Photonics On Crystals

POC-OC-122413-LilO3 Crystal Datasheet

1. Main Features

- Wide transparency range from 300 nm to 5000 nm.
- High nonlinear optical coefficient (d15 = -5.5 × 10^-12 m/V).
- Negative uniaxial refractive indices for improved optical performance.
- Suitable for frequency-doubling, tripling, and mixing applications.
- Available in polished or as-cut formats with AR-coated options.

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2. Material General Description

Lithium Iodate (LiIO3) is one of the oldest commercial nonlinear optical (NLO) crystals, widely recognized for its high nonlinear coefficient and broad transparency range. It is used extensively in frequency-doubling, tripling, and laser mixing applications, particularly for low and medium power laser systems. Its hexagonal structure and excellent optical homogeneity make it ideal for critical laser components. However, LiIO3 is highly hygroscopic and requires dry storage and sealed housing for extended durability. Photonics On Crystals (POC) ensures high-quality fabrication to meet industry standards for precision optics.

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3. General Applications and Examples

1. **Frequency-Doubling and Tripling**
   LiIO3 crystals are extensively used in frequency-doubling and tripling processes for lasers operating in the UV and visible ranges. This capability is especially valuable in laser spectroscopy and bioimaging applications.
   Example: Conversion of a 532 nm laser to 266 nm for biomedical imaging.

2. **Laser Mixing Applications**
   The high nonlinear coefficient makes LiIO3 a preferred choice for laser mixing in low to medium power setups, enabling a variety of wavelength combinations for research and industrial applications.
   Example: Generating 355 nm output from 1064 nm and 532 nm lasers.

3. **Optical Parametric Oscillators (OPOs)**
   LiIO3 is also used in OPO systems due to its wide transparency range and excellent phase-matching properties.
   Example: Generating tunable wavelengths for spectroscopy and telecommunications.

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4. Chemical and Structural Properties

Property	Value
Crystal Structure	Hexagonal, Point Group 6
Transparency Range	300–5000 nm
Nonlinear Coefficient (d15)	-5.5 × 10^-12 m/V
Refractive Indices	n_o = 1.8571, n_e = 1.7165 (at 1064 nm)

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5. Optical and Nonlinear Optical Properties

Property	Value
Transparency Range (nm)	300–5000
Refractive Indices (1064 nm)	n_o = 1.8571, n_e = 1.7165
Nonlinear Coefficient (d15)	-5.5 × 10^-12 m/V
Sellmeier Equation (n_o)	$n^2 = 3.415716 + 0.047031 / (\lambda^2 - 0.035306) - 0.008801$
Sellmeier Equation (n_e)	$n^2 = 2.918692 + 0.035145 / (\lambda^2 - 0.028224) - 0.003641$

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6. Spectrum Transmission Curves

Spectrum transmission curves for LiIO3 crystals can be provided upon request, showcasing their excellent UV and visible light transmission characteristics.

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7. Coating Specification

- **AR Coatings:** Anti-reflective coatings available for specific wavelengths upon request.
- **Customization:** Custom coatings (e.g., BBAR, HR) are available for diverse applications.

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8. Standard Fabrication Specifications

Specification	Value
Dimension Tolerance (mm)	W ± 0.2 × H ± 0.2 × L + 0.5 / -0.2
Clear Aperture	Central 90% of the diameter
Surface Quality (Scratch/Dig)	20/10 to MIL-PRF-13830B
Flatness	λ/4 @ 633 nm
Transmitted Wavefront Distortion	λ/4 @ 633 nm
Parallelism	< 30 arc sec
Perpendicularity	≤ 15 arc min
Angle Tolerance (°)	Δθ ≤ 0.5
Quality Warranty Period	One year under proper use

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9. POC Strength and Capabilities

Photonics On Crystals (POC) specializes in the high-precision fabrication of LiIO3 crystals. Our capabilities include:

- **Customization:** Dimensions, coatings, and finish can be tailored to specific requirements.
- **High Quality Assurance:** Each crystal undergoes stringent quality checks to ensure performance and durability.
- **Technical Support:** Our team provides comprehensive support for application-specific needs.

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10. Standard Products

Product Code	Dimensions (mm)	Coating	Application
POC-LiIO3-532-10	10 × 10 × 10	AR @ 532 nm	Frequency Doubling
POC-LiIO3-266-12	12 × 12 × 12	AR @ 266 nm	Tripling
POC-LiIO3-Custom	Customizable	On Request	All Applications