

PRODUCT NOTE

**PREFERRED FLOAT ZONE (PFZ) SILICON FOR POWER ELECTRONICS**

**Material solutions for high and medium power devices**

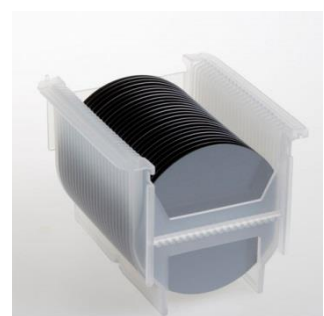
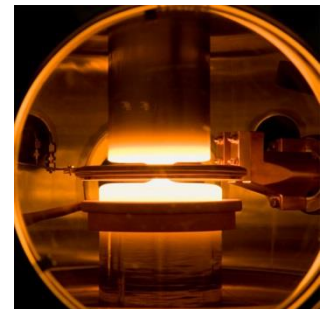
Based on substrate characteristics such as high purity, low radial resistivity variance (RRV) and no wafer-to-wafer variance, applications of Preferred Float Zone (PFZ) silicon wafers are multiple. They form the perfect basis for both lateral and vertical high and medium power devices like Power MOSFET's, IGBT's and high power thyristors. They are entering an automotive industry on the move of making electrical and hybrid vehicles equipped with lots of power efficient semiconductor circuits for steering and electrical circuitry, amongst others.

The manufacture of Topsil Preferred Float Zone wafers is based on more than half a century's expertise in float zone technology. The wafers contain minimum amounts of degrading impurities and they are therefore suitable for the part of the power electronics industry requiring perfect silicon. The result is powerful and reliable devices, with the smallest possible CO<sub>2</sub> footprint.

Preferred Float Zone (PFZ) silicon for high and medium power devices has a number of unique properties:

- Large bulk target resistivity range
- Low resistivity tolerances and record low radial resistivity variations
- High minority carrier lifetimes with low radial variation of the bulk lifetime
- Tolerance towards device processing
- Built-in control of defect levels – no D-defects and no BMD's

PFZ silicon wafers are available in n- and p-type versions, see tables for standard parameters below. Other parameters are available upon request.



N-type		Unit	Target resistivity range		
			1-100Ωcm	100-500Ωcm	500-1000Ωcm
Orientation			<111>*, <100>		
Resistivity tolerance	125 mm	%	±10	±13	±20
	150 mm		±8	±10	±20
	200 mm		±10	±15	±20
RRV	125 mm	%	<10 <100> <15 <111>	<18	<20
	150 mm		<12	<18	<20
	200 mm		<14	<20	<25
Striations		%	±15	±20	±20
Minority carrier bulk lifetime		µs	>500	>1000	>1000

**Table I.** Resistivity capabilities for n-type PFZ products. \* <111> is not available in 150 mm diameter PFZ products

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P-type		Unit	Target resistivity range		
			1-100Ωcm	100-500Ωcm	500-1000Ωcm
Orientation			<111>*, <100>		
Resistivity tolerance	125 mm	%	±10	±13	±20
	150 mm		±8	±10	±20
	200 mm		±8	±10	±20
RRV	125 mm	%	<8 <100> <15 <111>	<18	<20
	150 mm		<8	<8	<10
	200 mm		<8	<10	<20
Striations		%	±10	±15	±15
Minority carrier bulk lifetime		µs	>200	>500	>500

**Table II.** Resistivity capabilities for p-type PFZ products. \* <111> is not available in 150 mm diameter

## Topsil Semiconductor Materials A/S

Topsil is a world leading supplier of ultrapure silicon to 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.

Silicon is used in electronic components to aid conversion and control of electrical power. Topsil provides ultrapure silicon mainly for the most demanding purposes, based on extensive knowledge and significant investments in new technology, facilities and equipment.

Headquartered in Copenhagen Cleantech Park, Topsil spans production sites in Denmark and Poland and sales locations in Europe, Asia and the US. Topsil is publicly listed at the Nasdaq OMX Copenhagen stock exchange and was founded in 1959.

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