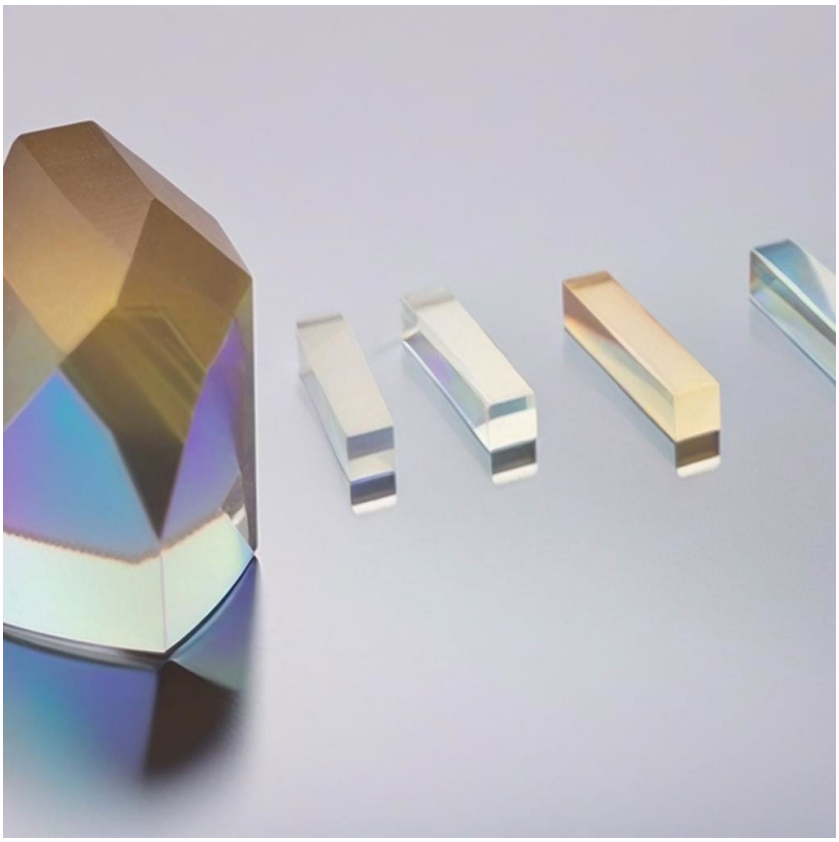
Photonics On Crystals

POC-OC-122419-BaGa2GeSe6 Crystal Datasheet

1. Main Features

- Broad transparency range from 0.5 µm to 18 µm.
- Large nonlinear coefficient of approximately 40 pm/V.
- High chemical stability and resistance to thermal damage.
- Ideal for high-power applications with a high damage threshold.
- Low optical scattering properties, enabling superior performance in frequency conversion.



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2. Material General Description

BaGa2GeSe6 Crystal, often abbreviated as BGSe Crystal, is a high-performance nonlinear optical material renowned for its broad transmission range (0.5–18 µm), large nonlinear optical coefficient (~40 pm/V), and excellent thermal and chemical stability. This crystal is capable of achieving efficient frequency conversion processes, including second harmonic generation, sum-frequency mixing, and optical parametric amplification.

The crystal's exceptional damage threshold (with a melting point of 880°C) and low optical scattering make it suitable for high-power applications such as Nd:YAG laser pumping and mid-infrared frequency conversion. BaGa2GeSe6 also supports low-dispersion and high-durability processing,

making it an excellent material for advanced photonics applications. Its unique chemical stability allows for easy cutting and polishing, enabling custom fabrication to meet user-specific requirements.

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3. General Applications and Examples

BaGa2GeSe6 Crystals are indispensable in a variety of high-performance photonics and optical systems. Key applications include:

1. **Mid-Infrared Laser Systems**:
   With a wide transmission range and high optical clarity, BaGa2GeSe6 is well-suited for mid-IR laser systems, enabling precision applications in spectroscopy, defense, and biomedical imaging.
2. **Nonlinear Optical Frequency Conversion**:
   Its high nonlinear optical coefficient (~40 pm/V) makes it ideal for second harmonic generation (SHG), difference frequency generation (DFG), and optical parametric oscillation (OPO) systems for producing mid- and far-infrared laser outputs.
3. **CO and CO2 Laser Systems**:
   The crystal's low optical losses and high damage threshold make it perfect for frequency doubling and mixing of CO and CO2 laser emissions, providing efficient wavelength conversion in high-power applications.
4. **Infrared Lidar and Remote Sensing**:
   BaGa2GeSe6's transparency and low absorption in the IR spectrum support accurate remote sensing and lidar technologies.
5. **Advanced Research**:
   BaGa2GeSe6 Crystals enable cutting-edge research in nonlinear optics and photonics, offering a highly stable platform for developing new IR optical devices.

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4. Chemical and Structural Properties

Property	**Value**
Chemical Formula	BaGa2GeSe6
Transparency Range	0.5–18 µm
Space Group	42 mm
Bandgap Energy	2.38 eV
Mohs Hardness	a-cut: 380 kg/mm², c-cut: 394 kg/mm²
Density	5.2 g/cm³
Melting Point	880°C

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5. Optical and Nonlinear Optical Properties

Property	Value
Transparency Range	0.5–18 µm
Refractive Index (1064 nm)	n = 2.7
Nonlinear Coefficient (pm/V)	~40
Absorption Coefficient	< 0.05 cm^{-1} (1064 nm)
Laser Damage Threshold	> 1.5 J/cm^2 (1064 nm, 15 ns, 1 Hz)

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6. Spectrum Transmission Curves

(Spectrum transmission curves can be provided upon request, showcasing superior transparency in the range of 0.5–18 µm.)

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7. Coating Specification

- **AR Coatings**: Available for 3–5 µm and 8–12 µm ranges.
- **Dual-Band Coatings**: Custom coatings designed for specific laser wavelengths.
- **Customization**: Specialized coatings available for extended applications upon request.

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8. Standard Fabrication Specifications

Specification	Value
Orientation Accuracy	± 0.5°
Clear Aperture	> 90%
Surface Quality (Scratch/Dig)	40-20
Flatness	λ/6 at 633 nm
Parallelism	< 30 arc sec
Perpendicularity	< 10 arc min
Surface Flatness Tolerance	± 0.1 mm
Length Tolerance	± 0.1 mm (1–10 mm)
	± 0.5 mm (> 10 mm)

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9. POC Strength and Capabilities

Photonics On Crystals

Photonics On Crystals (POC) specializes in the design and delivery of advanced BaGa2GeSe6 Crystals for infrared and mid-infrared optical systems. POC offers:

- Customization for specific wavelength and orientation requirements.
- Precision fabrication and polishing services with stringent quality control.
- Solutions tailored for both research and industrial applications.

With advanced manufacturing expertise, POC ensures the highest standards of reliability and efficiency in crystal production.

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10. Standard Products

Face Dimensions (mm)	**Length (mm)**	**Orientation (Theta/Phi)**	**Coating**	**Application**	**Price (USD)**
5 x 5	10	0°/0°	AR @ 3–5 µm	Mid-IR spectroscopy	Request
10 x 10	15	0°/0°	AR @ 8–12 µm	OPO/OPA systems	Request
Custom	Custom	Custom	Custom	Custom	Request