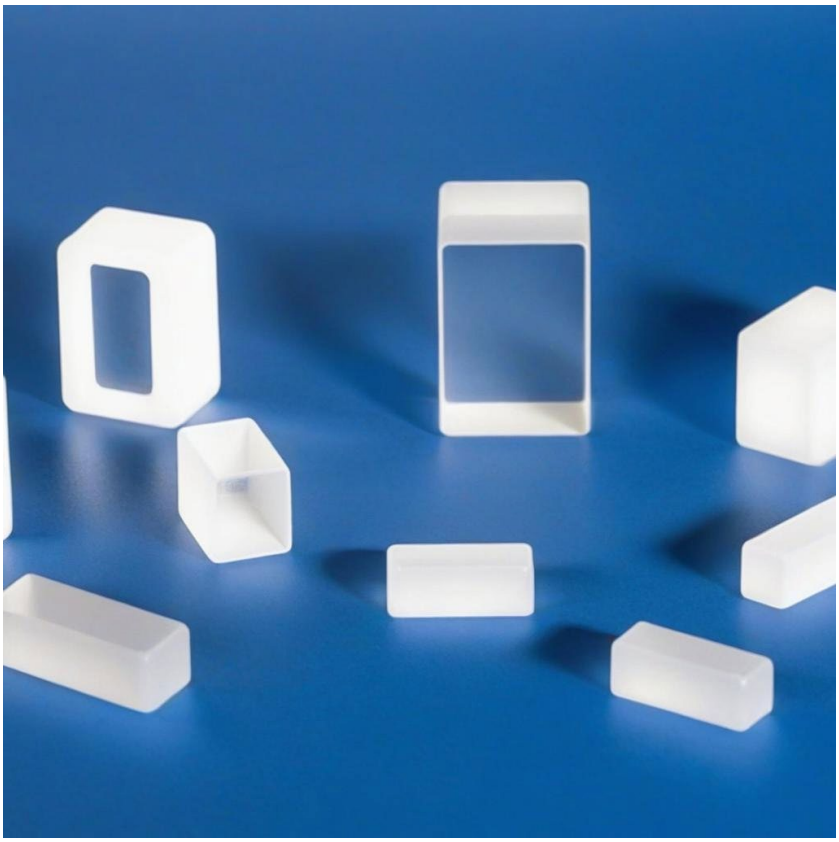
POC-OC-122405- Datasheet for CLBO Crystals by Photonics On Crystals (POC)

1. Main Features

- Exceptional UV nonlinear optical properties with a cut-off wavelength down to 180 nm.
- High FOHG and FIHG conversion efficiencies for Nd:YAG lasers.
- Wide acceptance angles with minimal walk-off, enhancing beam quality.
- VUV output achievable at 193 nm using precise phase matching.
- Durable and stable, suitable for high-power applications with no saturation.



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2. Material General Description

Cesium Lithium Borate ($CsLiB_6O_{10}$ or CLBO) is a cutting-edge nonlinear optical crystal, optimized for UV and deep UV applications. It is characterized by its excellent optical clarity, minimal absorption, and superior nonlinear optical efficiency. CLBO exhibits a larger temperature and spectral acceptance than other crystals, making it ideal for high-power laser systems and applications demanding precise harmonic generation. Its low hygroscopicity ensures stability under dry and sealed conditions. The crystal's rapid growth cycle and scalable dimensions enable cost-effective manufacturing for industrial and research needs.

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3. General Applications and Examples

CLBO crystals are extensively employed in various advanced photonics applications:

1. **High-Order Harmonic Generation**:
   - Used for FOHG (Fourth Order Harmonic Generation) and FIHG (Fifth Order Harmonic Generation) in Nd:YAG lasers, enabling applications in microlithography and semiconductor manufacturing.
   - Example: Generating 193 nm deep UV for microprocessing applications.
2. **UV and Deep UV Lasers**:
   - Applied in LiDAR systems, biomedical imaging, and UV spectroscopy.
   - Example: UV-LiDAR systems use CLBO for environmental monitoring and mapping.
3. **Microprocessing and Optical Communication**:
   - Ideal for high-precision material processing and advanced optical fiber communication technologies.
   - Example: CLBO's phase matching supports coherent UV light generation, critical for high-speed optical networks.
4. **Biomedical Research**:
   - Suitable for UV imaging techniques and fluorescence-based diagnostics.
   - Example: CLBO enables enhanced imaging resolution in molecular biology studies.
5. **Laser-Based Instrumentation**:
   - Widely used in scientific setups requiring stable and efficient nonlinear optical conversion.
   - Example: Facilitates efficient SHG and THG for pump lasers in OPO systems.

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4. Chemical and Structural Properties

Property	Specification
Crystal Structure	Tetragonal, Space Group I42m
Lattice Parameters	a = 10.49 Å, c = 9.939 Å
Symmetry	Z = 4
Melting Point	Approx. 844.5 °C
Density	3.85 g/cm³
Thermal Expansion	$\alpha a = 4.8 \times 10^{-5}$/K, $\alpha c = 2.69 \times 10^{-5}$/K

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5. Optical and Nonlinear Optical Properties

Property	Specification
Transparency Range	180–2750 nm
Angle Acceptance	1.02 mrad·cm (1064 nm)
Temperature Acceptance	9.4 °C·cm

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Property	Specification
Spectral Acceptance	7.03 nm·cm (1064 nm)
Walk-off Angle	1.78° (1064 nm)
Effective NLO Coefficients	d_{33} = 1.16 pm/V (at 488 nm)
NLO Coefficients	d_ijk = d*sin(2θ)*sin²(ϕ)
Sellmeier Equations	$n^2 = 2.2104 + 0.01018\lambda^2 - 0.01258\lambda^{-2}$

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6. Spectrum Transmission Curves

Available upon request.

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7. Coating Specification

Base Material	AR-Coating	Reflectance
CLBO	AR-532 nm/266 nm	R < 0.2% @ 532 nm
CLBO	AR-1064 nm/213 nm	R < 2% @ 213 nm

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8. Standard Fabrication Specifications

Parameter	Specification
Dimension Tolerance	W ± 0.1 mm x H ± 0.1 mm x L ± 0.2 mm
Flatness	λ/8 @ 633 nm
Surface Quality	10-5 to MIL-PRF-13830B
Chamfer	0.2 mm ± 45°
Damage Threshold	>300 MW/cm² (266 nm, 10 Hz)

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9. POC Strength and Capabilities

CLBO crystals boast a remarkable combination of thermal stability, high nonlinear optical efficiency, and broad transmission range, making them indispensable for high-precision UV applications. With superior angular and spectral tolerance, CLBO ensures consistent performance even under high-power laser conditions. These crystals are fabricated with stringent quality controls, ensuring reliability and longevity in challenging industrial environments.

10. Standard Products

Dimension (mm)	Coating	Application	Price (USD)	Customization
5 × 5 × 0.5	AR-532/266 nm	FOHG/FIHG	$420	Available
10 × 10 × 1.0	AR-1064/213 nm	SHG/THG	$580	Available