POC-OC-122402- Datasheet for LBO Crystals by Photonics On Crystals (POC)

1 Main Features

- **Wide Transparency Range**: Exceptional transparency from 160 nm to 2600 nm, suitable for diverse photonics applications.
- **High Nonlinear Coefficients**: Ideal for second-harmonic generation (SHG) and third-harmonic generation (THG) with high optical homogeneity.
- **Temperature and Angle Tolerance**: Wide acceptance angle and excellent temperature bandwidth for operational flexibility.
- **Superior Damage Threshold**: Excellent resistance to laser-induced damage, ensuring durability in high-power systems.
- **Customizable Solutions**: Tailored dimensions, coatings, and mounts available to meet specific application needs.
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Photonics On Crystals

2. Material General Description

Lithium Triborate (LBO) crystals are versatile nonlinear optical materials offering unparalleled transparency across the wavelength range of 160–2600 nm. Known for their high optical homogeneity and absence of photorefractive damage, LBO crystals are a leading choice in photonics for SHG, THG, and optical parametric oscillation (OPO). These crystals exhibit a high damage threshold, ensuring stability in high-intensity laser setups.

LBO's orthorhombic crystal structure and non-critical phase-matching (NCPM) capabilities further enhance its suitability for applications requiring precise wavelength generation and harmonic conversion. Its broad acceptance angle and minimal walk-off make it particularly effective in maintaining beam quality. POC offers LBO crystals fabricated to stringent standards, ensuring reliability and customization options for various industries, including medical imaging, industrial processing, and defense.

3. General Applications and Examples

- **Second-Harmonic Generation (SHG)**: Efficiently doubles the frequency of Nd:YAG and Ti:Sapphire lasers for high-power laser systems.
- **Third-Harmonic Generation (THG)**: Generates ultraviolet wavelengths for advanced scientific research.

- **Optical Parametric Oscillators (OPO)**: Enables tunable wavelengths across a broad spectrum for spectroscopy and metrology.
- **Frequency Doubling and Mixing**: High conversion efficiency in green laser systems for industrial processing and cutting.
- **Medical Imaging**: Produces ultraviolet light for high-resolution imaging and diagnostics.
- **Defense and Aerospace**: Powers lidar, rangefinding, and optical communication systems with precise wavelength outputs.
- **Scientific Research**: Facilitates nonlinear optical experiments and laser system development.

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4. Chemical and Structural Properties

Property	Value
Crystal Structure	Orthorhombic, Pna21
Lattice Parameters (Å)	a=8.4473, b=7.3788, c=5.1395
Density (g/cm³)	2.47
Melting Point (°C)	~834
Mohs Hardness	6
Thermal Conductivity (W/m·K)	3.5
Thermal Expansion Coefficients	$a=10.8\times10^{-6}$, $b=8.8\times10^{-6}$, $c=3.4\times10^{-6}$

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5. Optical and Nonlinear Optical Properties

Parameter	Type I SHG	Type II SHG
Transparency Range (nm)	160–2600	160–2600
SHG Phase Match Range (nm)	551–2600	790–2150
Effective NLO Coefficients (pm/V)	d11=0.05±0.009	d11=0.05±0.006
Walk-Off Angle (°)	0.6	0.12
Thermal-Optic Coefficient (K^{-1})	$dn/dt=3.9\times10^{-6}$	$dn/dt=6.3\times10^{-6}$
Damage Threshold (GW/cm²)	>10	>5

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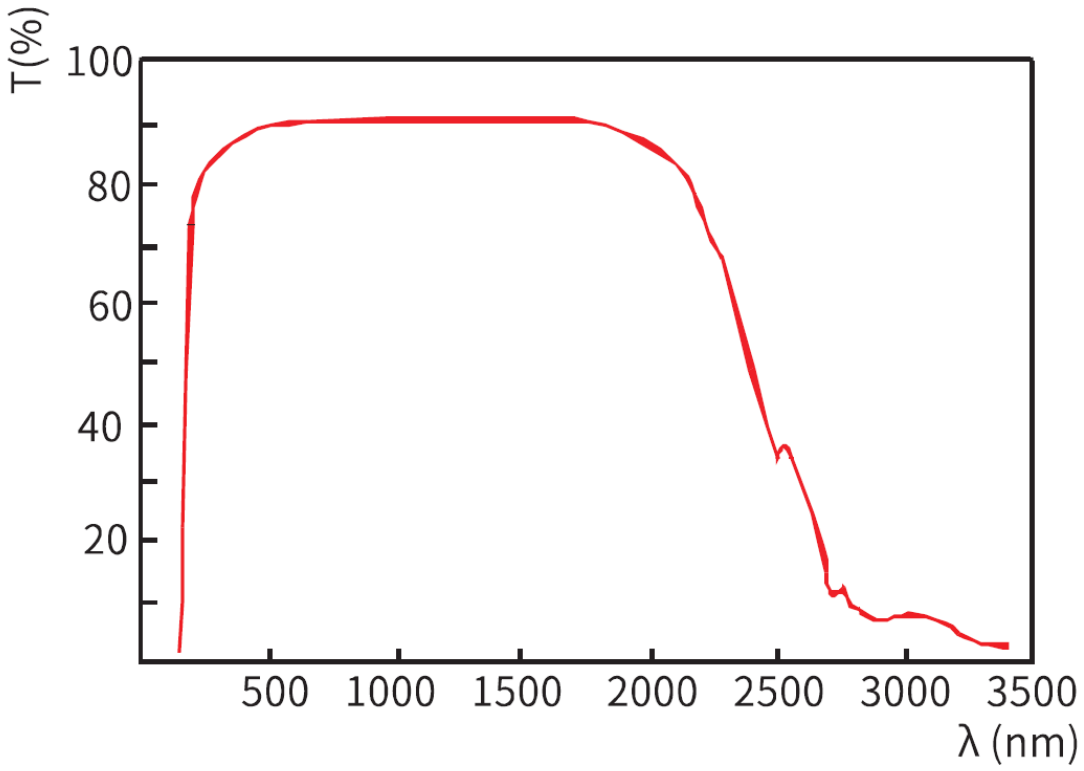
6. Spectrum Transmission Curve

LBO crystals feature a transmission spectrum with excellent transparency from 160 nm to 2600 nm. The curve demonstrates >80% transmission efficiency across the operating range, ensuring optimal performance for nonlinear optical applications.



7. Coating Specification

- **Dual AR Coating**: <0.2% reflectivity for SHG at 1064 nm.
- **Broadband AR Coating**: Optimized for 532 nm and 355 nm applications.
- **Durable DLC Coating**: Optional for extended durability in harsh environments.
- **Custom Coatings**: Available upon request for specific wavelength ranges.

8. Standard Fabrication Specifications

Parameter	Specification
Dimension Tolerance	±0.1 mm
Surface Flatness	λ/8 at 633 nm
Clear Aperture	>90%
Surface Quality	10/5 Scratch/Dig
Parallelism	≤20 arc seconds
Perpendicularity	≤5 arc minutes
Damage Threshold	>10 GW/cm² at 1064 nm

9. POC Strength and Capabilities

Photonics On Crystals (POC) leads the industry in advanced LBO crystal fabrication and customization. With a state-of-the-art manufacturing facility and a team of expert engineers, POC delivers products with precise quality control and rapid turnaround. Our capabilities include bespoke crystal dimensions, anti-reflective and DLC coatings, and system integration

for a variety of applications. POC is dedicated to providing tailored solutions, meeting the demands of industries ranging from medical diagnostics to aerospace.

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10. Standard Products

Dimension (mm)	Coating	Application	Price (USD)
3×3×3	AR@1064 nm	SHG Type I	230
5×5×5	AR@532 nm	THG Applications	320
10×10×10	Broadband AR Coating	OPO and OPA Systems	470
Custom Sizes	Upon Request	Tailored Solutions	Custom Quote