



HiRes™ SILICON FOR GHz APPLICATIONS

- solutions for low loss microwave and millimeter wave components

Low-loss, high performance microwave and millimeter wave components are key parts in emerging telecommunication systems. Low loss and high performance is essential to keep signal-to-noise ratios at acceptable levels and for maintaining efficient power management in the high reliability systems. Another important parameter is to meet the cost requirements of the total system. This is best achieved by using high resistivity (HiRes™) silicon substrates where technology is mature and substrate prices are attractive in comparison with traditional microwave and millimeter wave substrates such as quartz, ceramics and III-V semiconductors.

Typical devices that will benefit from using HiRes™ silicon are:

High-Q inductors and capacitors

Transmitter and receiver chips

GHz mixers

Low loss microstrip transmission lines and coplanar waveguides

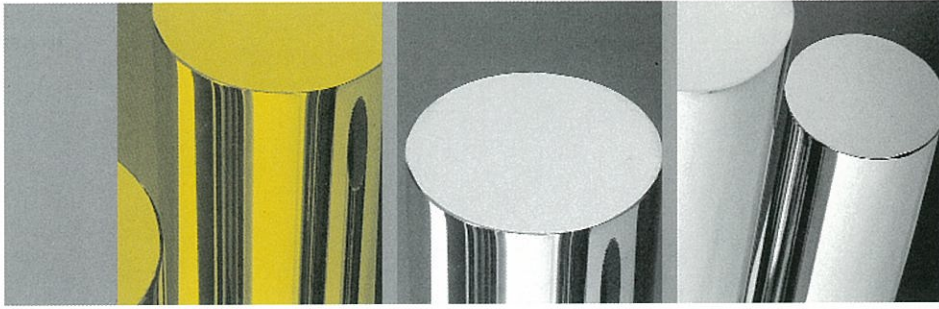
RF MEMS switches

Micromachined thin Film Bulk Acoustic Resonators (FBAR)

RF LDMOS and BiCMOS devices

Millimeter-wave attenuators

Topsil is the world leading supplier of HiRes™ silicon (high resistivity) for a number of applications. Focus on R&D at Topsil have resulted in products with the highest resistivities ever measured on silicon wafers. This combined with more than 40 years of experience in the production of float zone material and state-of-the-art wafering processes make HiRes™ silicon wafers the best choice for a low-loss substrate for microwave frequencies.



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Topsil offers Float Zone wafer substrates with the listed parameters. Other parameters than those in the table are possible on request.

Growth method	HiRes™ Float Zone
Resistivity	> 8 kΩcm (max resistivity 30 kΩcm)
Resistivity tolerance	±20%
Radial resistivity variation	< 25%
Diameter	100-150 mm
Crystal Orientation	<100>, <111>
Type and Dopant	N, P: Undoped
Oxygen and Carbon concentration	< 10 ¹⁶ cm ⁻³
Wafer thickness	200-1300 μm
Wafer surface finish	single side polished and double side polished

The Topsil R&D group is focused on developing new processes for future float zone products by use of simulation software. Modelling of crystal growth is complex, but Topsil has developed a proprietary knowledge in close cooperation with costumers requiring high quality silicon material with superior control of dopant contents and distribution in the crystal.