Photonics On Crystals

POC-OC-122421-HgGa2S4 Crystal Datasheet

1. Main Features

- Wide transparency range: 0.55–13 µm.
- High nonlinear optical coefficient: d36 approximately 1.8 times that of AgGaS2.
- Exceptional damage threshold: 60 MW/cm² (1064 nm, 10 ns).
- Negative uniaxial crystal with no > ne configuration.
- Ideal for nonlinear optical applications such as OPO and OPA.

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2. Material General Description

HgGa2S4 is a highly efficient nonlinear optical crystal with an exceptional nonlinear coefficient (d36), approximately 1.8 times that of AgGaS2. With a broad transparency range of 0.55–13 µm, it is particularly well-suited for mid-IR and near-IR applications, including optical parametric oscillation (OPO) and amplification (OPA). The crystal demonstrates excellent damage threshold properties and is chemically stable, making it ideal for high-power laser systems. Its broad wavelength tuning range makes it a competitive option alongside other crystals such as AgGaS2, ZnGeP2, and GaSe.

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3. General Applications and Examples

HgGa2S4 Crystals are widely utilized in advanced photonics and laser technologies. Specific examples include:

1. **Laser Frequency Conversion**:
    - Effective in optical parametric oscillators (OPO) and optical parametric amplifiers (OPA).
    - Supports broad wavelength tuning, enabling frequency conversion in high-power laser systems.
2. **Spectroscopic Analysis**:
    - Used in mid-IR spectroscopy for environmental sensing and atmospheric studies.
3. **Medical Imaging and Biophotonics**:
    - Provides accurate and efficient imaging in medical diagnostics.
4. **High-Power Lasers**:
    - Suited for defense applications and laser material processing due to its damage threshold.
5. **Research and Development**:
    - Extensively used in the study of nonlinear optical effects for high-energy applications.

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4. Chemical and Structural Properties

Property	Value
Transparency Range	0.55–13 µm
Bandgap Energy	2.34 eV
Density	4.95 g/cm³
Mohs Hardness	3–3.5
Crystal Configuration	Negative Uniaxial (no > ne)
Refractive Indices	See table below

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5. Optical and Nonlinear Optical Properties

Property	Value
Transparency Range	0.55–13 µm
Nonlinear Coefficient (d36)	1.8 × d36 of AgGaS2

Refractive Indices (no, ne)	See below
Damage Threshold	60 MW/cm² (1064 nm, 10 ns)

Refractive Indices (no and ne):

- no = 2.6592, ne = 2.5979 @ 0.5495 µm
- no = 2.5796, ne = 2.5264 @ 0.6500 µm
- no = 2.4774, ne = 2.4324 @ 1.0760 µm
- no = 2.4386, ne = 2.3979 @ 3.5400 µm
- no = 2.3690, ne = 2.3290 @ 11.000 µm

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6. Spectrum Transmission Curves

(Spectrum transmission curves for HgGa2S4 Crystals can be provided upon request, highlighting its broad transmission properties and efficiency across IR ranges.)

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7. Coating Specification

- **AR Coatings**: Optimized for mid-IR wavelengths (0.8–1.2 µm, 3–5 µm, and 8–12 µm).
- **Customized Coatings**: Available upon request for specific wavelength applications.

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8. Standard Fabrication Specifications

Specification	**Value**
Dimension Tolerance	±0.1 mm
Surface Quality (Scratch/Dig)	40-20
Flatness	λ/8 @ 632.8 nm
Parallelism	<30 arc sec
Perpendicularity	<10 arc min
Edge Bevel	<0.2 mm × 45°

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9. POC Strength and Capabilities

Photonics On Crystals (POC) specializes in manufacturing and supplying high-quality HgGa2S4 Crystals tailored to meet the needs of various industries. Our capabilities include:

- Customized crystal growth and fabrication services.
- High-precision polishing and coating for optimal optical performance.

- Comprehensive quality control for consistent results.

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10. Standard Products

Face Dimensions (mm)	Length (mm)	Orientation (Theta/Phi)	Coating	Application	Price (USD)
10 × 10	10	0°/0°	AR @ 3–5 µm	Mid-IR spectroscopy	Request
20 × 20	20	0°/0°	AR @ 8–12 µm	Frequency conversion	Request
Custom	Custom	Custom	Custom	Custom	Request