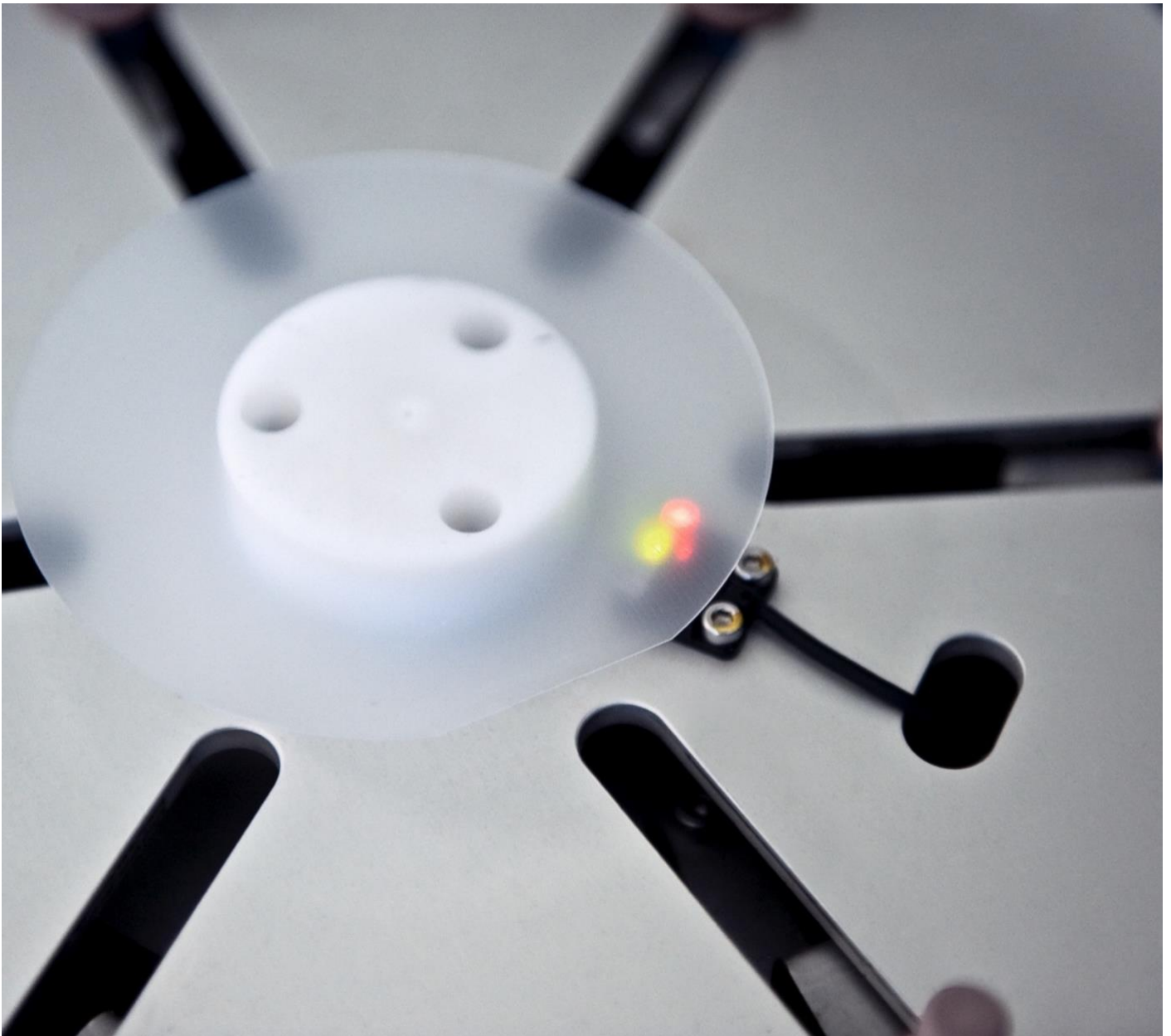


MATERIAL DATASHEET

# SEMICONDUCTOR GRADE QUARTZ



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## **High Purity amorphous SiO<sub>2</sub>**

low OH content  
low trace metal content  
high heat resistance

good chemical purity  
virtually bubble and inclusion free

high transmission in NUV\* (> 90%)  
reasonable transmission in MUV\* (> 90% from 250 nm  
wavelength and >75% from 200 nm wavelength)

used in thin film semiconductors, optical switches, solar and  
industrial applications

## Chemical Properties

Element	Al	Ca	Cr	Cu	Fe	K
ppm by weight	15	0.5	<0.05	<0.05	0.1	0.4

Element	Li	Mg	Mn	Na	Ti	Zr
ppm by weight	0.6	0.05	<0.05	0.3	1.1	0.7

OH Content < 30 ppm

## Mechanical Properties

Density [g/cm <sup>3</sup> ]	2.203
Mohs Hardness	5.5 ... 6.5
Micro Hardness N/mm <sup>2</sup>	8600 ... 9800
Knoop Hardness N/mm <sup>2</sup>	5800 ... 6100
Modulus of elasticity (at 20°C) N/mm <sup>2</sup>	7.25 x10 <sup>4</sup>
Modulus of torsion N/mm <sup>2</sup>	3.0 x10 <sup>4</sup>
Poisson's Ratio	0.17
Compressive strength (approx.) N/mm <sup>2</sup>	1150
Tensile strength (approx.) N/mm <sup>2</sup>	50
Bending strength (approx.) N/mm <sup>2</sup>	67
Torsional strength (approx.) N/mm <sup>2</sup>	30
Sound velocity m/s	5720

## Thermal Properties

<b>Thermal Data</b>	
Softening temperature °C	1710
Annealing Temperature °C	1220
Strain Temperature °C	1125
Max. working temperature continuous °C	1160
Short-term °C	1300
<b>Heat Conductivity [W/m*K]</b>	
20 °C	1.38
100 °C	1.47
200 °C	1.55
300 °C	1.67
400 °C	1.84
950 °C	2.68

<b>Mean expansion coefficient [K<sup>-1</sup>]</b>	
- 50 ... 0 °C	2.7 x 10 <sup>-7</sup>
0 ... 100 °C	5.1 x 10 <sup>-7</sup>
0 ... 200 °C	5.8 x 10 <sup>-7</sup>
0 ... 300 °C	5.9 x 10 <sup>-7</sup>
0 ... 600 °C	5.4 x 10 <sup>-7</sup>
0 ... 900 °C	4.8 x 10 <sup>-7</sup>

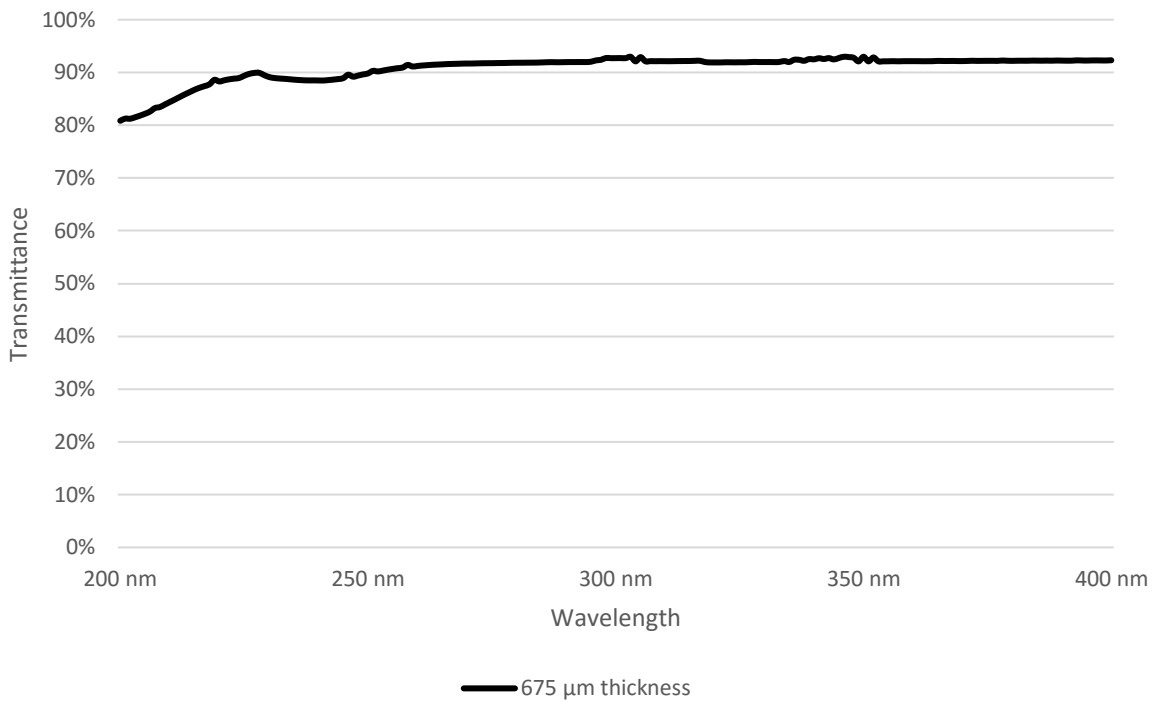
<b>Mean specific heat [J/kg K]</b>	
0 ... 100 °C	772
0 ... 500 °C	964
0 ... 900 °C	1052

### **Optical Properties**

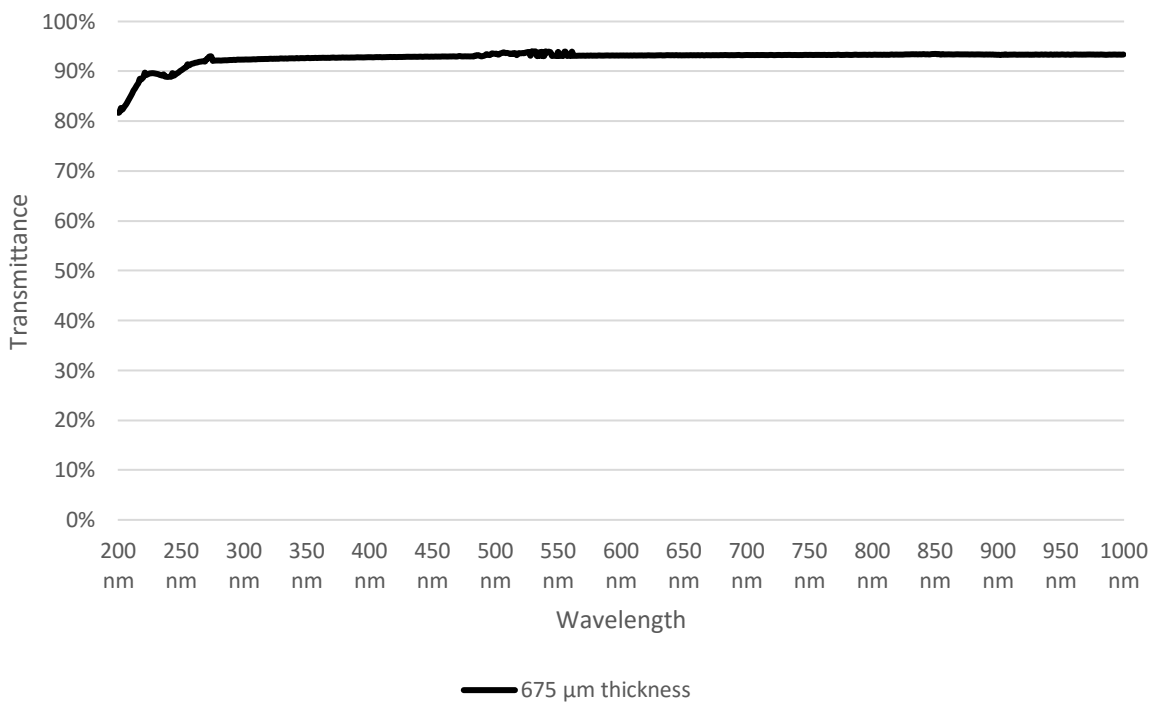
Refractive Index n <sub>d</sub>	1.46
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Wavelength	Transmittance
200 nm	80.8 %
250 nm	89.8 %
300 nm	92.7 %
350 nm	92.9 %
400 nm	92.8 %
500 nm	93.5 %
750 nm	93.3 %
1000 nm	93.4 %

Transmittance in UV



Transmittance



## Electrical Properties

<b>Resistivity [<math>\Omega</math> cm]</b>	
20 °C	$10^{18}$
400 °C	$10^{10}$
800 °C	$6.3 \times 10^6$
1200 °C	$1.3 \times 10^5$

<b>Dielectric strength in kV/mm (sample thickness <math>\geq 5</math>mm)</b>	
20 °C	25 ... 40
500 °C	4 ... 5

<b>Dielectric loss angle (tg <math>\delta</math>)</b>	
1 kHz	$5.0 \times 10^{-4}$
1 MHz	$1.0 \times 10^{-4}$
$3 \times 10^{10}$ Hz	$4.0 \times 10^{-4}$

<b>Dielectric constant (<math>\epsilon</math>)</b>	
20 °C 0 ... $10^6$ Hz	3.70
23 °C $9 \times 10^8$ Hz	3.77
23 °C $3 \times 10^{10}$ Hz	3.81

**Disclaimer:**

The above data has been taken from the original raw material specification of the raw material producer. Completeness and validity cannot be guaranteed.

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