Photonics On Crystals

POC-OC-122472-CaF_2 Crystal Datasheet

1 Main Features:

- Wide transmission range from 130 nm to 10 µm.
- High UV and IR transmittance (>94% @ 0.3 µm to 7 µm).
- Exceptional optical properties with low refractive index and absorption.
- High resistance to thermal and mechanical shocks.
- Suitable for high-power laser applications due to high damage threshold.

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2. Material General Description:

Calcium Fluoride (CaF_2) crystals exhibit exceptional optical and mechanical properties, making them ideal for applications requiring high UV and IR transmittance. These crystals are isotropic, providing low absorption and low refractive index, and are widely utilized in scientific and industrial applications. With high resistance to thermal and mechanical shocks, CaF_2 is frequently used in high-power laser systems, optical windows, and lenses. Its wide transmission range of 130 nm to 10 µm enables diverse uses in ultraviolet, visible, and infrared fields. The availability of monocrystalline and polycrystalline forms enhances its adaptability across various industries. Moreover, CaF_2 is a preferred choice for spectroscopic instruments, high-energy detectors, and advanced astronomical devices.

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3. General Application and Examples:

1. **Laser Optics:**
   CaF_2 crystals are highly efficient for high-power laser systems due to their high damage threshold, low absorption, and thermal resistance. They are widely used as laser windows and optical components in industrial and scientific lasers.
2. **Infrared Applications:**
   The crystal's high transmittance in the IR range (up to 10 µm) makes it an excellent material for IR thermography windows, IR optics, and optical sensor systems. Its applications include medical diagnostics, surveillance, and remote sensing.
3. **Astronomical Observations:**
   The superior optical clarity of CaF_2 crystals has been critical in developing astronomical equipment such as telescopes, allowing for enhanced imaging and spectral analysis.
4. **Spectroscopy:**
   CaF_2 serves as an optimal material in spectroscopic instruments, including UV and IR spectrometers, due to its broad transmission range and chemical stability.
5. **Precision Optics:**
   Used in high-performance lenses, prisms, and optical components for photography, camera lenses, and high-precision optical assemblies.

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4. Chemical, Physical, and Structural Properties:

Property	Details
Crystal Structure	Cubic System
Cleavage Plane	(111)
Density	3.18 g/cm³
Melting Point	1360°C
Molecular Weight	78.08
Thermal Conductivity	11.72 W/m*K at 286 K
Thermal Expansion	18.1×10^{-6}/°C at 273 K
Hardness (Mohs)	4.5
dn/dT	-10.6×10^{-6}/°C
Solubility	0.0017 g at 20°C

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5. Optical, Laser, and Nonlinear Optical Properties:

Property	Details

Transmission Range	0.13 µm to 9 µm
Transmittance	>94% (0.3 µm to 7 µm)
Refractive Index	1.39908 at 5 µm
Reflection Loss	5.4% at 5 µm (both surfaces)
Absorption Coefficient	0.03 @ 2.6 µm to 2.9 µm

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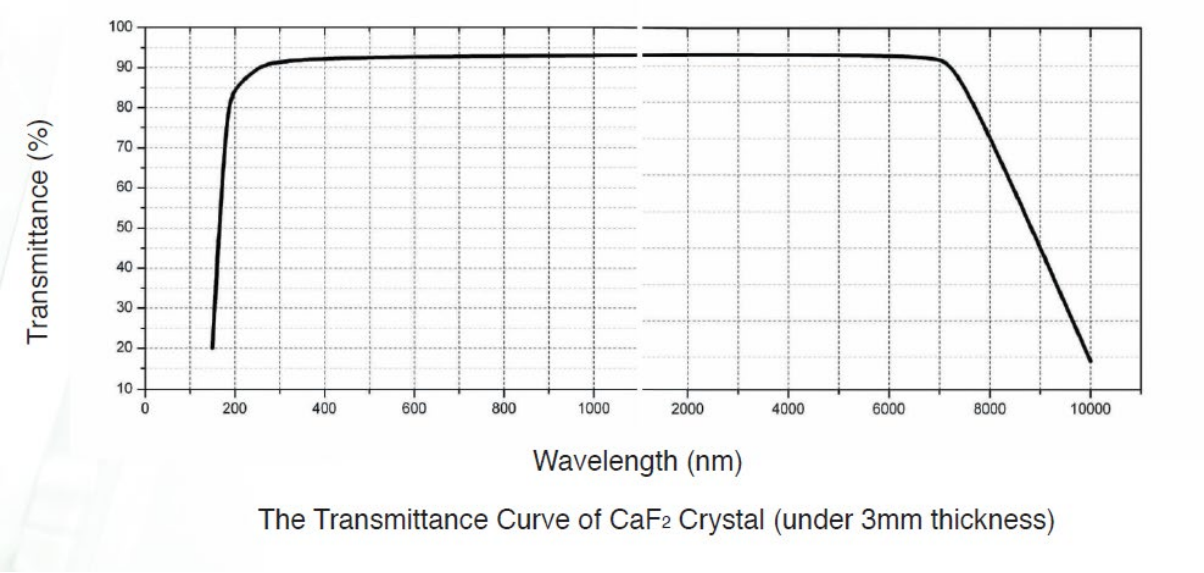
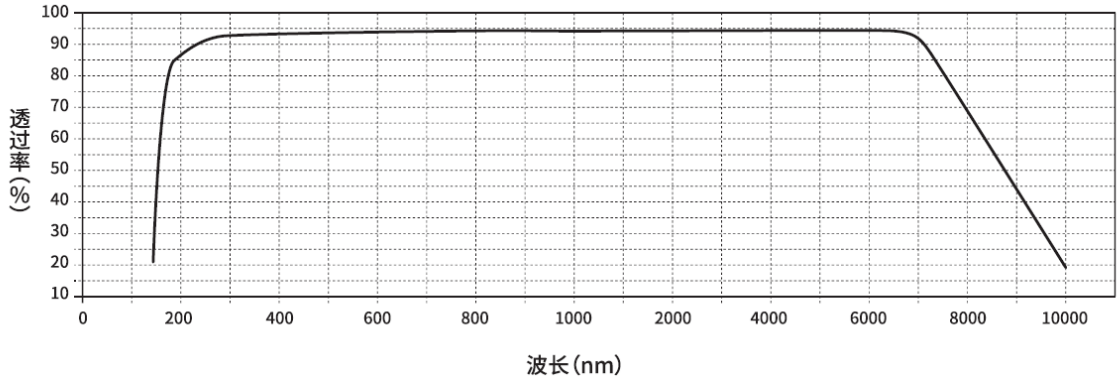
6. Spectrum Transmission Curve:

Refer to the provided transmittance graph, which demonstrates high transmittance across the wavelength range of 0.13 to 9 µm, with peak performance in the UV and IR spectrum.



The Transmittance Curve of CaF_2 Crystal (under 3mm thickness)



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7. Coating Specification:

- **AR-Coating:** Anti-reflective coatings tailored for specific UV, VIS, and IR wavelengths.
- **Custom Coatings:** Available upon request to meet user-specific requirements.

8. Standard Fabrication Specifications:

Specification	Details
Surface Quality (Scratch/Dig)	20/10
Surface Flatness	λ/4 at 633 nm
Clear Aperture	>85%
Maximum Diameter	375 mm
Edge Chamfer	<0.25 × 45°
Length Tolerance	±0.1 mm
Coating	Customizable

9. POC Strength and Capabilities:

Photonics On Crystals (POC) is a leading supplier of high-quality CaF_2 crystals, leveraging advanced growth technologies and strict quality control to meet the most demanding optical and industrial requirements. Our expertise in crystal growth and customization ensures unparalleled reliability and performance. Key capabilities include:

- Extensive stock and custom manufacturing of high-purity CaF_2 blanks.
- Expertise in AR coatings for UV and IR applications.
- Comprehensive technical support and fast delivery services.
- Dedicated R&D team to address specialized customer needs.

10. Standard Products:

Diameter	Thickness	Coating	Price (USD)	SKU
50 mm	10 mm	AR (UV-VIS)	220	101001
75 mm	20 mm	AR (IR)	350	101002
100 mm	25 mm	Uncoated	400	101003
Custom Sizes Available		Upon Request	Quoted	Custom