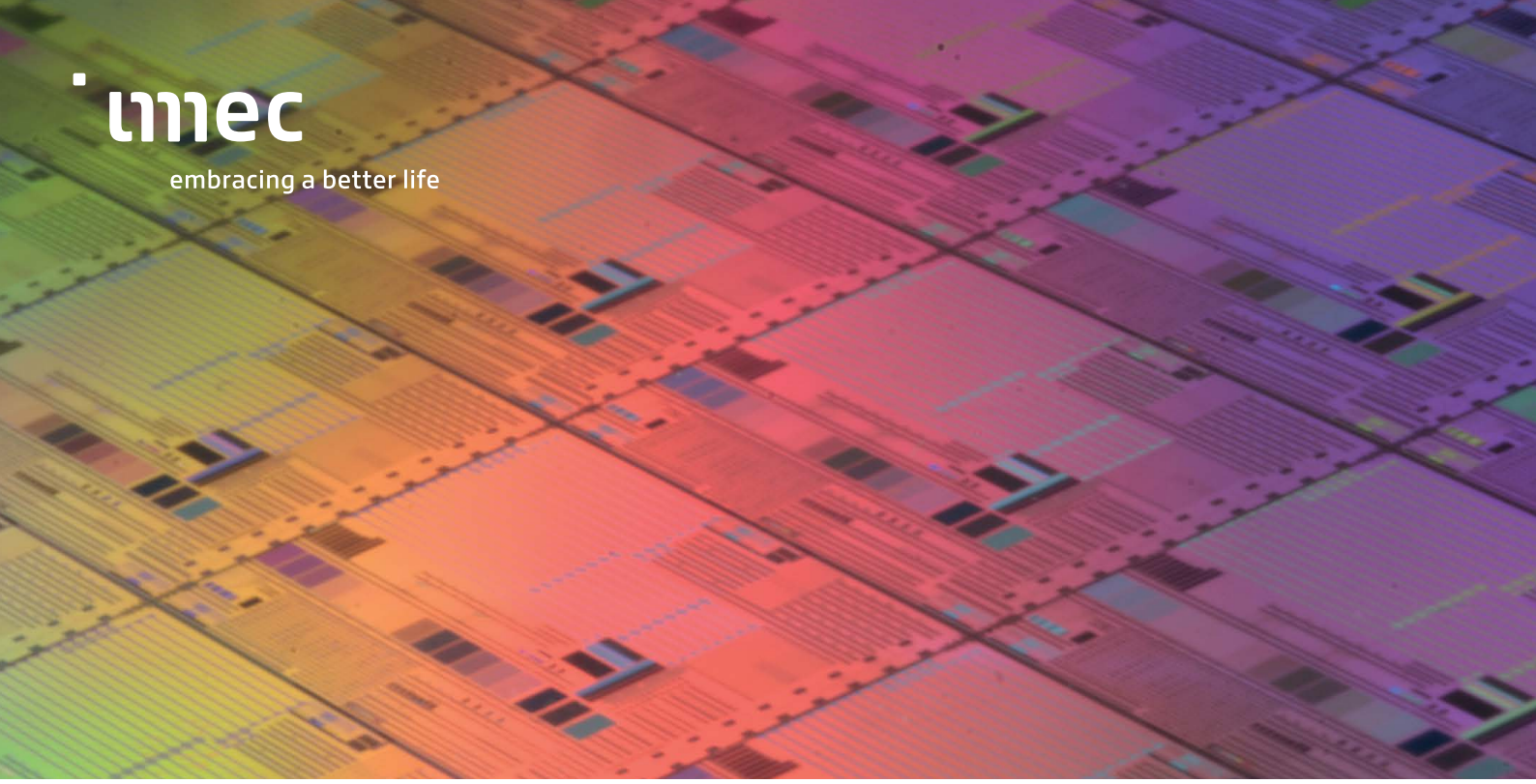


Radiation hardened platforms

The imec.IC-link connects innovators and entrepreneurs to the leaders in semiconductor technology. Our world class experts and global network of trusted partners support our customers across the entire value chain. **We turn ideas into reality at a single point of contact.**

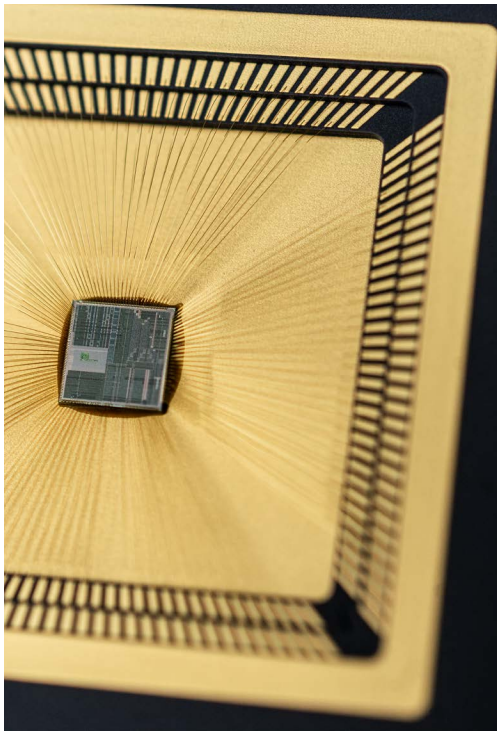
As part of our offering, imec supports radiation-hardened by design platforms using layout and circuit design techniques applied to existing commercial foundry technology. Our platforms are called **DARE**: Design Against Radiation Effects.

DARE

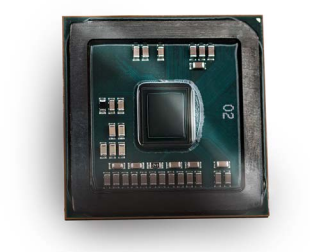
DARE uses commercial foundry technology to create reliable, low-power, low mass, mixed signal solutions for **components to be used in harsh environments**. It's comprised of a set of digital and analog IP blocks, a rad-hard-aware digital design flow, and additions to simulate radiation effects in the analog design flow. DARE provides a cost-effective and flexible alternative to the limited number of low-volume foundries that manufacture ASICs in intrinsically radiation-hard technology.

We offer DARE platforms for commercial process technologies in **different nodes from different foundries**. The DARE platform with the highest level of maturity is based on 180nm UMC technology and is compatible with logic, mixed-mode RF and CIS (imager) technology flavors. The platforms based on TSMC 65nm low-power and X-FAB 180nm have also advanced into product development and qualification phases. Our most advanced GF 22nm DARE platform is being used for space-qualified ASICs, while still undergoing improvements and extensions on customer request. To address even more demanding digital applications, radiation effects in a 7nm FinFET technology are being evaluated.

DARE developments are funded by the European Space Agency and the European Commission. Application areas include space, avionics, high-energy physics, and medical.



22nm radiation evaluation test chip

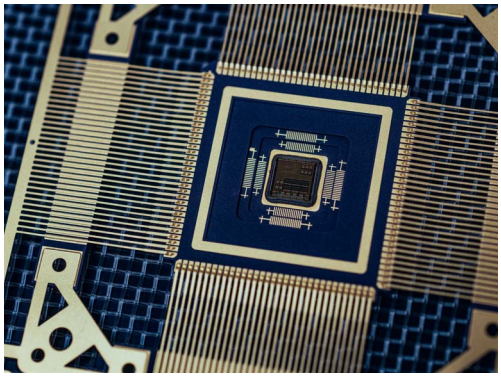


65nm rad-hard platform demonstrator chip

Flexible and portable

In addition to the available building blocks, custom-defined and application-specific blocks can be developed using the proven DARE hardening techniques. These blocks can be integrated with DARE's expanding IP portfolio. Development of such new blocks can be done by yourself, imec, or a third-party design house of your choice.

On demand, imec can transfer the hardening concepts to other technologies and nodes.



180nm mixed-signal rad-hard ASIC

Evaluation and qualification

Imec.IC-link relies on a dedicated, highly skilled team. Its activities include evaluation, screening and qualification of aerospace ASICs, following standards like ESCC 9000 and 9030. Our IC packaging offer includes custom package design, tooling and manufacturing for ceramic and plastic solutions with wire bonding or flip chip. Our service model can be adapted to your expectations.

We have delivered flight modules to several large European aerospace contractors. Our offer includes the development of all required hardware and software as well as all expertise required for the delivery of flight modules. Our trusted, long-term, approved subcontractors will perform the major activities.

Discover more about DARE:
imeciclink.com/dare

Wide range of building blocks:

- Digital standard cells (CORE)
- General-purpose I/O cells (GPIO)
- Phase-locked loops (PLL)
- Single- and dual-port static random-access memory (SRAM)
- Low-voltage differential signaling I/O cells (LVDS)
- Stub series terminated logic cells (SSTL)
- Bandgap voltage and current references (IVREF)
- Analog-to-digital converters (ADC)
- Digital-to-analog converters (DAC)
- Low-dropout regulators (LDO)

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