

Optical Properties of FUSED SILICA (SiO2)

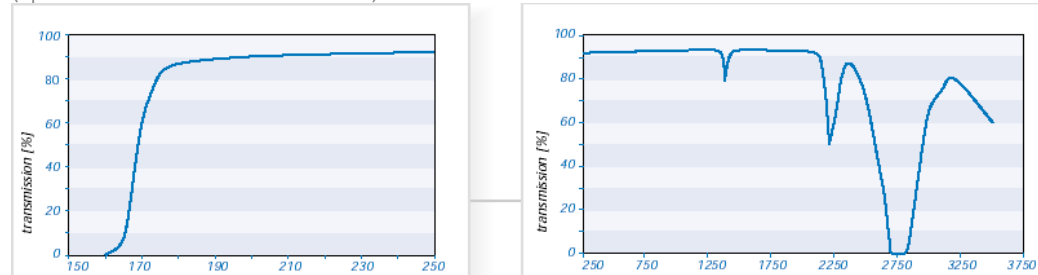
Refractive Indices

Wavelength [nm]	193nm	248nm	365nm	486nm	587nm	633nm	852nm	1.06µm	1.31µm	1.53µm	1.97µm	2.32µm	3.37µm
Refractive Index	1.5608	1.5086	1.4745	1.4631	1.4584	1.4570	1.4524	1.4497	1.4469	1.4443	1.4385	1.433	1.41

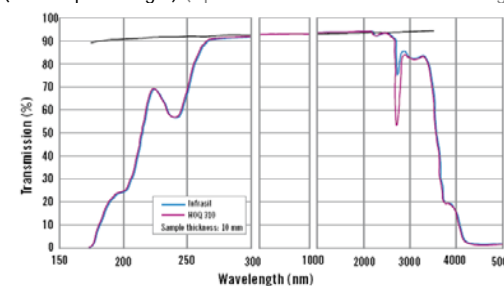
Other Indices

Linear Thermal Expansion Coefficient $\alpha_{(25^{\circ}\text{C}-100^{\circ}\text{C})}$	[10-6/K]	0.5	Abbé v_d	67.87	Elastic Modulus	[GPa]	72	
Heat Conductivity $\lambda_{(32^{\circ}\text{C})}$	[W/(m·K)]	1.31	Density ρ	[g/cm ³]	2.2	Shear Modulus	[GPa]	31.2
Electrical Resistivity (20°C)	[10 ¹⁸ Ω·cm]	1.15	Poisson's Ratio μ	0.17	Dielectric Constant ϵ_r		3.8	

1) Typical Transmission of Schott Lithosil™Q1 including Fresnel reflection losses (10 mm path length)
(Specifications from SCHOTT lithotec AG)



2) Typical Transmission of Infrasil including Fresnel reflection losses (10 mm path length) (Specifications from Hereaus Quarzglas)



Fused Silica provides excellent optical properties and no bulk absorption from the UV to the Infrared wavelength range. SUSS MicroOptics is using high-quality Fused Silica Wafers (Ø200mm) made of SCHOTT Lithosil™ Q1, Hereaus Infrasil or equivalent.

Optical Properties of Silicon (Si)

Refractive Indices

Wavelength [nm]	1µm	1.31µm	1.55µm	1.71µm	2.15µm	3.5µm	4µm	6µm	8.5µm	11µm
Refractive Index n_λ 20°C]	3.57	3.503	3.478	3.466	3.448	3.428	3.426	3.420	3.418	3.412

Other Indices

Linear Thermal Expansion Coefficient $\alpha_{(25^{\circ}\text{C}-100^{\circ}\text{C})}$	[10-6/K]	2.55-4.15	Dielectric Constant ϵ_r at 10 GHz	13	Elastic Modulus	[GPa]	131	
Heat Conductivity $\lambda_{(32^{\circ}\text{C})}$	[W/(m·K)]	163.3	Density ρ	[g/cm ³]	2.33	Shear Modulus	[GPa]	80
Transmission Range for Wafer 0.5mm thickness	[nm]	1.2–15µm	Poisson's Ratio μ	0.266	Bulk Modulus	[GPa]	102	



Fresnel reflection: For normal incidence, the fraction of reflected incident power at one surface is given by $R = (n_\lambda - 1)^2 / (n_\lambda + 1)^2 \approx 30\%$ per surface. Anti-Reflection Coatings reduce the Fresnel loss below 0.3% for the desired wavelength ranges.