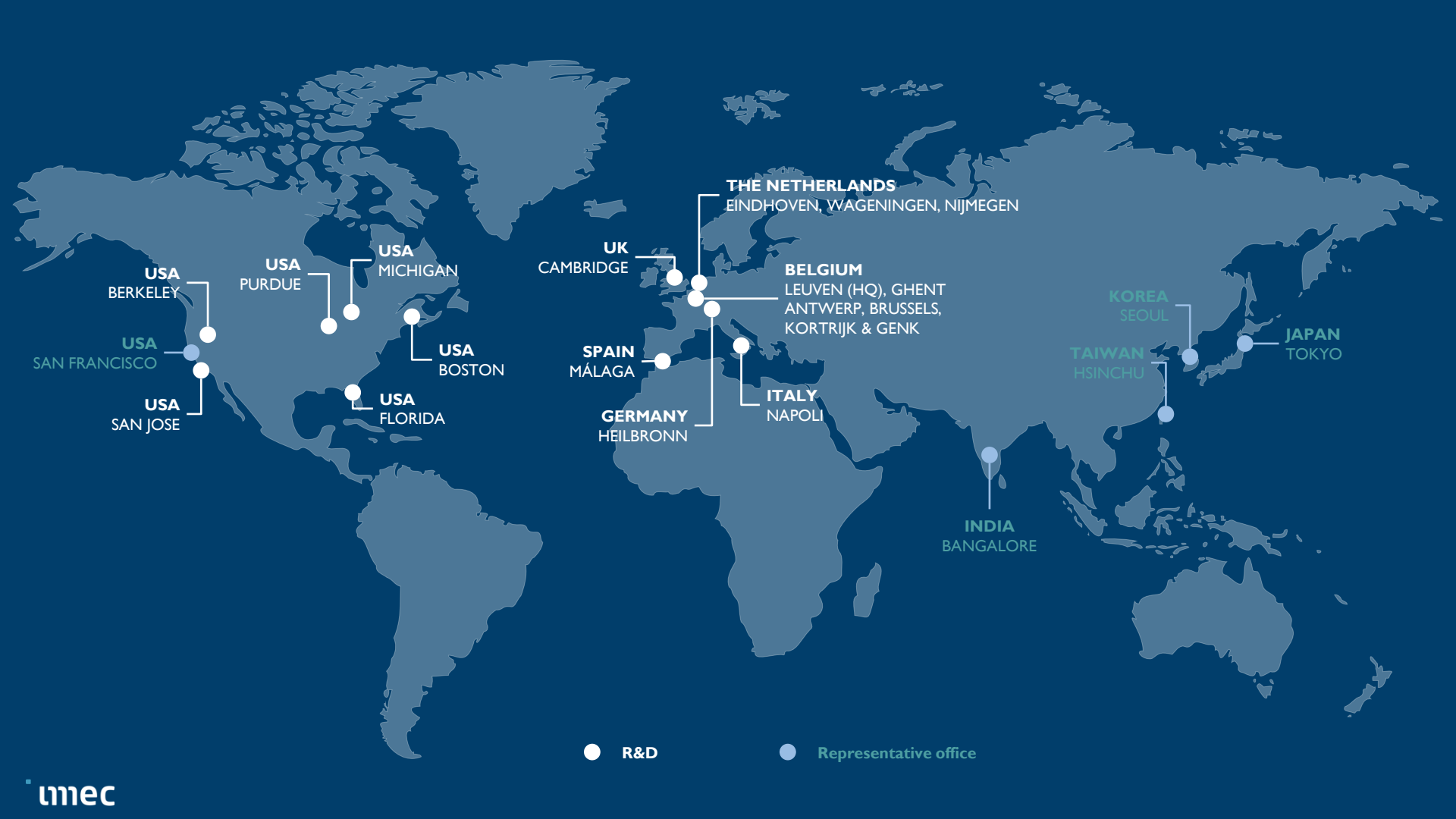

imec
regi…
gov't…
EU…
in…
1.024B€
industrial revenue
Structural public revenue
(mainly Flemish government)
1984
2024
imec


To be constructed
New opened
Fab 2+Fab 3
300mm
FAB4 300mm
FAB3 expansion
2000m² opened 2023
FAB1 200mm
FAB4 construction
4000m² – ready in 2027
Chips JU
Office
building
imec Leuven Campus:
World leading semiconductor R&D


THE NETHERLANDS
EINDHOVEN, WAGENINGEN, NIJMEGEN
UK
CAMBRIDGE
BELGIUM
LEUVEN (HQ), GHENT
ANTWERP, BRUSSELS,
KORTRIJK & GENK
USA
BERKELEY
USA
PURDUE
USA
MICHIGAN
USA
BOSTON
USA
SAN FRANCISCO
USA
SAN JOSE
USA
FLORIDA
SPAIN
MÁLAGA
GERMANY
HEILBRONN
ITALY
NAPOLI
KOREA
SEOUL
JAPAN
TOKYO
TAIWAN
HSINCHU
INDIA
BANGALORE
R&D
Representative office

OUR STRONG CONNECTION WITH THE ACADEMIC WORLD NURTURES OUR INNOVATIVE EXCELLENCE.

Global collaboration with >200 universities
700 PhD students

Long-term research pipeline and fundamental insights

Turning academic insights into industrial innovations

Together, we develop new concepts and leading-edge technology

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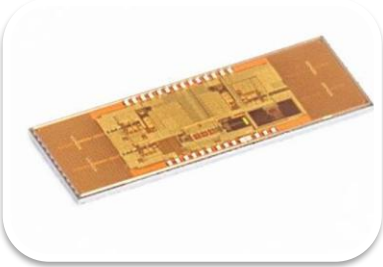
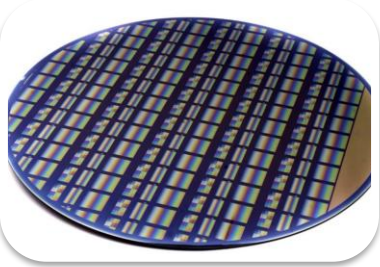
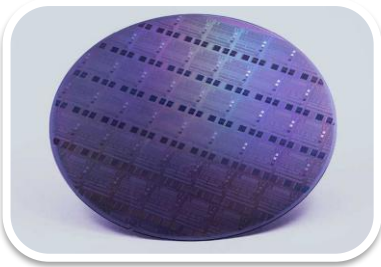
IMEC SEMICONDUCTOR PLATFORMS



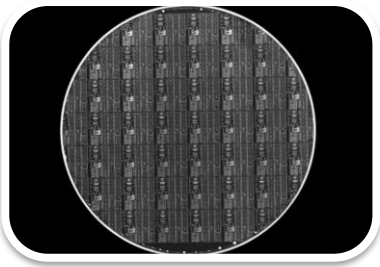
Radar



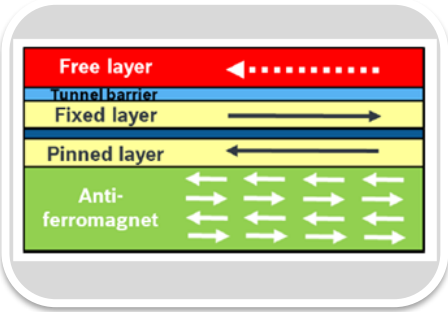
Scaled imagers



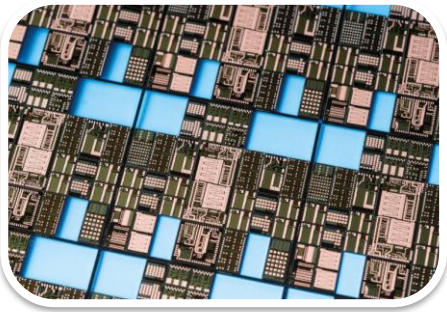
Photonics & flat optics



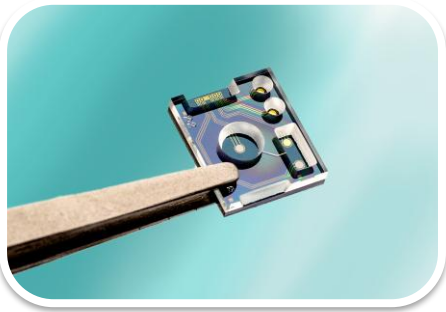
MEMS & Ultrasound



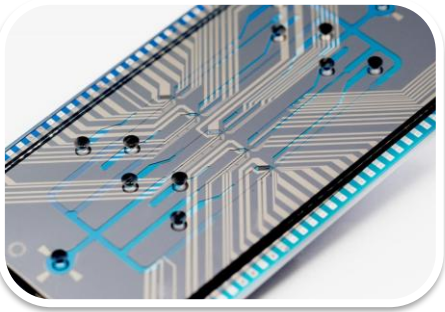
TMR



High-voltage GaN



Electrochemical



Micro-fluidics

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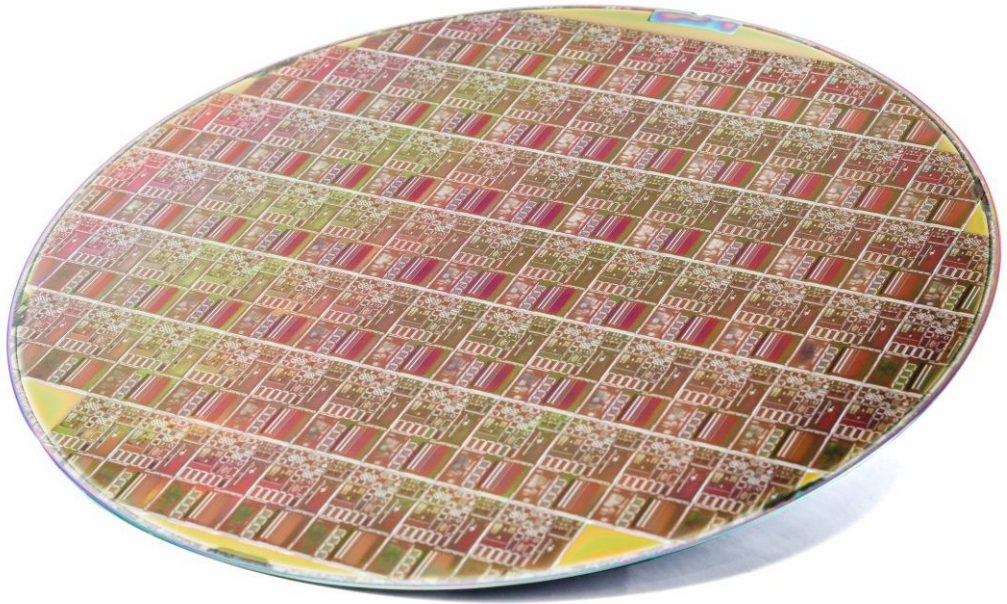
Non-Terrestrial Networks (NTN)

Cost-Effective High-Efficiency GaN-on-Silicon Technology

Benefits for NTN Power Amplifiers (PA) and Front-Ends Modules (FEM)

- **High-performance** front-end modules for NTN
- **>60%** device **efficiency** (PAE)
- **>2x more cost-effective** (vs SiC), reaching CMOS price point
- **>30% smaller FEM** footprint (vs GaAs)
- Tech **benchmarking** vs **GaAs, CMOS, GaN-on-SiC** a.o.



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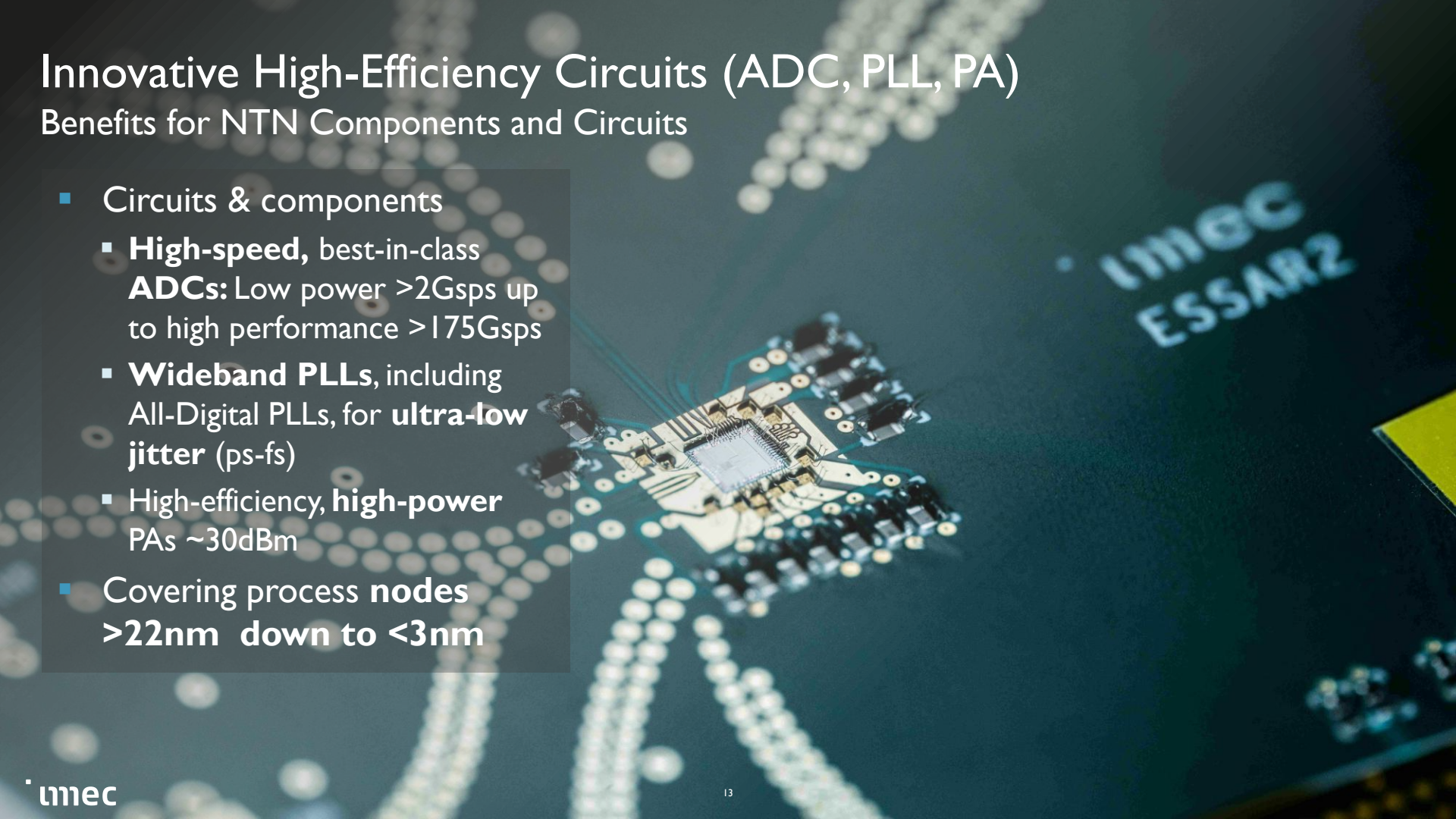
Innovative High-Efficiency Circuits (ADC, PLL, PA)

Benefits for NTN Components and Circuits

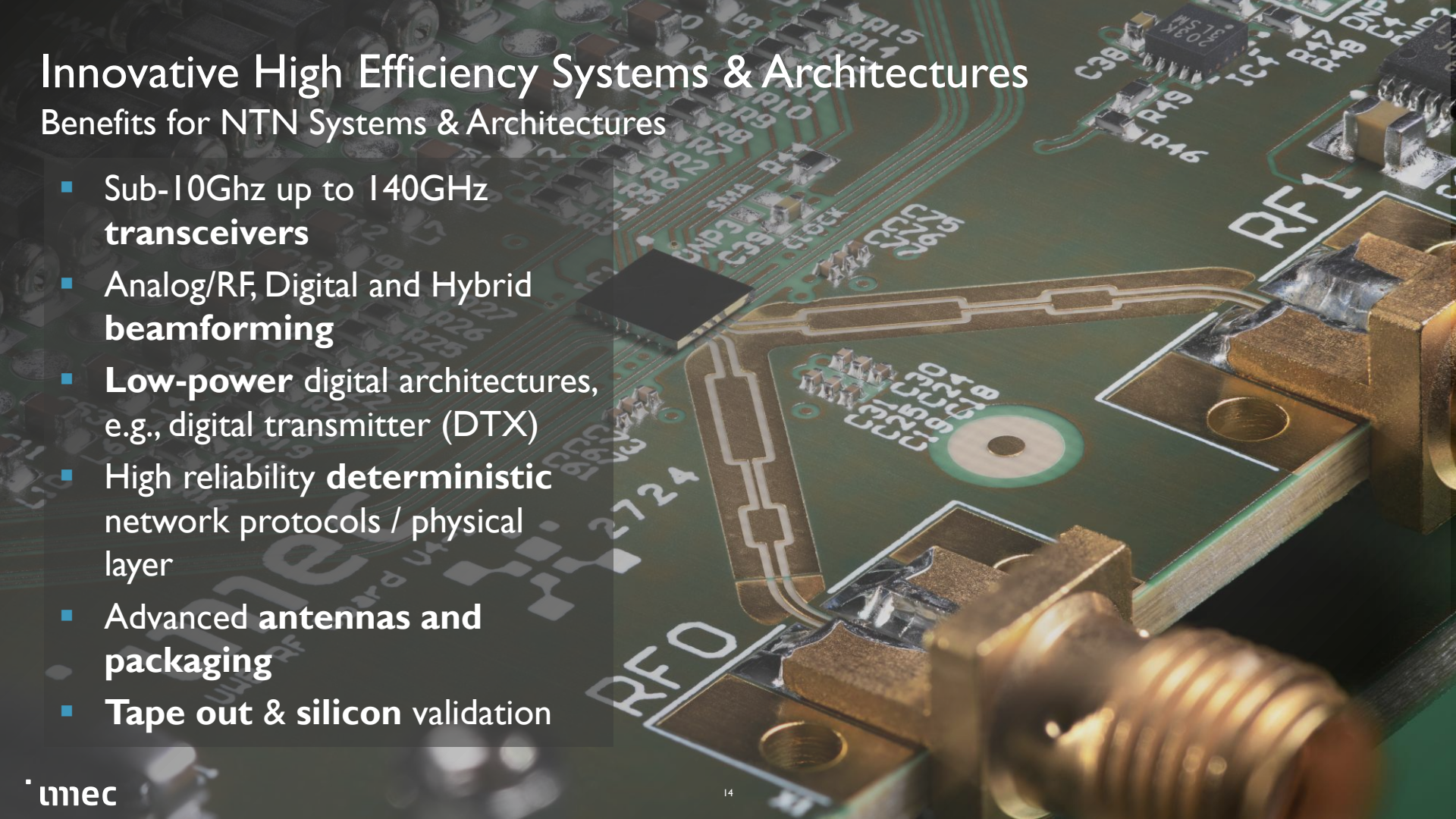
- Circuits & components
  - **High-speed,** best-in-class **ADCs:** Low power >2Gsps up to high performance >175Gsps
  - **Wideband PLLs**, including All-Digital PLLs, for **ultra-low jitter** (ps-fs)
  - High-efficiency, **high-power** PAs ~30dBm
- Covering process **nodes >22nm down to <3nm**



Innovative High Efficiency Systems & Architectures

Benefits for NTN Systems & Architectures

- Sub-10Ghz up to 140GHz **transceivers**
- Analog/RF, Digital and Hybrid **beamforming**
- **Low-power** digital architectures, e.g., digital transmitter (DTX)
- High reliability **deterministic** network protocols / physical layer
- Advanced **antennas and packaging**
- **Tape out** & **silicon** validation



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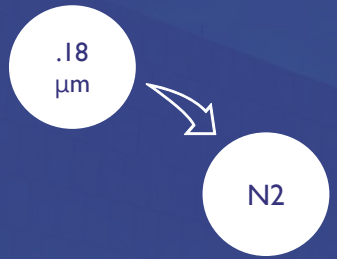
ASIC services

IC-Link, customized solutions for innovative chip manufacturing

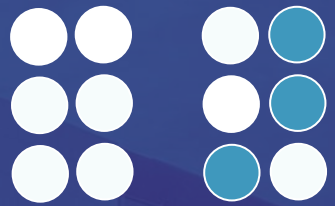
End-to-end ASIC services

Scaling ASICs without limits

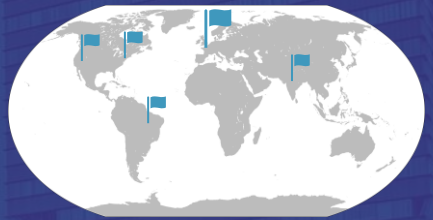
Wide technology range



Full turnkey or flexible services



Teams worldwide



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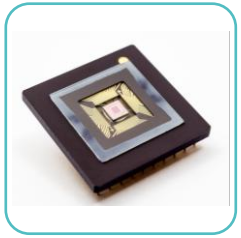
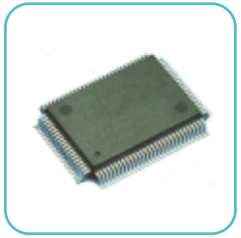
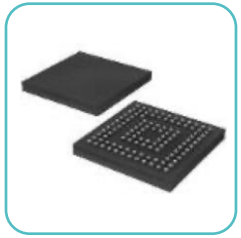
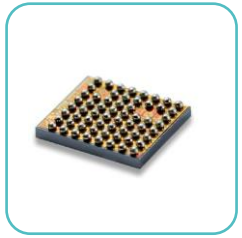
Custom ASIC is a business differentiator

UNIT COST → FORM FACTOR → PERFORMANCE → IP PROTECTION → MARKET DIFFERENTIATION

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IC-Link for space

Providing a fast route from prototype to volume

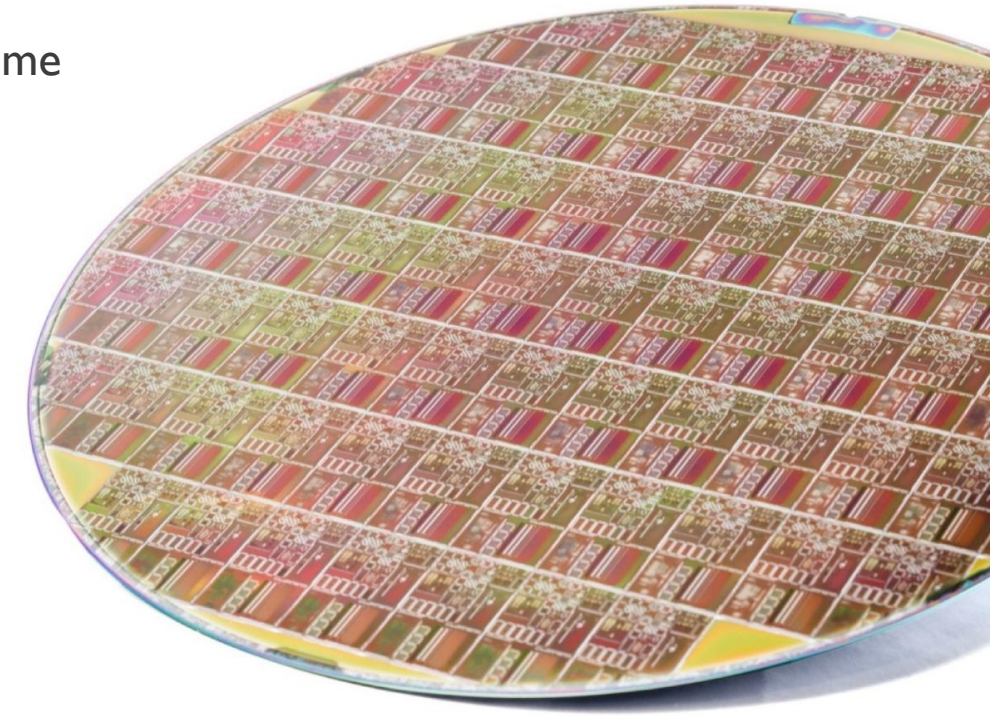
imec

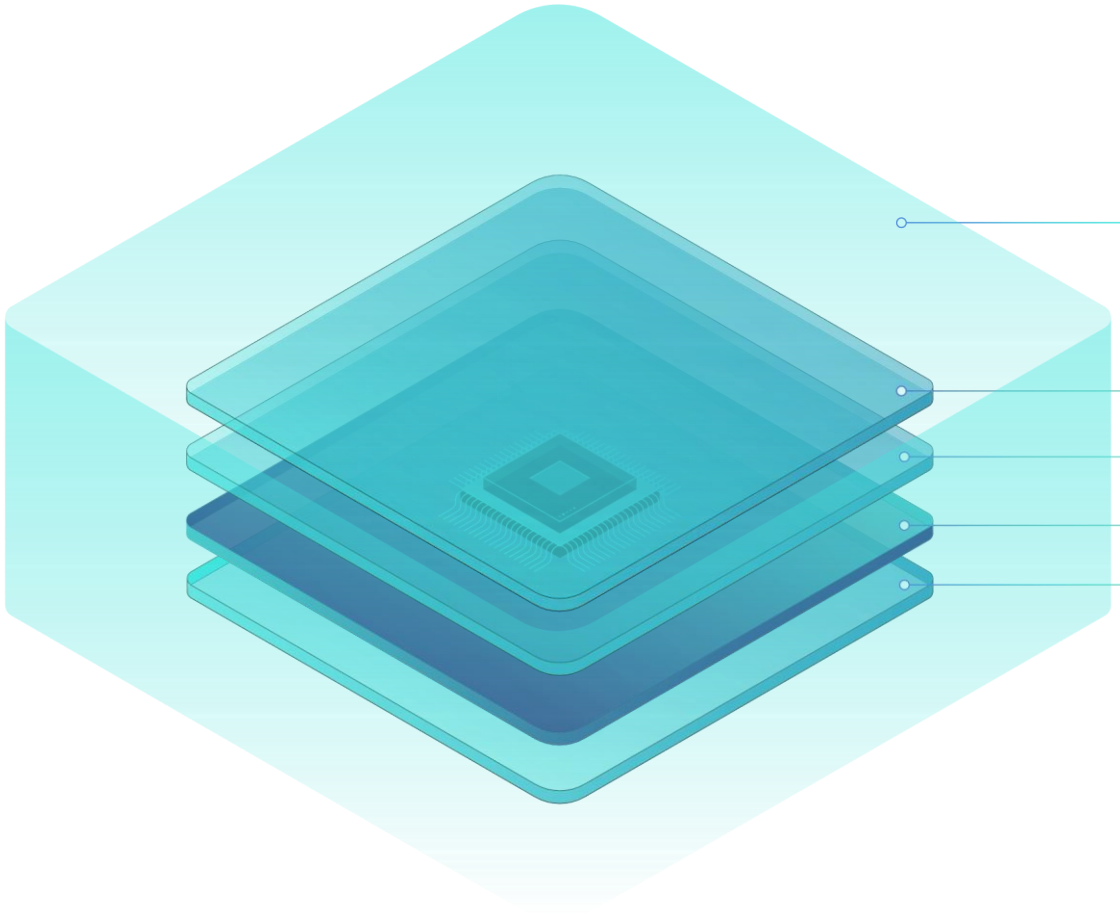
tsmc
TSMC VCA

UMC

xfab

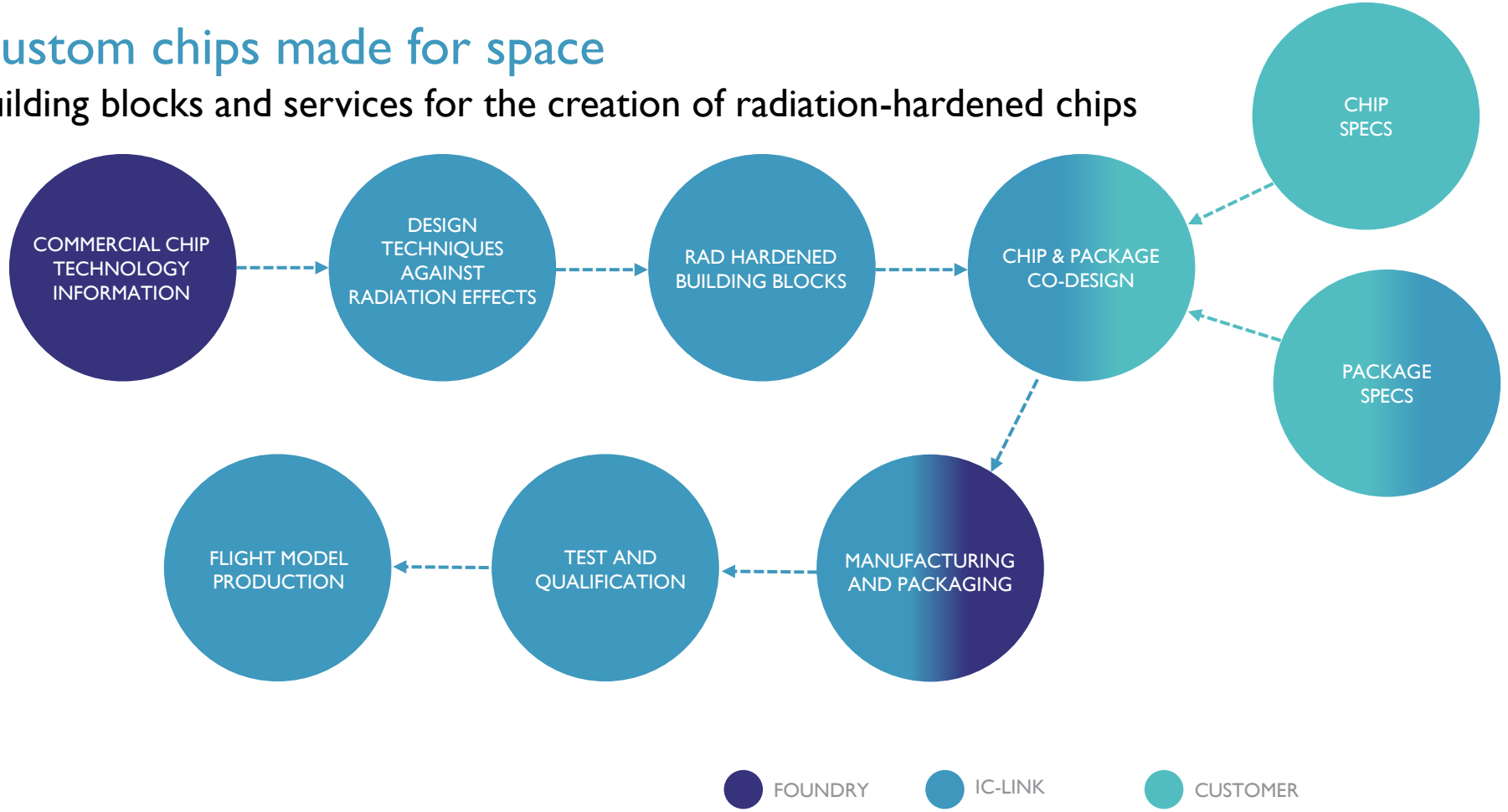
GlobalFoundries®




supply chain management
test & qualification
assembly & packaging
silicon manufacturing
IP & design services

Custom chips made for space

Building blocks and services for the creation of radiation-hardened chips



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Rad-hard IP & design services

Design Against Radiation Effects (DARE)

DARE Platforms

- Rad-hard solution using standard commercial technology
- Digital and analog design flows
- Supported by ESA and EC
- Various foundry technologies TSMC, XFAB, UMC, GF
- Solutions from 180nm down to 22nm, developing 7nm
- Flexible towards application needs for GEO, MEO, LEO and other fields like HEP

DARE Mitigation Approach

- Guard rings to kill latch-up
- Single-event-upset hardened flip-flops
- Single-event-transient hardened clock tree cells
- Single-event-upset & transient hardened memories
- Enhanced rad-hard aware physical implementation flow
- Single-event-transient analog simulation flow
- Enclosed-layout-transistor for high total-ionizing-dose applications

www.imeciclink.com/dare

Rad-hard IP & design platforms

Design Against Radiation Effects (DARE)

DARE180U

- UMC 180nm Mixed-Mode RF 1.8V / 3.3V
- SEL LETth > 60 MeV.cm^2/mg
- SEU FF (HIT/DICE)
- TID tolerance > 1 Mrad
- -55°C ~ 125°C
- Gate density = 25 kgates/mm^2
- Single & dual port memory compilers

DARE65T

- TSMC 65nm Low-Power Mixed-Mode RF 1.2V / 2.5V
- SEL LETth > 70 MeV.cm^2/mg
- SEU FF (DICE)
- TID tolerance > 100 krad
- -40°C ~ 125°C
- Gate density = 250 kgates/mm^2
- Single port memory compiler / 5 dual port memories

DARE180X

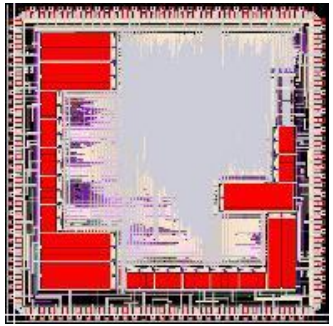
- XFAB 180nm 1.8V / 3.3V
- SEL LETth > 60 MeV.cm^2/mg
- SEU FF (DICE)
- TID tolerance > 100 krad
- -40°C ~ 125°C
- Gate density = 50 kgates/mm^2
- 5 dual port memories

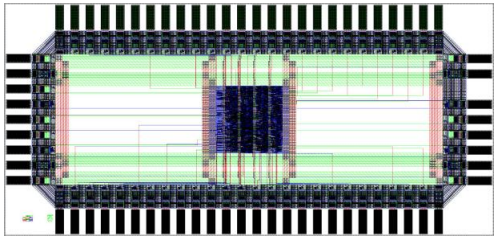
DARE22G

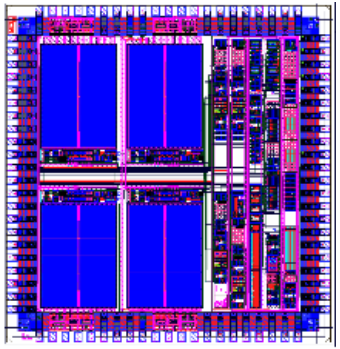
- GF 22nm FDSOI 0.8V / 1.8V
- SEL LETth > 70 MeV.cm^2/mg
- SEU FF (DICE)
- TID tolerance > 100 krad
- -40°C ~ 125°C
- Gate density = 2.5 Mgates/mm^2

HISPASAT 36W-1

- Launched on January 27, 2017 - GEO orbit
- Innovative regenerative payload
- First use of SmallGeo platform
- 645 chips delivered by imec
  - 543 DARE chips in UMC 180nm
  - 102 DARE chips in Onsemi I3T80



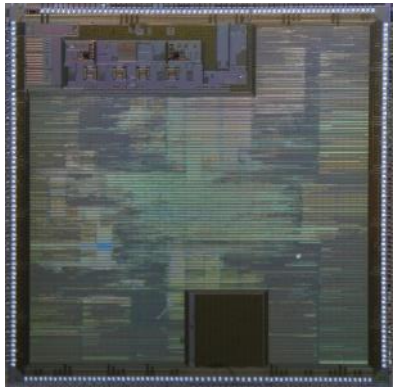


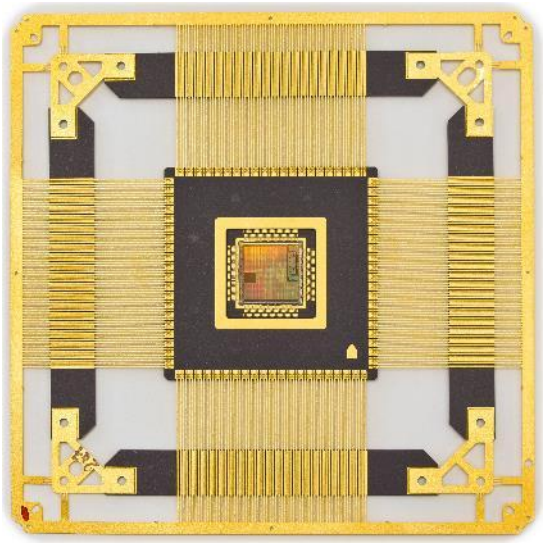


TRL9 DARE 180nm ASIC

Digital Programmable Controller (DPC)

- Defined by Thales Alenia Space (Belgium)
  - Digital library enhancements: imec
  - Digital design: Thales Alenia Space + P&R by imec
  - Analog design: ICsense
- Manufactured in DARE 180nm UMC
- Delivery: Qualified Flight hardware
- Currently flying in several missions





Pictures: TAS-B

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