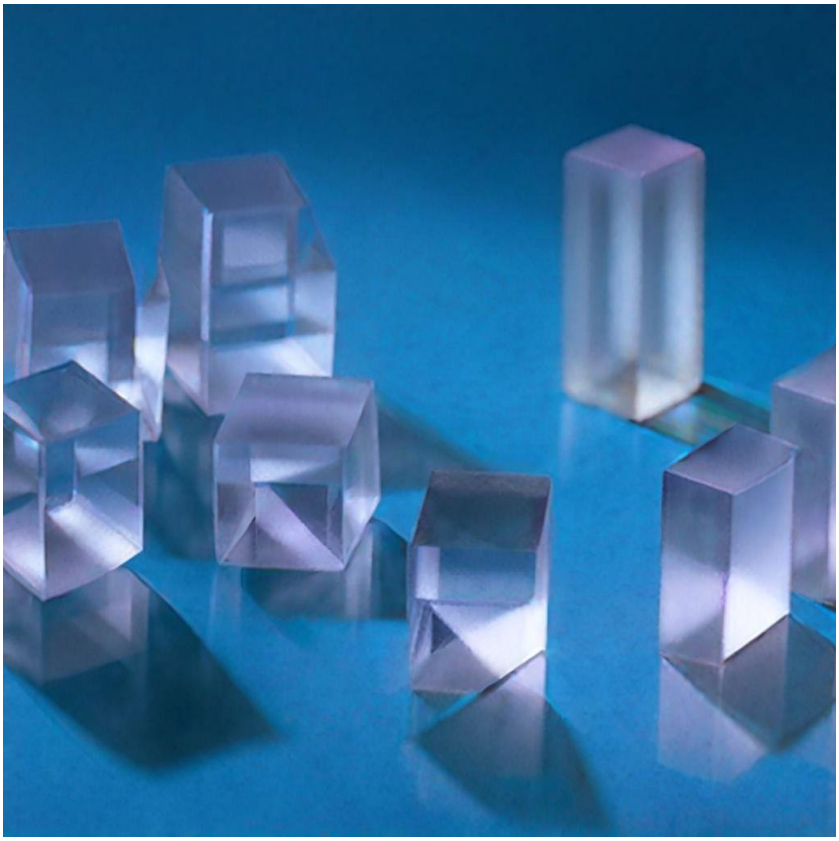
Photonics On Crystals

POC-OC-122417-AgGaGe5Se12 Crystal Datasheet

1. Main Features

- Broad transparency range: 0.6 – 16.5 µm.
- Bandgap width: 2.2 eV for efficient nonlinear processes.
- High laser damage threshold: 220 MW/cm² at 1.06 µm, 15 ns, 1 Hz.
- Supports second-harmonic generation (SHG), sum-frequency generation (SFG), and optical parametric amplification (OPA).
- Suitable replacement for AgGaS2 and AgGaSe2 in high-power laser applications.



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2. Material General Description

The **AgGaGe5Se12 Crystal** is a cutting-edge nonlinear optical material featuring a broad transmission range of 0.6 – 16.5 µm, making it ideal for mid-infrared (mid-IR) laser applications. With a high bandgap of 2.2 eV, this crystal demonstrates superior performance in frequency conversion processes such as SHG, SFG, and OPA. The laser damage threshold of 220 MW/cm² (1.06 µm, 15 ns, 1 Hz) ensures its durability under high-power operations. AgGaGe5Se12 offers enhanced properties over its predecessors, AgGaS2 and AgGaSe2, providing greater application flexibility for advanced laser systems.

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3. General Applications and Examples

1. **Nonlinear Frequency Conversion:** AgGaGe5Se12 is a preferred crystal for frequency conversion processes such as SHG, SFG, and OPA. Its wide transparency range enables efficient operation in the 3 – 5 µm and 8 – 14 µm spectral regions, critical for mid-IR laser applications.
2. **Infrared Laser Systems:** Ideal for Nd:YAG (1.06 µm) and Ti:Sapphire (0.8 µm) laser-pumped systems, AgGaGe5Se12 supports high-power output in the mid-IR spectrum, making it suitable for spectroscopy, remote sensing, and laser-based material processing.
3. **Medical and Diagnostic Applications:** With its mid-IR transparency, this crystal facilitates precise laser surgical tools and advanced imaging technologies for medical diagnostics.
4. **Environmental Monitoring:** The broad wavelength range supports infrared spectroscopy for atmospheric monitoring and pollutant detection.
5. **Replacement in Laser Systems:** AgGaGe5Se12 serves as a versatile replacement for AgGaS2 and AgGaSe2 in laser systems, offering improved damage thresholds and a broader transparency range.

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4. Chemical and Structural Properties

Property	Value
Chemical Formula	AgGaGe5Se12
Crystal Structure	Orthorhombic
Lattice Parameters	a = 1.065 nm, b = 0.785 nm
Density	5.4 g/cm³
Bandgap Width	2.2 eV
Mohs Hardness	2.8
Thermal Conductivity	0.45 W/(m·K)
Melting Point	825 °C

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5. Optical and Nonlinear Optical Properties

Property	Value
Transparency Range	0.6 – 16.5 µm
Nonlinear Coefficients	d31 = 15 pm/V
Refractive Indices	n0 = 2.48, ne = 2.66
Laser Damage Threshold	220 MW/cm² (1.06 µm, 15 ns)

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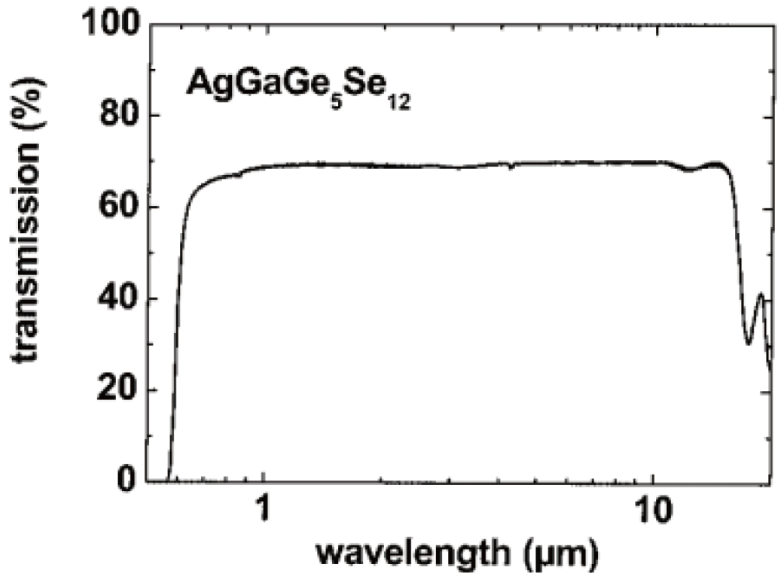
6. Spectrum Transmission Curves

(Spectrum transmission curves for AgGaGe5Se12 Crystal can be provided upon request, showcasing its high transmission efficiency across the 0.6 – 16.5 µm range.)



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7. Coating Specification

- **Anti-Reflective Coating (AR):** Optimized for mid-IR wavelengths, reducing reflectance to <0.2%.
- **Customized Coatings:** Other coatings (e.g., BBAR, HR) are available upon request for specialized applications.

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8. Standard Fabrication Specifications

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

9. POC Strength and Capabilities

Photonics On Crystals (POC) is a leading provider of AgGaGe5Se12 Crystals, offering high-quality products tailored to industrial and scientific requirements. With precision fabrication and robust quality control, POC ensures optimal performance and durability for mid-IR laser systems. Our team supports custom design and coating solutions to meet diverse application demands.

10. Standard Products

Product Code	Dimensions (mm)	Coating Type	Application	Price (USD)
AGGS-1010-AR	10 × 10 × 2	AR Coating	Mid-IR Laser Systems	Request
AGGS-2020-AR	20 × 20 × 5	AR Coating	High-Power Applications	Request
Custom	Custom Sizes	Customized	Tailored for Specific Needs	Request