

Sapphire Optical Glass Material Datasheet

1. Document Overview

This datasheet introduces single crystal sapphire optical substrate material, core physical & optical properties, compare with aluminosilicate glass, for optical engineers to select display protective cover materials.

2. Basic Material Info

- Material Grade: Optical-grade single crystal sapphire (α -Al₂ O₃)
- Crystal Orientation: C-plane / A-plane customizable
- Mohs Hardness: Grade 9 (harder than stainless steel, scratch-proof)
- Density: 3.98 g/cm³
- Working Temperature Range: -40° C ~ 120° C continuous use, short-term 180° C
- Chemical Resistance: Inert to salt water, medical disinfectant, weak acid & alkali
- Biocompatibility: Medical-grade, safe for human skin & diagnostic equipment contact

3. Optical Performance

- Visible Light Transmittance: $\geq 92\%$ (400 – 700nm)
- Near IR Transmittance: $\geq 88\%$ (700 – 1700nm)
- Birefringence: Low birefringence for high-precision touch display
- Refractive Index: 1.76 @ 550nm

4. Comparison Table: Sapphire VS Aluminosilicate Glass

Index	Single Crystal Sapphire	Chemically Strengthened Aluminosilicate Glass
Hardness	Mohs 9	Mohs 6-7
Max Working Temp	120°C long-term	70°C long-term
Anti-scratch	Excellent	General
Medical Biocompatible	Yes	No
Deep Sea Salt Resistance	Perfect	Poor
Unit Cost	Medium-High	Low

5. Applicable Scenarios

Automotive touch display, medical diagnostic equipment, AR/VR eyepiece, underwater ROV detection window, high-temperature industrial instrument HMI

6. Storage & Processing Notice

Must use cleanroom CNC cutting, avoid hard metal friction before coating; store in dust-free vacuum packaging.