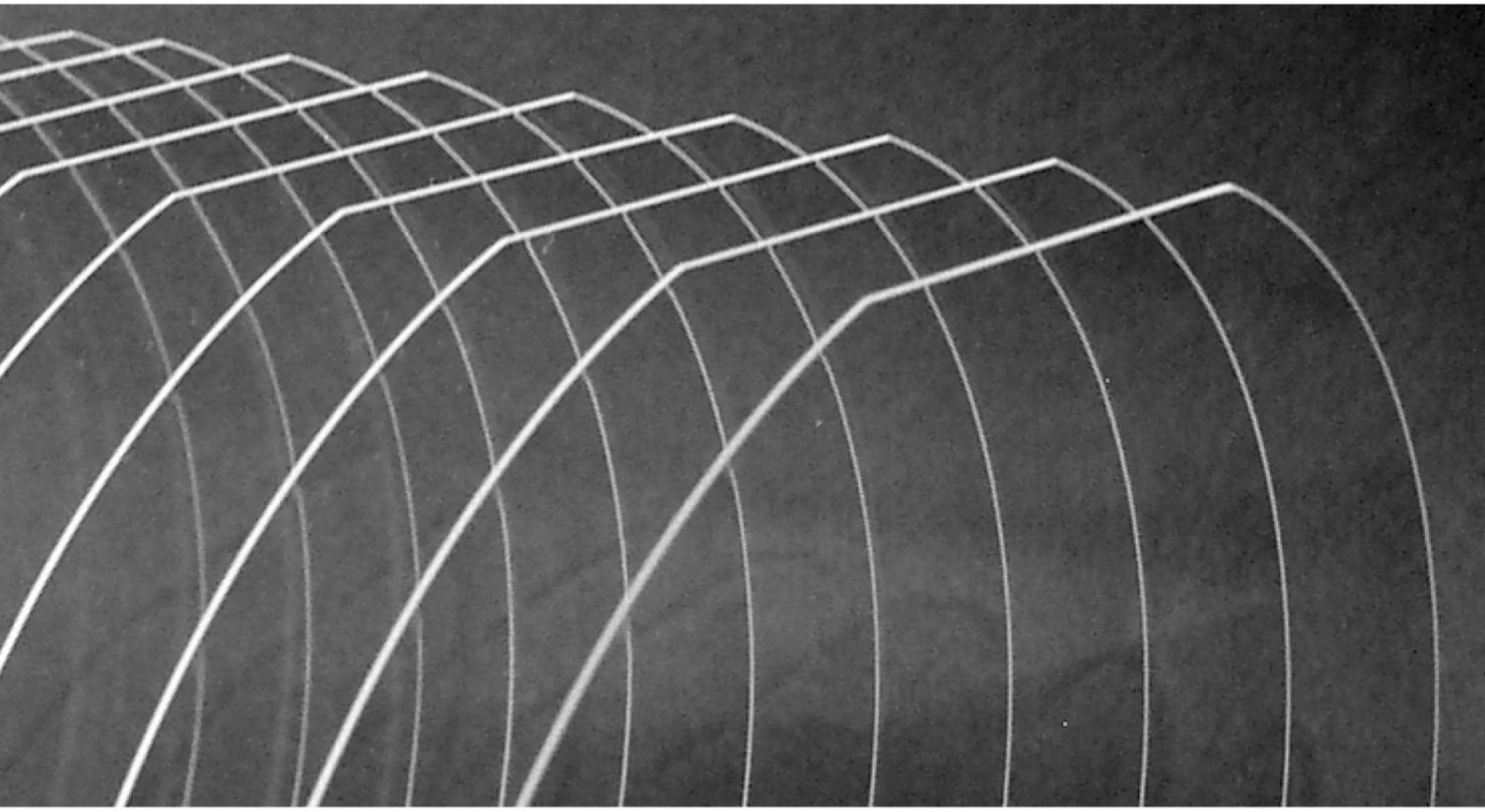
WAFER UNIVERSE



MATERIAL DATASHEET

SEMICONDUCTOR GRADE QUARTZ

SEMICONDUCTOR GRADE QUARTZ

High Purity amorphous SiO_2

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

Thermal Properties

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

Mean expansion coefficient [K^{-1}]	
- 50 … 0 °C	2.7 x 10^{-7}
0 … 100 °C	5.1 x 10^{-7}
0 … 200 °C	5.8 x 10^{-7}
0 … 300 °C	5.9 x 10^{-7}
0 … 600 °C	5.4 x 10^{-7}
0 … 900 °C	4.8 x 10^{-7}

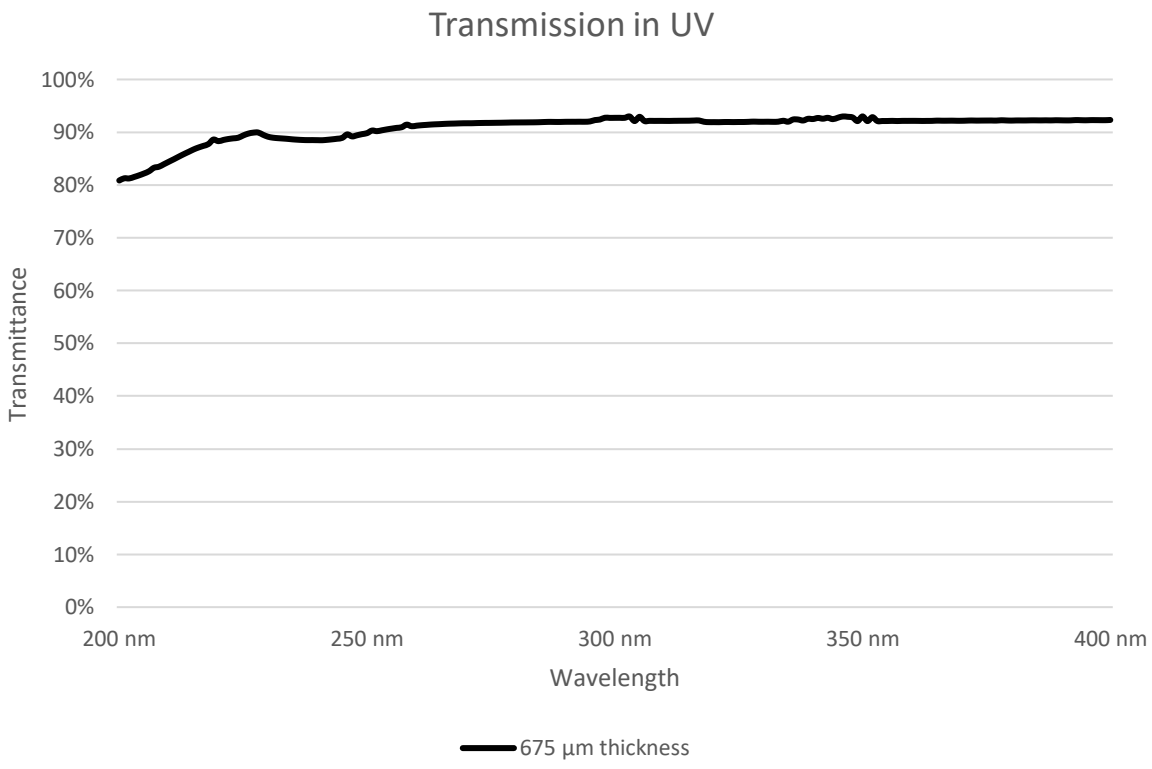
Mean specific heat [J/kg K]	
0 … 100 °C	772
0 … 500 °C	964
0 … 900 °C	1052

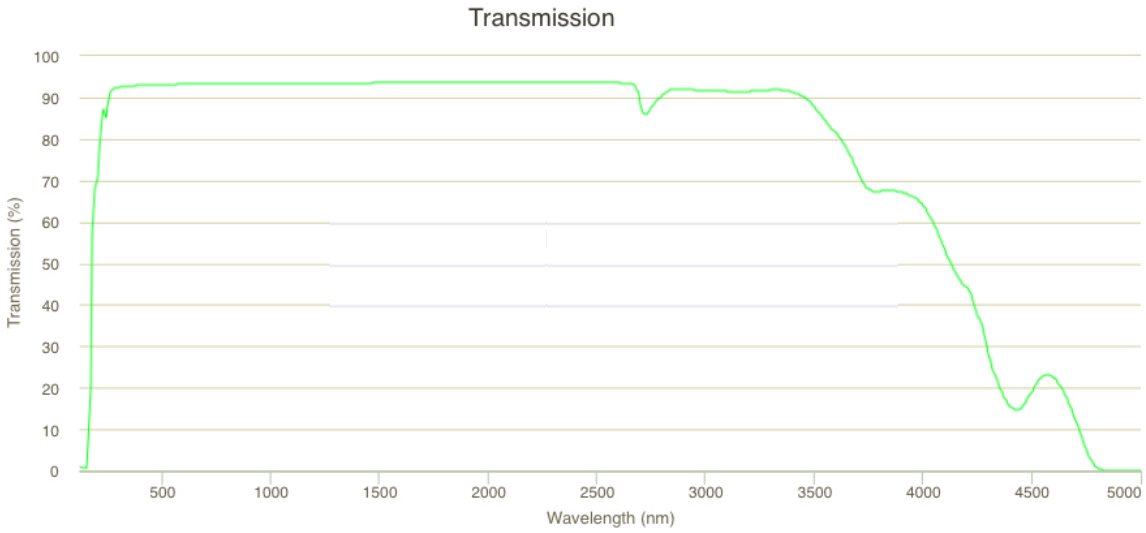
Optical Properties

Refractive Index n_d	1.46

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 %

	Wavelength (nm)	Refractive Index
	400	1,4703
(nh)	404,65	1,4698
(ng)	435,83	1,4668
HeCd	441,6	1,4663
Kr	447,1	1,4659
(nF)	486,13	1,4632
Ar	488	1,4631
Ar	514,5	1,4617
2 x Nd: YAG	532	1,4608
(ne)	546,07	1,4602
(nd)	587,56	1,4586
HeNe	632,8	1,4571
(nc)	656,27	1,4565
Ruby	694,3	1,4555
Kr	752,5	1,4543
	800	1,4534





Electrical Properties

Resistivity [Ω cm]	
20 °C	10^{18}
400 °C	10^{10}
800 °C	6.3×10^{6}
1200 °C	1.3×10^{5}

Dielectric strength in kV/mm (sample thickness ≥5mm)	
20 °C	25 … 40
500 °C	4 … 5

Dielectric loss angle (tg δ)	
1 kHz	5.0×10^{-4}
1 MHz	1.0×10^{-4}
3×10^{10} Hz	4.0×10^{-4}

Dielectric constant (ε)	
20 °C 0 … 10^{6} Hz	3.70
23 °C 9×10^{8} Hz	3.77
23 °C 3×10^{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.

CONTACT:

Wafer Universe
A brand of Plan Optik AG
Ueber der Bitz 3
56479 Elsoff
Germany

Phone: +49 2664 239 929 0

Mail: sales@waferuniverse.com
Web: www.waferuniverse.com

V070721