



PRODUCT NOTE

INTRINSIC SILICON FOR QUANTUM AND RADIO-FREQUENCY TECHNOLOGIES

Intrinsic silicon for technologies requiring exceptional purity

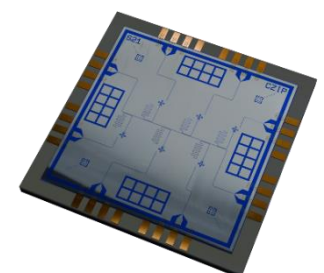
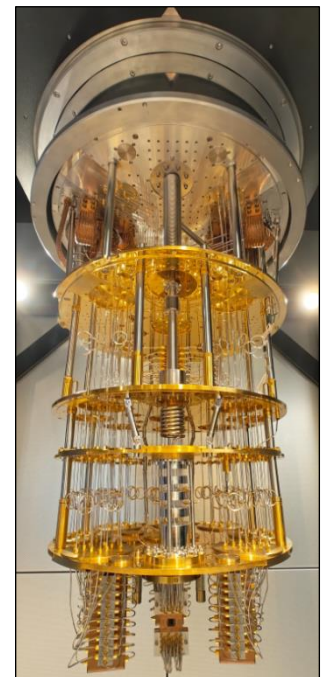
Quantum computing, communication, and sensing systems rely on materials with exceptional purity and stability. In these systems, minimizing defects and impurities is essential for achieving long coherence times and reliable qubit performance. Another critical parameter is ensuring scalability and cost-effectiveness for future quantum platforms. Topsisil Intrinsic Float Zone Silicon meets these demanding requirements. With its ultra-high purity, electrical carriers below detection, and outstanding minority carrier lifetime, Topsisil Intrinsic Float Zone Silicon is a perfectly suited substrate for state-of-the-art spin and superconducting qubits. Thanks to its excellent bulk material quality, it meets the stringent specifications for next-generation quantum devices. Combined with advanced wafer surface processing, this results in a minimum of two-level system defects and thus long coherence times.

The proven performance of Topsisil Float Zone Silicon for quantum platforms is highlighted in a *Nature* publication, reporting record high coherence times for superconducting qubits (Bland, M.P., Bahrami, F., Martinez, J.G.C. et al., *Nature* 647, 343–348 (2025)).

The excellent bulk material and surface quality of Topsisil Intrinsic Float Zone Silicon makes it an ideal host material for high-performance radio-frequency (RF) designs due to very low electrical losses for filters, strip lines, and high Q circuits.

Topsisil Intrinsic Float Zone Silicon is an ideal substrate choice for a wide selection of quantum technologies across computing, communication, and sensing, as well as advanced RF designs, e.g.:

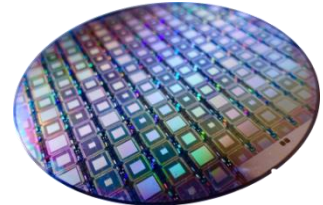
- Superconducting qubits and resonators,
- silicon photonics, e.g. with silicon colour centres or spin qubits,
- semiconductor quantum dots,
- cryogenic electronics for quantum control,
- and lossless RF qubits interface circuits.



Topsil is the world leading supplier of intrinsic silicon for a number of applications. A strong focus on R&D has resulted in products with ultra-high purity and the highest resistivities ever measured on silicon wafers. This - combined with more than half a century of experience in the production of float zone material and state-of-the-art wafering equipment - makes intrinsic silicon wafers an excellent choice for the next generation of quantum technologies.



Topsil offers our Intrinsic Float Zone Silicon with the listed parameters. Other parameters than those in the table are available upon request.



Growth method	Intrinsic Float Zone Silicon
Resistivity	>20 kΩcm
Diameter	100 mm, 150 mm, 200 mm
Crystal orientation	<100>
Type and Dopant	Intrinsic (Float Zone refined high purity silicon, electrical carriers below detection)
Oxygen and Carbon concentration	<10 ¹⁶ cm ⁻³
Wafer thickness	>220-1000 μm depending on wafer diameter
Wafer surface finish	Single side polished and double side polished according to SEMI M1 standard
Wafer surface roughness	<0.5 nm

CONTACT
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Topsil GlobalWafers A/S

Topsil is a world leading supplier of ultrapure silicon for the global semiconductor industry. Engaging in long term relations with customers, Topsil focuses on premium quality, an efficient production process and a safe delivery of products.

Float-Zone FZ silicon is the high-purity alternative to crystals grown by the Czochralski CZ method. Based on extensive knowledge, expertise and significant investments in new technology, facilities and equipment, Topsil FZ silicon products are ideal for the most demanding purposes in conversion and control of electrical power.

Topsil was founded in 1959. Situated near Copenhagen, Denmark, Topsil is part of the GlobalWafers Group with manufacturing presence in Europe, Asia and the US.

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