

Sapphire Windows

Sapphire is a single crystal aluminum oxide (Al_2O_3). Sapphire has a good transmission characteristics from $0.20\mu m$ up to $5.50\mu m$. It exhibits high mechanical strength, chemical resistance, thermal conductivity and thermal stability. It is widely used as windows materials in specific field such as infrared military equipment, satellite and the space technology, and laser measuring appliance with strong power.

Sapphire Windows

Specifications:

- Material: **Sapphire**
- Diameter Range: $\Phi 2.0mm - \Phi 30.0mm$
- Diameter Tolerance: $+0/-0.1mm$
- Thickness Tolerance: $\pm 0.1mm$
- Parallelism: 3 arc minutes up to 30 arc seconds
- Clear Aperture: $>90\%$
- Surface Quality: 40/20
- Flatness: 1λ up to $\lambda/4$ per inch
- Bevel: $0.25mm \times 45^\circ$
- Coating: Available according to customer's request



Material Properties

Physical properties Composition: 99.995% Al_2O_3 (white sapphire)

Crystal structure	Hexagonal-rhombohedral
Density	$3.98g/cm^3$

Mechanical properties

Mohs hardness	
Knoop hardness	$\perp C: 1,575-1,660 kgf/mm^2; //C: 1,670-2,000 kgf/mm^2$
Flexural strength	900MPa
Compressi strength	2.0GPa
Tensile strength	300-400Gpa
Young's module E	-400Gpa
Poissonratio	0.32-0.36

Thermal properties

Max.use temperature	1800-1950 $^{\circ}C$
---------------------	-----------------------

Melting temperature	2050 °C
Index of linear thermal expansion @200°C	⊥C: 5.4*10 ⁻⁶ /°C; //C:6.2*10 ⁻⁶ /°C
Thermal conductivity at 20°C	41.9W/m. ⁰ k

Optical properties

Nd (refraction index @589.3nm)	⊥C:1.769; //C:1.760
Optical transmission(1mm THK.)	
Visible light	>85%
Infrared	>85% @0.75-2.0μm; >90% @2.0-4.0μm; >80% @4.5μm
Ultraviolet	>80% @250-300nm; >60% @220nm; >50% @200nm

Electrical properties

Dielectric constant at 1MHz	7.5-10.5
Resistivity at 20°C	>10 ¹⁶ Ω .cm
Dielectric strength	48KV/mm
Chemical Properties	Practically inert to all chemica agents even at high
Nuclear radiation resistance	Excellen