

LEADING THE WAY IN MICROELECTRONICS AND PHOTONICS

Finland has a remarkable microelectronics and photonics ecosystem, featuring global success stories, growing companies, and ongoing university spin-offs.

Photo credit: Vaisala

EXAMPLES OF GLOBAL CORPORATIONS IN FINLAND

ASM



APPLIED
MATERIALS

NORDIC
SEMICONDUCTOR

TEXAS
INSTRUMENTS

SPECIM
SPECTRAL IMAGING

MEDIATEK

Qualcomm OKMETIC

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As a response to the accelerating global demand for chips and photonics, Finland aims to create one of Europe's largest and most significant research and business clusters for specialized microelectronics and quantum technologies. Significant initiatives, including Chips From Finland Initiative and the EU Chips Act, are underway to further strengthen the competitiveness of the Finnish semiconductor industry.

Finland's strengths lie in research, development, and production of high-quality, highly specialized microelectronics & photonics. Finland is a highly lucrative business environment for both R&D centric business and manufacturing, offering an ecosystem of highly skilled workforce, competitive labor costs and an active business environment.

A key for Finland's success has been specialization. Finland has a strong background in System-on-Chip (SoC) design – a legacy rooted in Nokia's expertise in telecom chip design. Nokia's extensive technological advancements have empowered Finnish microelectronics across various domains. Nowadays, a broad specialization expertise has made Finland a hub for R&D, attracting key global players.

FINNISH EXPERTISE IN MICROELECTRONICS

5G/6G, SYSTEMS-ON-CHIP & RADIO FREQUENCY AND ANTENNA

Finland's microelectronics ecosystem powers national and global telecommunications and specialized electronics industries. With expertise in RF, analog, mixed-mode, and digital design, it has been crucial for past successes and continues to drive ongoing investments.

INTEGRATED CIRCUITS DESIGN

Fabless Integrated Circuit Design and specialized manufacturing technologies drive Finland's semiconductor industry, attracting top international companies to establish design sites. Finland's abundant IC design talent also appeals to global firms on a European scale.

ATOMIC LAYER DEPOSITION (ALD)

Finland boasts extensive expertise in ALD and related manufacturing and testing equipment. The Helsinki region, with over 60 ALD reactors in R&D use, leads global research in this specialized technology.

PROCESSING, TEST-EQUIPMENT AND RAW MATERIALS

Equipment business is a well-known stronghold in Finland, which requires highly educated workforce and benefits from strong R&D ecosystem.

MICRO ELECTRO MECHANICAL SYSTEMS (MEMS)

Finnish R&D in MEMS has revolutionized sensor technology, impacting fields like automotive, biomedical, and electronics. Finland excels across the value chain, from wafer fabrication to system development.

SENSORS

Finland has a strong presence in the sensors sector, with notable entities and a vibrant ecosystem of smaller sensor companies. A strong industrial system with a wide R&D ecosystem supports diverse technological capabilities of the sensors companies and contributes valuable know-how in system-level design.

PHOTONICS

Finland possesses expertise across various photonics areas like Optical Sensing, Micro- and Nanophotonics, Laser and Fiber Optics, Photonic Integrated Circuits, and Extended Reality, alongside robust startup activity. Notably, Finland leads in nanophotonics and silicon photonics, attracting global companies. The Finnish photonics cluster spans the entire value chain, from components to full systems.

QUANTUM TECHNOLOGIES

Finland has strong R&D in the field of quantum computing. Focus areas have been cryogenic technologies, superconducting qubits and quantum sensors, including applications of quantum technology.



TOP RESEARCH AND COLLABORATION ENVIRONMENT

A significant factor contributing to Finland's innovation success is the culture of collaboration and low barriers between the Finnish state, academic institutions and companies. This unique ecosystem enables seamless knowledge sharing, creates opportunities for joint-research projects and fosters innovation in a way that few other countries can replicate. Several Finnish universities conduct cutting-edge research in the field of microelectronics and photonics, including Aalto University, Tampere University, University of Oulu, University of Eastern Finland but also University of Helsinki, University of Turku, University of Jyväskylä etc. VTT, the Technical Research Centre of Finland, is a powerhouse in microelectronics R&D within all the areas.



CHIPS WITH ZERO LIFETIME EMISSIONS

The heavy growth of the microelectronics and photonics industry requires more environment-friendly technologies and more scaled manufacturing. In Finland, the extensive R&D program 'Chip Zero' aims to make semiconductor manufacturing more sustainable. The program is led by Applied Materials and brings together Finland's strong technology R&D ecosystem with leading international and Finnish companies as well as research institutes, catalysing the green transition in the semiconductor industry. Another emerging trend within the green transition are different applications of power electronics. Finland has significant power electronics know-how and industrial production as well as a strong base of end-users of power electronics which are interesting customers and partners for international power electronics suppliers.

ACTIVE MEMBER IN THE EUROPEAN CHIPS ACT

The European Chips Act will strengthen Europe's competitiveness and resilience in semiconductor technologies and applications and help achieve the digital and green transition. Finland is active on the European Chips Act and, among other things, its' pillar one pilot line activities. Finnish know-how and capability are reinforcing global and European microelectronics expertise and accelerating the green transition within semiconductor industry.

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