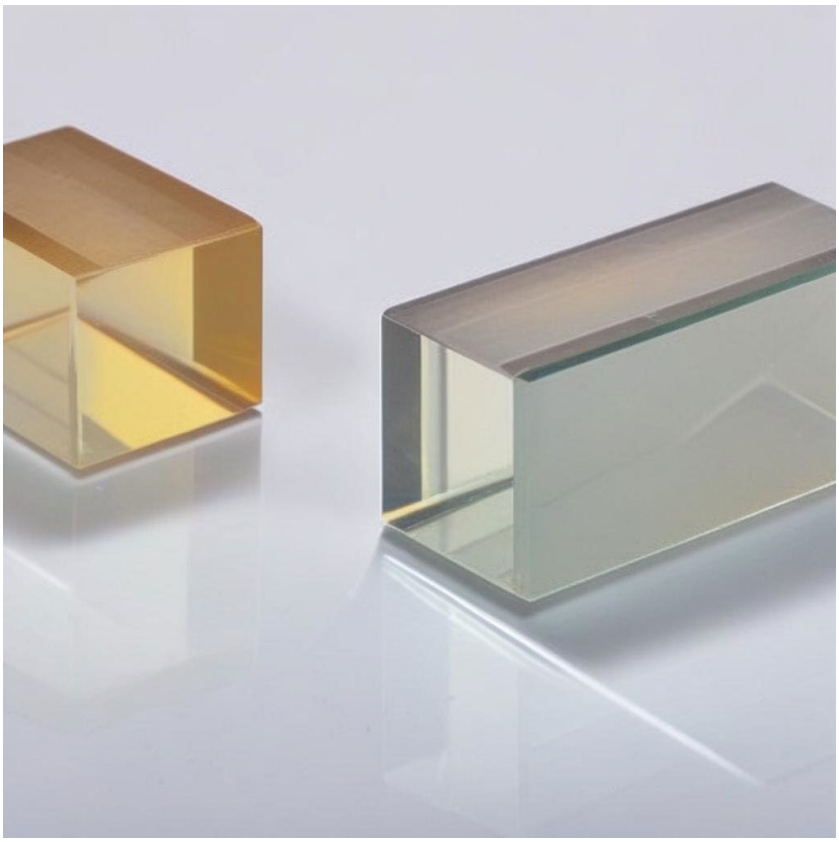
Photonics On Crystals

POC-OC-122487-Zerodur Glass Datasheet

1 Main Features

- Zerodur Glass offers near-zero thermal expansion, ensuring dimensional stability even in extreme environments.
- High resistance to thermal and mechanical stresses, ideal for precision applications.
- Excellent optical and mechanical properties make it suitable for metrology and optical applications.
- Used in applications demanding high precision and long-term stability, such as astronomy and semiconductor manufacturing.
- POC specializes in custom processing of Zerodur for a wide variety of uses.



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2. Material General Description

Zerodur Glass is a high-performance glass-ceramic material originally produced by Schott and is known for its unique properties such as ultra-low thermal expansion and exceptional dimensional stability. While Photonics On Crystals (POC) does not manufacture Zerodur, the company expertly processes this material for demanding applications in precision optics, metrology, and scientific research.

With a coefficient of thermal expansion close to zero, Zerodur Glass remains dimensionally stable even under extreme temperature changes, making it indispensable for applications requiring

exceptional precision and reliability. Its chemical and mechanical properties ensure its suitability in environments where durability and performance are critical, such as astronomical telescopes, semiconductor lithography, and industrial metrology systems. Zerodur Glass's versatility is reflected in its use in optical components like mirrors, substrates, and precision measuring tools.

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3. General Applications and Examples

1. **Astronomy and Space Exploration:**
   Zerodur Glass is widely used in the construction of large telescope mirrors for space and ground-based observatories. Its ability to remain dimensionally stable under fluctuating temperatures ensures the accuracy of astronomical observations.
2. **Semiconductor Lithography:**
   Zerodur serves as a substrate material in lithography equipment for semiconductor manufacturing, where its thermal stability is essential for nanometer-scale precision.
3. **Precision Metrology:**
   The dimensional stability of Zerodur Glass makes it ideal for use in metrological systems, ensuring consistent and accurate measurements over extended periods.
4. **High-Precision Optics:**
   Zerodur is processed into optical components such as windows, prisms, and beam splitters for laser systems, spectrometers, and imaging devices.
5. **Scientific Research and Instrumentation:**
   From interferometers to advanced spectrometers, Zerodur Glass is a vital material in research setups requiring unparalleled precision and stability.

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4. Chemical, Physical, or Structural Properties

Property	Value
Material Type	Glass-ceramic
Density	2.53 g/cm³
Thermal Expansion Coefficient	~0.02 × 10^-6/K
Young's Modulus	90 GPa
Poisson's Ratio	0.24
Hardness (Knoop)	650
Refractive Index (at 550 nm)	~1.54
Transparency Range	0.3–2.5 µm
Chemical Durability	Highly resistant to acids and alkalis

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5. Optical, Laser, or Nonlinear Optical Properties

Property	Value
Thermal Stability	Ultra-stable for precision optics
Surface Quality	10-5 (scratch-dig)
Surface Flatness	λ/10 @ 632.8 nm
Optical Homogeneity	Excellent across large dimensions
Absorption Coefficient	Low, minimizing energy loss

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6. Spectrum Transmission Curves

Transmission data for Zerodur Glass indicates high transparency within the 0.3–2.5 µm range. These characteristics make it suitable for visible and near-infrared applications. Detailed transmission curves can be provided upon request.

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7. Coating Specification

- **Anti-Reflective Coatings:** Available to enhance transparency for specific wavelengths.
- **Metallic Coatings:** For high-reflectivity applications such as mirrors.
- **Custom Coatings:** Tailored solutions for laser optics, imaging systems, and scientific instruments.

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8. Standard Fabrication Specifications

Specification	Value
Dimensional Tolerance	±0.02 mm
Surface Flatness	λ/10 @ 632.8 nm
Parallelism	<5 arcseconds
Scratch-Dig Quality	10-5
Maximum Size	Up to 1000 mm (customizable)
Beveling	<0.2 × 45°

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9. POC Strength and Capabilities

Photonics On Crystals (POC) is equipped with advanced facilities and expertise to process Zerodur Glass into precision components tailored to client needs. With an emphasis on quality and customer collaboration, POC ensures high standards in dimensional accuracy, optical performance, and custom design solutions for diverse industries.

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10. Standard Products

Product	Dimensions (mm)	Surface Flatness	Price (USD)
Zerodur Mirror Substrate	100 × 100 × 20	λ/10	$2,000–$4,000
Zerodur Prism	50 × 50 × 10	λ/8	$1,200–$2,500
Zerodur Optical Window	200 × 200 × 30	λ/6	$3,000–$6,000
Customization Options	Available upon request	Tailored Specifications	Contact for quote