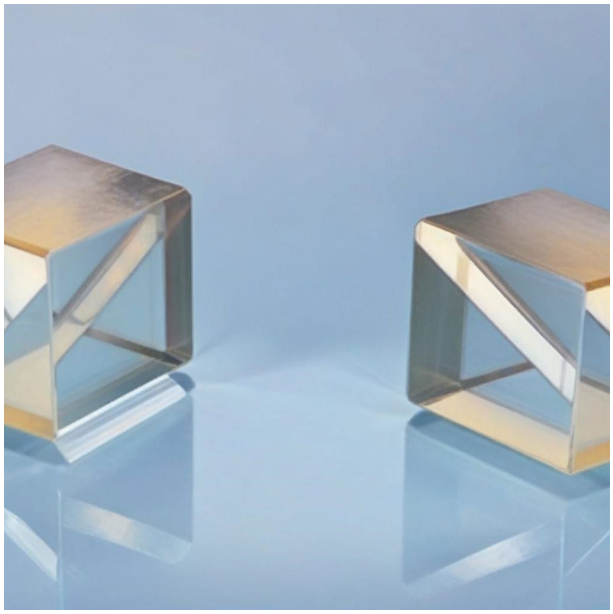
Photonics On Crystals

POC-OC-122415-ZnGeP2 Crystal Datasheet

1. Main Features

- Wide transmission range from 0.74 µm to 12 µm.
- High nonlinearity coefficient (75 pm/V) for efficient wavelength conversion.
- Excellent thermal conductivity (35 W/m·K) for high-power applications.
- Nominal absorption coefficient < 0.04 cm^-1 at 2.1 µm for o-wave applications.
- Ideal for mid-IR OPOs and terahertz frequency generation.



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2. Material General Description

Zinc Germanium Phosphide (ZnGeP2) is a high-performance nonlinear optical crystal widely recognized for its exceptional properties in mid-infrared laser systems. It offers a broad transparency range from 0.74 µm to 12 µm, combined with a high nonlinear optical coefficient and excellent thermal conductivity, making it ideal for applications such as optical parametric oscillators (OPOs), difference frequency generation (DFG), and second harmonic generation (SHG).

ZnGeP2 crystals are particularly suited for high-power laser systems due to their low absorption coefficient and high laser-induced damage threshold. Their versatility extends to the generation of terahertz frequencies, remote sensing, and medical applications. At Photonics On Crystals (POC), we ensure high-quality fabrication and customization to meet specific application needs.

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3. General Applications and Examples

1. **Mid-Infrared Frequency Generation** ZnGeP2 is extensively used for generating mid-IR radiation through DFG and OPO systems.

Example: Producing laser wavelengths in the 2.5–12 µm range for gas detection and medical imaging.

2. **Terahertz Frequency Generation** ZnGeP2's nonlinear properties are ideal for generating terahertz frequencies for spectroscopy and imaging.
   Example: Generation of frequencies for security scanning and material characterization.
3. **High-Power Laser Applications** The high thermal conductivity and damage threshold make ZnGeP2 suitable for military and industrial laser systems.
   Example: Military-grade countermeasure systems and material processing.
4. **Spectroscopic and Medical Applications** ZnGeP2 is employed in spectroscopy for chemical analysis and in medical diagnostics for precise imaging.
   Example: Spectroscopic analysis of molecular compositions.

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4. Chemical and Structural Properties

Property	Value
Chemical Formula	ZnGeP2
Crystal Structure	Tetragonal
Lattice Parameters	a = 5.467 Å, c = 10.801 Å
Density	4.13 g/cm³
Melting Point	1110 °C
Mohs Hardness	5
Thermal Conductivity	35 W/m·K
Transparency Range	0.74–12 µm

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5. Optical and Nonlinear Optical Properties

Property	Value
Transparency Range	0.74–12 µm
Nonlinear Coefficient (d36)	75 pm/V
Refractive Index at 10.6 µm	n = 3.067
Absorption Coefficient	< 0.04 cm^-1 at 2.1 µm
Laser-Induced Damage Threshold	> 2 GW/cm² at 2.09 µm
Sellmeier Equation for Refractive Index	$n^2 = A + (B * \lambda^2) / (\lambda^2 - C)$
Dispersion Equation Coefficients	A = 3.132, B = 1.297, C = 0.162

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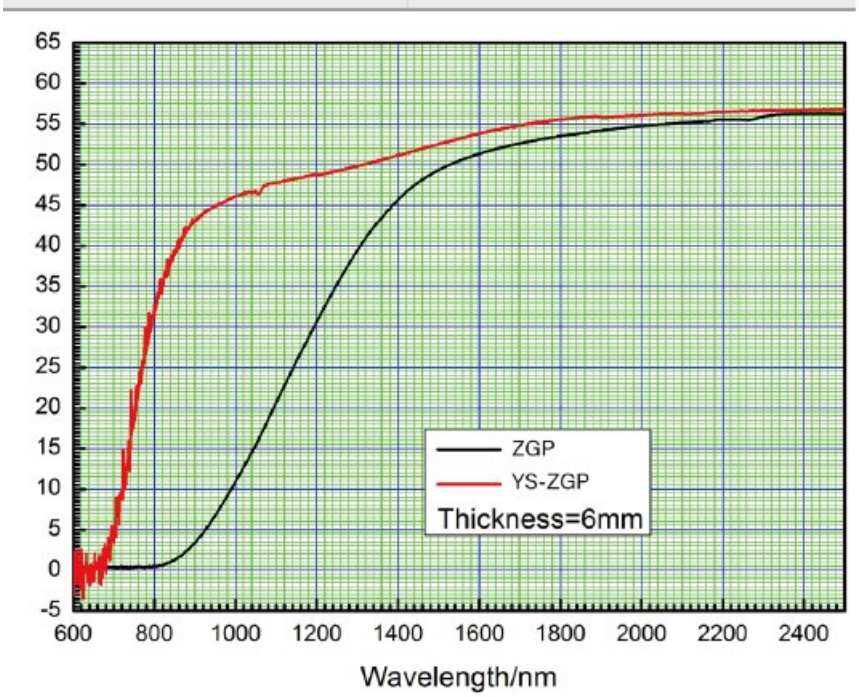
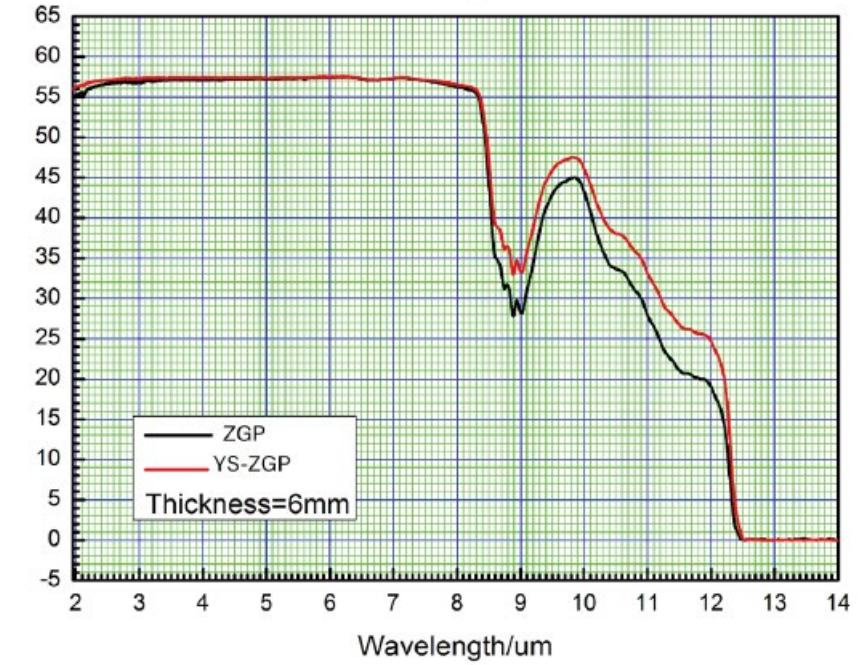
6. Spectrum Transmission Curves

(Spectrum transmission curves for ZnGeP2 crystals are available upon request, showcasing excellent performance across the mid-IR spectrum.)





7. Coating Specification

- **AR Coatings:** Anti-reflective coatings for wavelengths from 0.74 µm to 12 µm, optimized for specific pump and signal wavelengths.

- **Custom Coatings:** BBAR, HR, or dual-band coatings available upon request for specialized applications.
- **Durability:** Coatings are optimized for high laser damage threshold and extended lifespan under extreme operating conditions.

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8. Standard Fabrication Specifications

Specification	Value
Dimension Tolerance (mm)	W ± 0.1 × H ± 0.1 × L ± 0.2
Surface Flatness	λ/8 @ 633 nm
Surface Quality (Scratch/Dig)	20/10 to MIL-PRF-13830B
Parallelism	< 30 arc sec
Perpendicularity	≤ 15 arc min
Angle Tolerance (°)	Δθ ≤ 0.5
Quality Warranty Period	One year under proper use

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9. POC Strength and Capabilities

Photonics On Crystals (POC) specializes in the production of high-quality ZnGeP2 crystals, delivering:

- **Customization Options:** Tailored dimensions, coatings, and surface finishes to meet specific application requirements.
- **High Precision:** Advanced fabrication techniques for superior optical homogeneity and precision.
- **Technical Expertise:** Comprehensive support for product selection, system integration, and long-term performance optimization.

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10. Standard Products

Product Code	Dimensions (mm)	Coating	Application
POC-ZnGeP2-12-10	10 × 10 × 10	AR @ 0.74–12 μm	Mid-IR Laser Radiation Conversion
POC-ZnGeP2-Infrared	12 × 12 × 12	BBAR @ Mid-IR	Optical Parametric Oscillators
POC-ZnGeP2-Custom	Customizable	On Request	All Mid-IR Applications