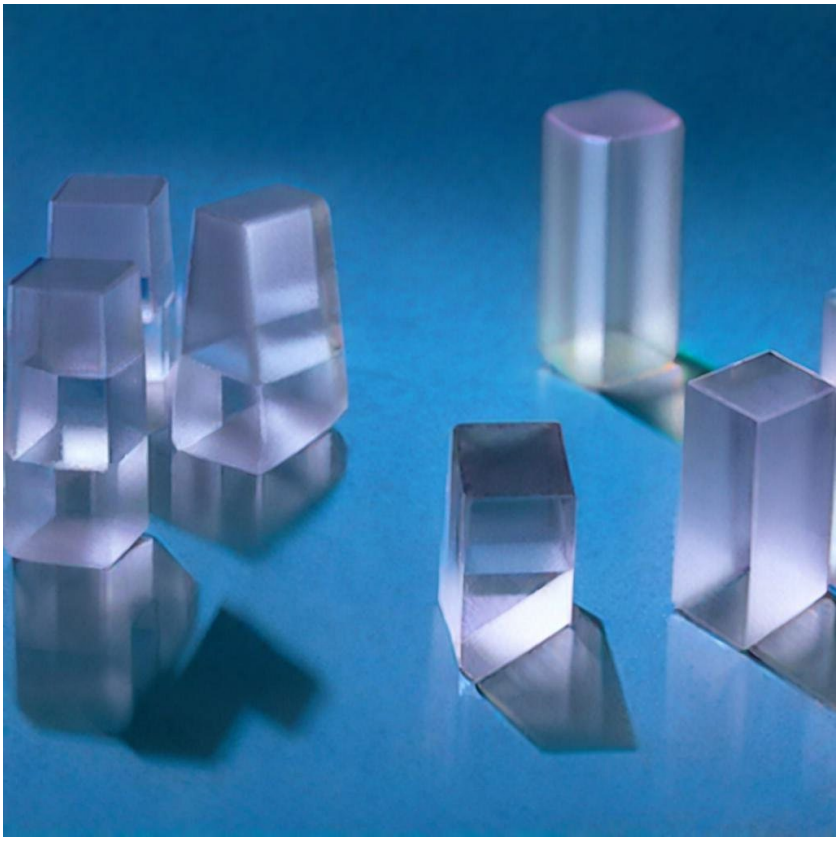
Photonics On Crystals

POC-OC-122485-EYE SAFE LASER CRYSTAL Datasheet

1 Main Features

- Operates in a wavelength range (>1.4 µm) that is considered safe for the human eye.
- High damage threshold and strong absorption in the vitreous body reduce risks to the retina.
- Ideal for applications in laser ranging, target recognition, and optical communication.
- Exhibits excellent thermal, mechanical, and optical properties for stable high-power laser systems.
- Customizable crystal dimensions and coatings to meet application-specific requirements.



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2. Material General Description

Eye Safe Laser Crystals are specialized materials designed to emit laser wavelengths greater than 1.4 µm, which is safe for the human eye as per US national safety standards. This wavelength range ensures that most of the light intensity is absorbed by the vitreous body rather than damaging the retina. An exemplary wavelength is 1.57 µm, which offers 400 times safer exposure compared to conventional 1.06 µm lasers. These crystals are widely utilized in applications that demand precise laser targeting while adhering to stringent safety protocols. Their efficiency in mid-infrared wavelengths and exceptional optical performance make them indispensable in fields such as laser radar, medical treatment, and optical fiber communication.

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3. General Applications and Examples

1. **Laser Ranging:**
   Eye safe laser crystals are used in advanced laser range finders for accurate distance measurements in various industries, including automotive and surveying.
2. **Laser Irradiation:**
   Their high damage threshold makes them suitable for applications requiring focused and sustained irradiation for scientific or industrial use.
3. **Laser Radar (LIDAR):**
   In LIDAR systems, these crystals enable precise and safe target detection and navigation, widely used in automotive safety systems, drones, and environmental mapping.
4. **Target Recognition:**
   Their unique wavelength properties ensure contrast enhancement between the target and background, enabling efficient recognition in defense and aerospace applications, including identifying vehicles, ships, and other objects.
5. **Medical Laser Systems:**
   Eye safe laser crystals are critical for medical treatments such as dermatological procedures and minimally invasive surgeries, providing safe and precise laser operation.
6. **Optical Fiber Communication:**
   These crystals are ideal for mid-infrared fiber communication systems, ensuring minimal transmission loss and reliable data transfer over long distances.

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4. Chemical, Physical, or Structural Properties

Property	Value
Chemical Composition	Customized for specific applications
Density	~6.5 g/cm³
Thermal Conductivity	~20 $W \cdot m^{-1} \cdot K^{-1}$
Melting Point	~1500°C
Crystal Orientation	<111>, <100>, or custom
Durability	High damage threshold
Cleavage Plane	Customizable

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5. Optical, Laser, or Nonlinear Optical Properties

Property	Value
Emission Wavelength	1.5–1.7 µm
Transparency Range	1.4–3 µm

Refractive Index	~1.8
Laser Damage Threshold	>500 MW/cm²
Nonlinear Coefficient	High
Absorption Coefficient	Low

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6. Spectrum Transmission Curves

The spectrum transmission curves demonstrate the crystal's strong transmission efficiency in the 1.5–1.7 µm range, ensuring optimal performance for eye-safe laser applications. Detailed spectral data can be provided upon request.

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7. Coating Specification

- **Anti-Reflective Coatings:** Optimized for the 1.5–2.0 µm range with reflectance <0.3%.
- **High-Damage Threshold Coatings:** Suitable for high-power laser systems.
- **Custom Coatings:** Available for specific operational environments, such as harsh conditions or extended wavelength ranges.

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8. Standard Fabrication Specifications

Specification	Value
Dimensional Tolerance	±0.05 mm
Surface Flatness	λ/8 @ 632.8 nm
Surface Quality	40-20 (scratch-dig)
Parallelism	<30 arcsec
Bevel	<0.25 × 45°
Diameter Range	Up to 100 mm
Thickness Range	0.5–10 mm

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9. POC Strength and Capabilities

Photonics On Crystals (POC) excels in the development and production of eye safe laser crystals, leveraging advanced material processing technologies and stringent quality assurance protocols. POC offers tailored crystal solutions for diverse applications, providing high-performance, reliable, and efficient products to meet the demands of cutting-edge industries.

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10. Standard Products

Photonics On Crystals

Product	Dimensions	Price (USD)
Eye Safe Laser Rods	5–50 mm length	$2,000–$7,000
Eye Safe Optical Windows	20–100 mm diameter	$3,500–$12,000
Eye Safe Nonlinear Media	Custom dimensions	$4,000–$15,000
Customization Options	Available upon request	Contact for quote