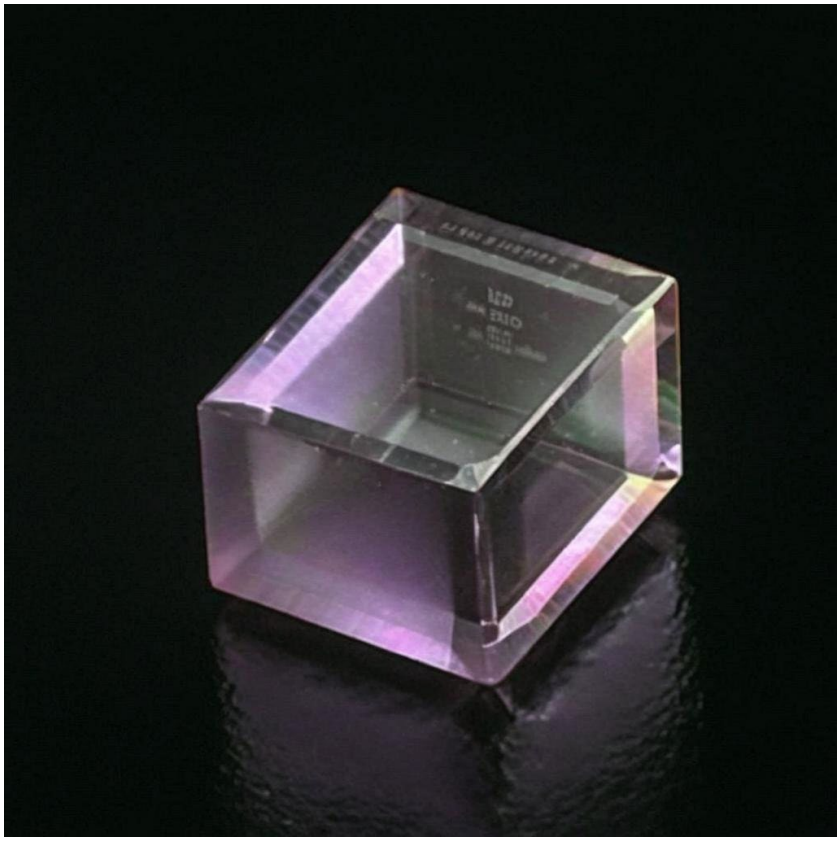
Photonics On Crystals

POC-OC-122500-Ce:LaCl3 Crystal Datasheet

1 Main Features

- Superior energy resolution for precise applications.
- Fast scintillation decay ensures rapid signal processing.
- Excellent linearity response for consistent and accurate results.
- High stability with temperature variations, suitable for diverse environments.
- High count rate capabilities for advanced radiation detection.



---

2. Material General Description

Ce:$LaCl_3$ (Cerium-doped Lanthanum Chloride) is a cutting-edge scintillation crystal with remarkable properties, including high light output, short decay time, and excellent energy resolution. With its light output surpassing many standard scintillation materials, it is ideally suited for applications in nuclear medical imaging (PET, SPECT), high-energy physics, γ-ray detection, environmental monitoring, and geological exploration. Its high-performance characteristics make it an invaluable material for radiation detection and monitoring in challenging environments.

This crystal's ability to deliver consistent performance across varied temperatures and its superior energy resolution underscore its significance in high-precision applications. The availability of customizable sizes and fast delivery ensures its adaptability to unique project requirements.

3. General Applications and Examples

$Ce:LaCl_3$ crystals are widely used across diverse domains, particularly for their unmatched performance in:

- **Nuclear Medical Imaging (PET, SPECT):** The high light output and fast decay time of $Ce:LaCl_3$ crystals enable precise and real-time imaging of radioactive tracers for medical diagnostics.
- **High-Energy Physics:** $Ce:LaCl_3$ offers high energy resolution, making it an optimal choice for detecting and measuring subatomic particles in advanced physics experiments.
- **γ-ray Detection:** Its sensitivity and energy resolution make it a reliable material for detecting high-energy gamma rays in scientific and industrial applications.
- **Security and Environmental Monitoring:** The crystal is instrumental in monitoring radioactive materials for security checkpoints, border controls, and environmental hazards.
- **Geological Exploration:** The crystal's excellent stability and sensitivity allow it to be used in the detection of radioactive elements for mineral and resource exploration.

Examples of practical implementations include its usage in radiation counters, portable detectors, and imaging equipment for healthcare and research.

---

4. Chemical, Physical, and Structural Properties

Property	Value
Density (g/cm^3)	3.67
Melting Point (°C)	859
Thermal Expansion ($°C^{-1}$)	11×10^{-6} (c-axis)
Refractive Index	1.9
Emission Peak (nm)	350
Decay Constant (ns)	28
Light Yield (photons/keVγ)	48
Light Output (%)	80% ~ 95%
Energy Resolution (%)	4.2% ~ 5.1%
Cleavage Plane	(100)
Hygroscopic	Yes

---

5. Optical, Laser, or Nonlinear Optical Properties

The $Ce:LaCl_3$ crystal features:

- High light yield (up to 95%), making it suitable for low-light environments.
- Excellent energy resolution in the range of 4.2% to 5.1%, facilitating accurate signal measurement.
- A peak emission wavelength at 350 nm, tailored for optimal detection systems.
- A rapid decay constant of 28 ns for efficient data acquisition.

Further optical data can be presented upon request or sourced as per application needs.

---

6. Spectrum Transmission Curves

No specific transmission curves are provided. However, Ce:$LaCl_3$ typically exhibits high transmission efficiency within the UV and visible spectrum. Additional details can be researched or tailored upon request.

---

7. Coating Specification

Standard anti-reflective coatings can be applied to enhance optical transmission efficiency and durability. Custom coatings are available based on the client's specific requirements.

---

8. Standard Fabrication Specifications

Parameter	Specification
Standard Sizes	Ø50 × 50 mm, Ø50 × 25 mm, Ø30 × 30 mm, Ø25 × 25 mm
Sealed Materials	Aluminum alloys, Stainless steel, Titanium alloys
Cleavage Plane	(100)
Hygroscopic Nature	Requires proper sealing
Customization	Sizes and finishes available upon request

---

9. POC Strength and Capabilities

Photonics On Crystals (POC) leverages its advanced facilities and expertise to deliver high-quality Ce:$LaCl_3$ crystals for varied applications. Key strengths include:

- Customizable crystal fabrication tailored to specific project needs.
- State-of-the-art technology ensuring superior optical and mechanical properties.
- Fast delivery with reliable customer support.
- Expertise in working with hygroscopic materials for durable and secure applications.

---

10. Standard Products

Size	Coating	SKU	Price (USD)
Ø50 × 50 mm	Customizable	101	1200
Ø50 × 25 mm	Customizable	102	1000
Ø30 × 30 mm	Customizable	103	900
Ø25 × 25 mm	Customizable	104	800
Custom Sizes	Available upon request	TBD	TBD