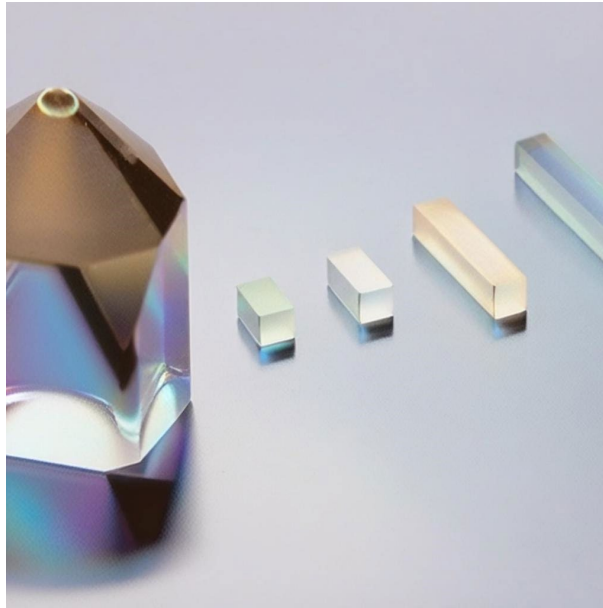


POC-OC-122414-CdSe Crystal Datasheet

1. Main Features

- Wide transparency range from 0.7 to 24 μm , ideal for infrared applications.
- Reasonably high nonlinearity for efficient laser radiation conversion.
- Small walk-off angle, minimizing beam distortion.
- High thermal conductivity for enhanced heat dissipation.
- Suitable for far-infrared and laser mixing applications.



2. Material General Description

Cadmium Selenide (CdSe) crystals are a highly versatile nonlinear optical material with an extensive transparency range of 0.7 to 24 μm . Known for their positive uniaxial symmetry and large nonlinear coefficients, CdSe crystals are widely utilized in difference frequency generation (DFG) and optical parametric oscillation (OPO) for producing far-infrared laser radiation. Their small walk-off angle ensures minimized beam distortion, making them an optimal choice for critical optical applications. With high thermal conductivity and a laser damage threshold of 60 MW/cm² (10.6 μm , 200 ns), CdSe is ideal for laser systems requiring precision and durability. Photonics On Crystals (POC) ensures the highest quality standards in crystal growth and fabrication to meet diverse industry needs.

3. General Applications and Examples

1. Far-Infrared Wavelength Generation

CdSe crystals are extensively used in generating far-infrared wavelengths via DFG and OPO methods. This is particularly effective for scientific research, spectroscopy, and defense applications.

Example: Generating 12 μm radiation from pump sources operating at 2 μm and 10 μm .

<https://www.poc.com.sg> Photonics on Crystals, A brand of *Shapeoptics Holdings*

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2. Infrared Optical Components

With their broad transparency range and mechanical stability, CdSe crystals are utilized in creating infrared optical elements such as substrates, polarizers, and waveplates.

Example: Infrared waveplates for high-precision polarization control in spectroscopy.

3. Laser Mixing Applications

CdSe's high nonlinearity supports efficient wavelength mixing for high-power laser systems in industrial and medical applications.

Example: Combining wavelengths in the mid-infrared region to achieve tunable laser output.

4. Chemical and Structural Properties

Property	Value
Chemical Formula	CdSe
Crystal Structure	Hexagonal, 6mm
Lattice Parameters	a = 4.2985 Å, c = 7.0150 Å
Density (@ 288 K)	5.81 g/cm ³
Mohs Hardness	3.25
Thermal Conductivity (@ 293 K)	6.9 (Ilc), 6.2 (Uc) W·m ⁻¹ ·K ⁻¹
Transparency Range	0.7–24 μm (at 0 transmittance level)

5. Optical and Nonlinear Optical Properties

Property	Value
Dispersion Equation for n _o	$n^2 = 4.2243 + 1.7680 \lambda^2 / (\lambda^2 - 0.2270) + 3.1200 \lambda^2 / (\lambda^2 - 3380)$
Dispersion Equation for n _e	$n^2 = 4.2009 + 1.8875 \lambda^2 / (\lambda^2 - 0.2171) + 3.4641 \lambda^2 / (\lambda^2 - 3629)$
Refractive Indices (@ 10.0 μm)	n _o = 2.431, n _e = 2.452
Laser-Induced Damage Threshold	60 MW/cm ² (10.6 μm, 200 ns)
Nonlinear Coefficient	Positive uniaxial (n _o > n _e)

6. Spectrum Transmission Curves

(Spectrum transmission curves for CdSe crystals are available upon request and demonstrate the material's excellent performance across the IR spectrum.)

7. Coating Specification

- **AR Coatings:** Anti-reflective coatings for infrared wavelengths (e.g., 0.7–24 μm) to reduce reflection losses.
- **Custom Coatings:** Options like BBAR or HR coatings are available for specific wavelength ranges based on application requirements.

8. Standard Fabrication Specifications

Specification	Value
Dimension Tolerance (mm)	$W \pm 0.1 \times H \pm 0.1 \times L \pm 0.2$
Surface Flatness	$\lambda/4$ @ 633 nm
Surface Quality (Scratch/Dig)	20/10 to MIL-PRF-13830B
Parallelism	< 30 arc sec
Perpendicularity	≤ 15 arc min
Angle Tolerance (°)	$\Delta\theta \leq 0.5$
Quality Warranty Period	One year under proper use

9. POC Strength and Capabilities

Photonics On Crystals (POC) provides high-quality CdSe crystals with precise control over dimensions, coatings, and optical properties. Our team ensures:

- **Customization:** Tailored crystal sizes and coating options for diverse applications.
- **Advanced Fabrication:** Stringent quality standards to meet the demands of high-power laser systems.
- **Technical Expertise:** Comprehensive support for product selection and integration into optical setups.

10. Standard Products

Product Code	Dimensions (mm)	Coating	Application
POC-CdSe-24-10	10 × 10 × 10	AR @ 0.7–24 μm	Far-Infrared Radiation Generation
POC-CdSe-Infrared	12 × 12 × 12	BBAR @ Mid-IR	Infrared Waveplates
POC-CdSe-Custom	Customizable	On Request	All Infrared Applications