Photonics On Crystals

POC-OC-122502-Tl:NaI Crystal Datasheet

1 Main Features

- High luminescence efficiency with excellent performance in scintillation applications.
- High light yield of 38,000 photons per keV for exceptional sensitivity.
- Emission peak at 415 nm, optimized for detecting radiation efficiently.
- Decay constant of 250 ns, enabling rapid signal response.
- Customization options available for specific environmental or industrial applications.

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2. Material General Description

Thallium-doped Sodium Iodide (Tl:NaI) is a widely used scintillation crystal known for its high luminescence efficiency and exceptional radiation detection capabilities. This crystal is highly effective for converting gamma rays into visible light, making it suitable for environmental monitoring, oil well logging, and high-energy physics experiments. Tl:NaI crystals have a cubic structure and excellent optical properties. Their customizable design makes them versatile for use in various industries, including nuclear medicine and radiological monitoring.

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3. General Applications and Examples

- **Environmental Monitoring:** Used in gamma spectrometers for real-time detection of radioactive isotopes in the environment.
- **Oil Well Logging:** Deployed in geological surveys for analyzing subsurface formations and detecting natural resources.
- **Medical Imaging:** Utilized in gamma cameras for precise radiographic imaging.
- **Radiation Detection in High-Energy Physics:** Essential for detecting and measuring radiation in particle accelerators and nuclear reactors.
- **Homeland Security:** Suitable for monitoring radioactive materials and ensuring safety in sensitive environments.

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4. Chemical, Physical, and Structural Properties

Property	Value
Density (g/cm^3)	3.67
Melting Point (°C)	651
Mohs Hardness	2.1
Thermal Expansion (K^{-1})	47.4 x 10^{-6}
Refractive Index	1.85
Emission Peak (nm)	415
Decay Constant (ns)	250
Light Yield (photons/keV)	38,000
Crystal Structure	Cubic System
Cleavage Plane	(100)
Hygroscopic	Yes

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5. Optical, Laser, and Nonlinear Optical Properties

Tl:NaI crystals exhibit high optical efficiency, particularly in gamma-ray scintillation applications. Their luminescence properties enable fast signal responses, with minimal energy loss. The high light yield ensures accurate and reliable radiation detection. Optical transmission characteristics can be customized based on specific application requirements.

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6. Spectrum Transmission Curves

N.A

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7. Coating Specification

Coating options are available upon request to enhance performance in specific environments, such as anti-reflective coatings for optimized light transmission or protective coatings for improving moisture resistance.

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8. Standard Fabrication Specifications

Specification	Value
Face Dimension Tolerance	±0.1 mm
Thickness Tolerance	±0.2 mm
Parallelism Error	<30 arcsec
Clear Aperture	>85%
Protective Chamfers	<0.3 mm at 45°
Surface Flatness	λ/8 @ 632.8 nm
Wavefront Distortion	λ/4 @ 632.8 nm

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9. POC Strength and Capabilities

Photonics On Crystals (POC) excels in manufacturing and processing high-quality Tl:NaI crystals. With advanced fabrication technology and a commitment to customization, POC offers crystals tailored to the most stringent industry standards. The company supports global clients with timely delivery, reliable technical expertise, and versatile production capabilities.

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10. Standard Products

Face Dimensions	Length (mm)	Orientation	Price (USD)	Customization
20 x 20 mm	10	[100]	$490	Available
25 x 25 mm	12	[110]	$570	Available
30 x 30 mm	14	[110]	$690	Available

Customization services are available for specialized requirements, including size, coating, and orientation.