BGSe (BaGa4Se7) Nonlinear Crystal for Mid-IR, 0.47–18 µm, d11 = 24 pm/V

Model WQ-NLC-BGSE · waveqvanta.com/products/bgse-baga4se7-nonlinear-crystal

BGSe (BaGa4Se7) is the selenide analogue of BaGa4S7 and a comparatively new mid-infrared nonlinear crystal, grown by the Bridgman–Stockbarger technique. It transmits from 0.47 to 18 µm, apart from an absorption peak near 15 µm, and combines a nonlinear coefficient of d11 = 24 pm/V with a surface damage threshold of 557 MW/cm^2 at 1.064 µm. WaveQuanta supplies BGSe as oriented blanks, polished elements and coated elements for OPO, OPA and DFG with pump sources from 1 to 3 µm.



Key features

- Transmission range 0.47–18 µm, with an absorption peak near 15 µm
- Nonlinear coefficient d11 = 24 pm/V; powder SHG response about 2–3 times that of AgGaS2
- Surface damage threshold 557 MW/cm^2 at 1.064 µm (5 ns), about 3.7 times that of AgGaS2 under the same conditions
- Accepts pump sources from 1 to 3 µm, with tunable output over 3–18 µm
- Thermal expansion with low anisotropy: 9.24–11.70 × 10^{-6} /K along the three axes
- About 65% transmittance over 1–14 µm through a polished 2 mm thick (001) plate
- Shows terahertz phonon-polaritons and is studied for THz generation

Note: BGSe is a newly developed crystal and individual pieces may contain a few internal streaks. These do not affect stable performance, and returns are not accepted on the grounds of such streaks.

Specifications

Chemical Formula	BaGa4Se7
Space Group	Pc
Transmission Range	0.47–18 µm (absorption peak near 15 µm)
Transmittance	≈65% over 1–14 µm (polished 2 mm thick (001) plate)
Nonlinear Coefficient	d11 = 24 pm/V
Birefringence at 2 µm	0.07
Surface Damage Threshold	557 MW/cm^2 (1.064 µm, 5 ns, 1 Hz, 0.4 mm spot)
Thermal Expansion Coefficients	αa = 9.24 × 10^{-6} /K, αb = 10.76 × 10^{-6} /K, αc = 11.70 × 10^{-6} /K
Thermal Conductivity (298 K)	0.74 / 0.64 / 0.56 W/(m·K) along a / b / c
Thermal Diffusivity (298 K)	0.50 / 0.42 / 0.38 mm^2/s along a / b / c
Pump Wavelength Range	1–3 µm
Tunable Output Range	3–18 µm
Dimension Tolerance	(W ±0.1 mm) × (H ±0.1 mm) × (L +1 mm/−0.5 mm)
Clear Aperture	> 90% central area
Flatness	λ/8 @ 633 nm (T ≥ 1 mm)
Surface Quality	60-40 scratch-dig (after coating)
Parallelism	Better than 30″

Perpendicularity	10′
Orientation Accuracy	< 30″

Standard sizes

Size	Cut / orientation	Surface / coating	Mount
3 × 3 × 5 mm	θ = 42°, φ = 0°	Blank	Unmounted
3 × 7 × 15 mm	θ = 40.5°, φ = 0°	Blank	Unmounted
3 × 7 × 20 mm	θ = 40.5°, φ = 0°	Blank	Unmounted
3 × 7 × 30 mm	θ = 40.5°, φ = 0°, Type I, XZ-cut	S1: AR @ 1–1.5 μm (R < 0.2%); S2: HT @ 10–16 μm + 1–1.5 μm (R < 4%)	Unmounted
5 × 5 × 1 mm	θ = 40.5°, φ = 0°	S1: AR @ 1–3 μm; S2: AR @ 3–20 μm	Unmounted
5 × 5 × 1.5 mm	θ = 40.5°, φ = 0°	Blank	Unmounted
5 × 5 × 1.5 mm	θ = 40.5°, φ = 0°	S1: AR @ 1–3 μm; S2: AR @ 3–20 μm	Unmounted
5 × 5 × 2 mm	θ = 40.5°, φ = 0°	Blank	Unmounted
5 × 5 × 2 mm	θ = 40.5°, φ = 0°	S1: AR @ 1–3 μm; S2: AR @ 3–20 μm	Unmounted
5 × 5 × 3 mm	θ = 60°, φ = 0°	Polished, uncoated	Unmounted
5 × 5 × 4 mm	θ = 60°, φ = 0°	Blank	Unmounted
5 × 6 × 5 mm	θ = 10°, φ = 90°	Blank	Unmounted
7 × 7 × 2 mm	θ = 44°, φ = 0°	Blank	Unmounted
7 × 7 × 2 mm	θ = 44°, φ = 0°, XZ-cut	S1: HT @ 1.4–2.3 μm; S2: HT @ 5–9 μm	Unmounted
7.2 × 6.4 × 2.3 mm	θ = 47°, φ = 0°	Blank	Unmounted
7.2 × 6.4 × 3.3 mm	θ = 47°, φ = 0°	Blank	Unmounted
10 × 10 × 1 mm	θ = 43°, φ = 0°	Polished, uncoated	Unmounted

Typical applications

- Mid-IR OPO and OPA pumped at 1–3 μm
- Difference-frequency generation (DFG) for tunable 3–18 μm output
- Intracavity and extracavity frequency conversion, with CW or pulsed pumping
- Terahertz generation research