GaSe (Gallium Selenide) Nonlinear Crystal for Mid-IR SHG and THz, 0.62–20 µm

Model WQ-NLC-GASE · waveqvanta.com/products/gase-gallium-selenide-nonlinear-crystal

Gallium selenide (GaSe) is a layered nonlinear crystal with a d22 coefficient of 54 pm/V and a transparency range of 0.62–20 µm. It is used for frequency doubling of mid-IR lasers such as CO2, CO and DF lasers, for up-conversion of IR radiation into the visible, for optical parametric generation and for THz generation. Because GaSe cleaves along the (001) plane and cannot be cut at arbitrary phase-matching angles, WaveQuanta supplies it as thin mounted plates, from 0.1 mm to 3 mm thick.



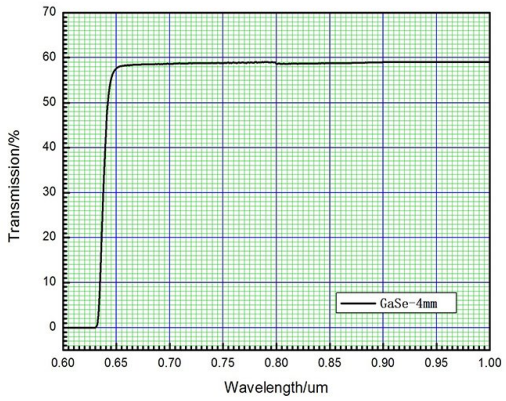
Key features

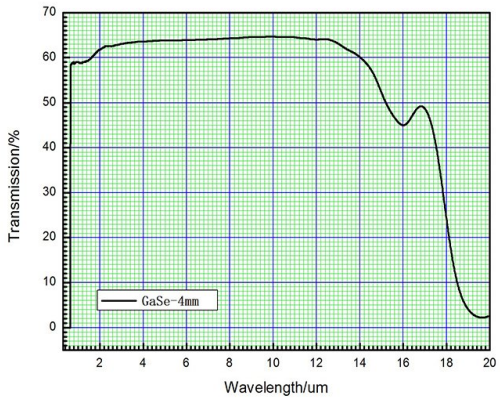
- Transparency range 0.62–20 µm
- Nonlinear coefficient d22 = 54 pm/V
- Optical damage threshold 30 MW/cm^2 at 1.064 µm (10 ns) and 28 MW/cm^2 at 9.3 µm (150 ns)
- Up to 9% conversion efficiency reported for CO2 laser SHG
- THz generation in the 0.1–4 THz range
- Soft, layered crystal (Mohs hardness 2) that cleaves along the (001) plane
- Plates are thinned layer by layer from a thicker blank; 0.2 mm is the usual minimum thickness, and 0.1 mm plates can be made without a flatness guarantee

Specifications

Chemical Formula	GaSe
Point Group	6m2
Lattice Parameters	a = 3.74 Å, c = 15.89 Å
Density	5.03 g/cm^3
Mohs Hardness	2
Cleavage Plane	(001)
Transparency Range	0.62–20 µm
Refractive Indices at 5.3 µm	no = 2.7233, ne = 2.3966
Refractive Indices at 10.6 µm	no = 2.6975, ne = 2.3745
Nonlinear Coefficient	d22 = 54 pm/V
Walk-off Angle	4.1° at 5.3 µm
Optical Damage Threshold	30 MW/cm^2 (1.064 µm, 10 ns); 28 MW/cm^2 (9.3 µm, 150 ns); 0.5 MW/cm^2 (10.6 µm, CW)
CO2 Laser SHG Efficiency	Up to 9%
THz Generation Range	0.1–4 THz
Typical Minimum Thickness	0.2 mm (0.1 mm on request, flatness not guaranteed)
Typical Mounting	10 × 10 mm plate in a 1-inch diameter holder, clear aperture Ø9–9.5 mm

Measured data (typical)





Standard sizes

Size	Cut / orientation	Surface / coating	Mount
Ø5 × 0.2 mm	—	—	Mounted
Ø5 × 0.3 mm	—	—	Mounted
Ø7 × 0.2 mm	—	—	Mounted
Ø7 × 0.3 mm	—	—	Mounted
Ø7 × 0.5 mm	—	—	Mounted
Ø7 × 0.6 mm	—	—	Mounted
Ø7 × 0.8 mm	—	—	Mounted
Ø7 × 1 mm	—	—	Mounted
Ø7 × 2 mm	—	—	Mounted
Ø7 × 3 mm	—	—	Mounted
Ø8 × 0.1 mm	Z-cut	—	Mounted
Ø8 × 0.4 mm	—	—	Mounted
Ø8 × 0.6 mm	—	—	Mounted
Ø8 × 2 mm	Z-cut	—	Mounted
8 × 1 mm	—	—	Mounted

Typical applications

- Second-harmonic generation of CO2, CO and chemical DF (λ = 2.36 μm) lasers
- Up-conversion of CO and CO2 laser radiation into the visible range
- Mid-IR pulse generation by difference-frequency mixing of Nd lasers with IR dye or F-centre lasers
- Optical parametric generation within 3.5–18 μm
- THz (T-ray) generation, 0.1–4 THz