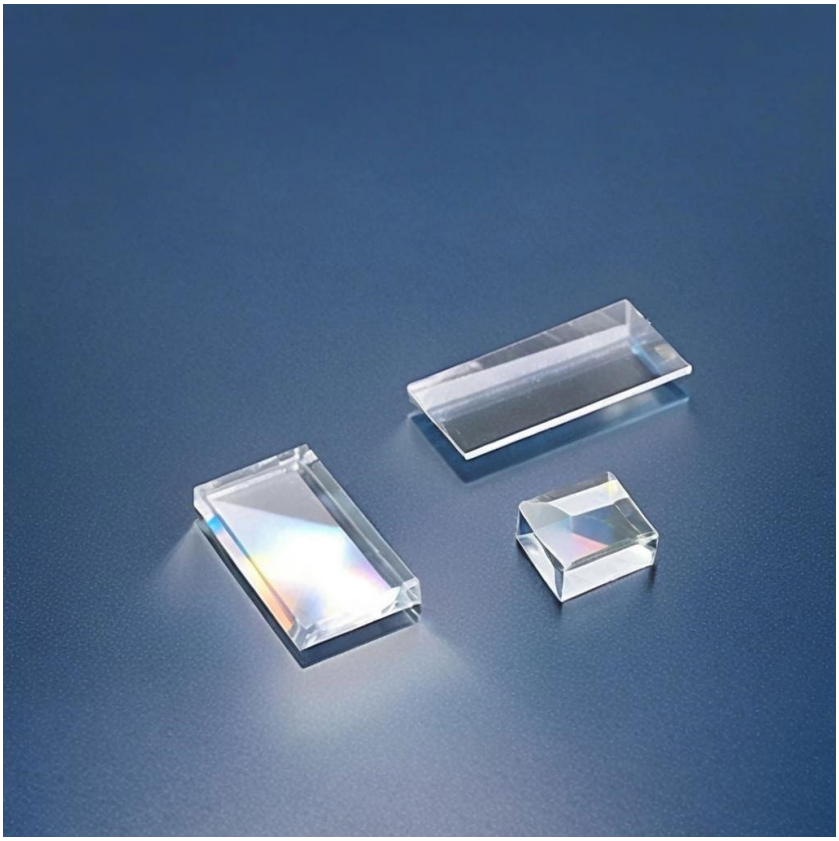
Photonics On Crystals

POC-OC-122468-Barium Nitrate Crystal Datasheet

1 Main Features

- Transparency range from 350 nm to 1800 nm
- Raman frequency shift of 1048 cm^{-1}
- High Raman gain, ideal for nanosecond applications
- Low absorption and stable properties
- Custom crystal dimensions and coatings available upon request



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2. Material General Description

Barium Nitrate Crystal ($Ba(NO_3)_2$) is a cubic crystal known for its high Raman gain coefficient, making it one of the most efficient materials for Raman laser applications in nanosecond steady-state regimes. The material exhibits a broad transparency range (350 nm to 1800 nm) and moderate damage thresholds, making it suitable for applications requiring "eye-safe" radiation in the 1.59 µm range. Despite its advantages, its relatively low thermal conductivity (1.17 $W \cdot m^{-1} \cdot K^{-1}$) and high thermo-optic coefficient ($dn/dT = -20 \times 10^{-6}/K$) can lead to thermal lensing, requiring careful thermal management during operation. Barium Nitrate Crystal is hygroscopic and should be handled with care.

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3. General Applications and Examples

Barium Nitrate Crystals are used in a range of Raman laser systems. Typical applications include:

- **Raman Lasers**: External cavity Raman lasers, especially for systems utilizing Q-switched Nd:YAG lasers.
- **Eye-Safe Lasers**: Generation of 1.59 µm radiation aligned with the CO_2 absorption line, suitable for lidar and environmental monitoring.
- **Nanosecond Raman Shifters**: Ideal for generating high-power radiation in nanosecond regimes due to its exceptional Raman gain coefficient (47 cm/GW @ 532 nm).

For these applications, the crystal's high transparency and Raman frequency shift make it an indispensable material for advanced photonics solutions.

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4. Chemical, Physical, and Structural Properties

Property	Value
Chemical Formula	$Ba(NO_3)_2$
Crystal Structure	Cubic, P-2_13
Lattice Parameters	a = b = c = 8.11 Å
Density	3.25 g/cm³
Mohs Hardness	2.5–3
Transparency Range	0.33–1.8 µm
Refractive Index @ 1064 nm	1.5559
Thermal Conductivity	1.17 $W \cdot m^{-1} \cdot K^{-1}$
Thermal Expansion Coefficient	13×10^{-6} / K
Thermo-Optic Coefficient (dn/dT)	-20×10^{-6} / K
Raman Frequency Shift	1048 cm^{-1}
Raman Linewidth	0.4 cm^{-1}
Raman Gain	47 cm/GW @ 532 nm
Laser-Induced Damage Threshold	> 10 J/cm² @ 1064 nm, 10 ns

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5. Optical and Nonlinear Optical Properties

Optical Property	Value
Raman Frequency Shift	1048 cm^{-1}

Raman Gain	47 cm/GW @ 532 nm, 11 cm/GW @ 1064 nm
Transparency Range	0.33 µm – 1.8 µm
Damage Threshold	10 J/cm² @ 1064 nm, 10 ns
Refractive Index	1.5559 @ 1064 nm

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6. Spectrum Transmission Curves

The transparency curve for Barium Nitrate Crystals reveals a broad operational range from 350 nm to 1800 nm, ideal for applications in visible and near-infrared wavelengths.

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7. Coating Specifications

Coating Type	Range	AR Coating Efficiency
AR Coating	500–700 nm	< 0.2% reflectance

Other coating options are available upon request.

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8. Standard Fabrication Specifications

Specification	Value
Orientation	[110]
Clear Aperture	> 85%
Face Dimensions Tolerance	± 0.05 mm
Length Tolerance	± 1 mm
Parallelism	< 5 arcmin
Perpendicularity	< 10 arcmin
Protective Chamfers	< 0.25 mm at 45°
Surface Quality	40-20 S-D
Coating	AR @ 500–700 nm

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9. POC Strength and Capabilities

Photonics On Crystals (POC) specializes in the manufacturing and customization of high-quality Barium Nitrate Crystals. With decades of experience in material fabrication, we provide:

- Expertise in thermal management and optical coatings.

- Customization services for various dimensions and coatings.
- High-precision manufacturing processes.
- Rapid delivery and technical support for specialized applications.

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10. Standard Products

Face Dimensions	Length	Coatings	Price (USD)
5 × 5 mm	15 mm	AR @ 500–700 nm	$870
5 × 5 mm	30 mm	AR @ 500–700 nm	$1050
8 × 8 mm	45 mm	AR @ 500–700 nm	$1240
8 × 8 mm	75 mm	AR @ 500–700 nm	$1410
Custom	Custom	Upon Request	Upon Request

This datasheet provides a comprehensive overview of the technical properties and applications of Barium Nitrate Crystals. For further inquiries, contact **Photonics On Crystals**.