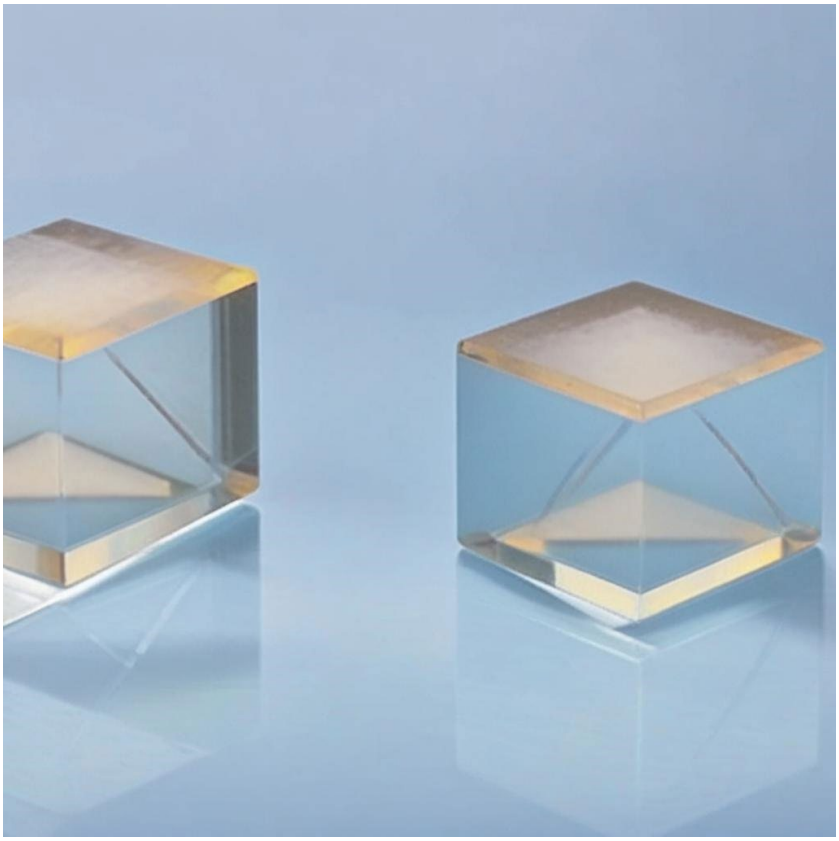
Photonics On Crystals

POC-OC-122510-GaSe Crystal Datasheet

1 Main Features

- Transparency range: 0.65 µm to 18 µm
- High nonlinearity and birefringence
- Soft and cleaves along the [001] plane
- Not suitable for cutting and polishing at certain angles
- Delivered uncoated and mounted for safe handling



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2. Material General Description

Gallium Selenide (GaSe) crystals are unique negative uniaxial semiconductor crystals with hexagonal symmetry, featuring a bandgap of 2.2 eV at 300 K. These crystals offer exceptional damage thresholds and large nonlinear coefficients, with a broad transparency range from 0.62 µm to 20 µm. GaSe crystals exhibit low absorption coefficients, making them highly suitable for mid-IR applications, terahertz wave generation, and detection systems. Their strong birefringence enhances their application versatility in high-frequency terahertz spectrometry and imaging systems. However, their fragile structure limits the feasibility of antireflection coatings.

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3. General Applications

GaSe crystals are widely used in advanced photonics applications:

- **Mid-IR Difference Frequency Generation (DFG):** Useful in generating long-wave infrared signals, leveraging high nonlinear coefficients.
- **Second Harmonic Generation (SHG):** Efficient in CO2 and dye laser frequency doubling.
- **Terahertz Generation:** Suitable for generating terahertz waves via optical rectification.
- **Terahertz Detection:** Integrated into THz time-domain spectroscopy (THz-TDS) systems for precise spectrometric analyses.
- **Advanced Research:** Applied in terahertz imaging systems, atmospheric gas sensing, and nonlinear optical experiments.

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4. Chemical, Physical, and Structural Properties

Property	Value
Chemical Formula	GaSe
Crystal Structure	Hexagonal, -62m symmetry
Lattice Parameters	a = 3.74 Å, c = 15.89 Å
Density	5.03 g/cm³
Mohs Hardness	Approx. 0
Transparency Range	0.62–20 µm
Nonlinear Coefficient (d22)	54 pm/V
Refractive Indices (n_o, n_e)	$n_o > n_e$ (varies with wavelength)
Sellmeier Equations	Specified for 5.3 µm and 10.6 µm
Damage Threshold	28 MW/cm² (9.3 µm, 150 ns pulse)

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5. Optical, Laser, and Nonlinear Optical Properties

Wavelength (µm)	n_o	n_e	Walk-Off Angle
5.3	2.7233	2.3966	4.1°
10.6	2.6975	2.3745	-

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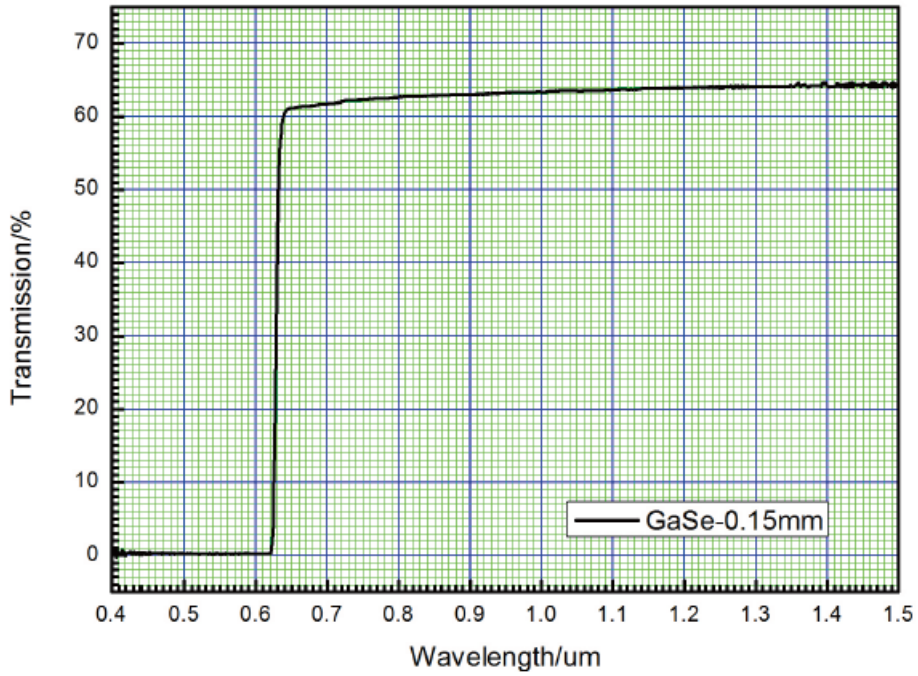
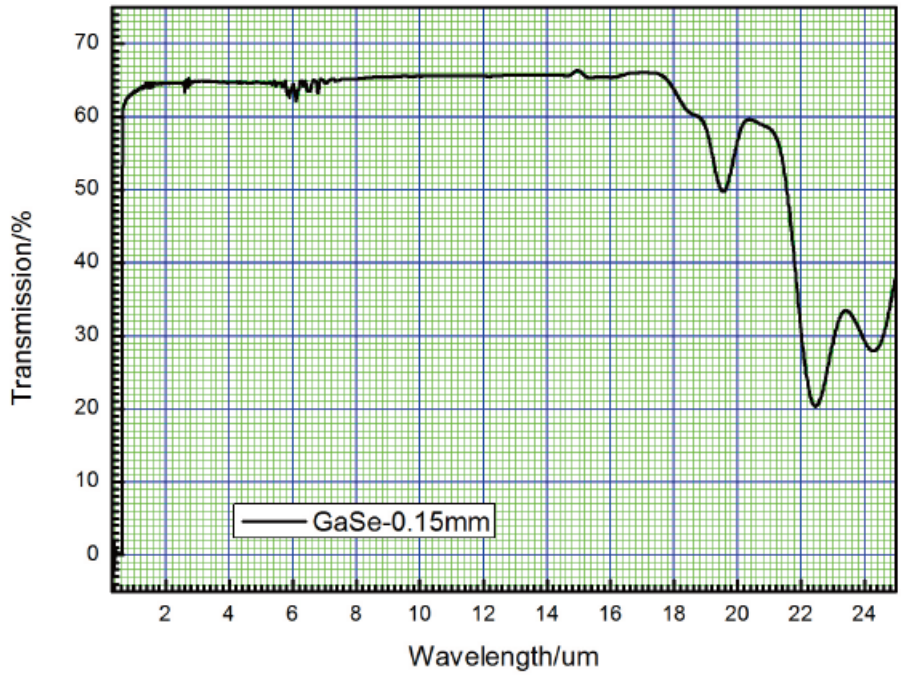
6. Spectrum Transmission Curves

The spectral transmission curve of GaSe demonstrates minimal absorption across the 0.62 µm to 20 µm range, making it highly effective for mid-infrared applications.





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7. Coating Specifications

- Coatings: Unavailable due to the fragile nature of GaSe.
- Surface Finish: Cleaved for maximum performance.

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8. Standard Fabrication Specifications

Parameter	Value
Standard Sizes	≥ Ø7 mm clear aperture
Surface Quality	Cleaved surface
Thickness Tolerance	±0.2 mm
Mount Options	Ø25.4 mm anodized aluminum mount

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9. POC Strength and Capabilities

Photonics On Crystals (POC) specializes in providing high-quality GaSe crystals optimized for nonlinear optical and terahertz applications. With precise fabrication capabilities, POC offers customizable dimensions and ensures superior quality assurance for fragile crystal materials. Their expertise guarantees reliable solutions tailored for advanced photonics research.

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10. Standard Products and Pricing

Clear Aperture	Length	Orientation	Coating	Price (USD)
≥ Ø7 mm	0.2 mm	Z-cut	Uncoated	$1,950
≥ Ø7 mm	0.5 mm	Z-cut	Uncoated	$1,750
≥ Ø7 mm	1.0 mm	Z-cut	Uncoated	$2,150
≥ Ø7 mm	2.0 mm	Z-cut	Uncoated	$2,450

Customization options available upon request.