Photonics On Crystals

POC-OC-122486-Bonding Laser Crystal Datasheet

1 Main Features

- Effectively reduces thermal effects in high-power solid-state lasers.
- Improves overall beam quality and laser performance.
- Enables compact and efficient laser structures.
- Ideal for high-power and multi-wavelength laser applications.
- Wide compatibility with laser types such as Nd:YAG, Yb:YAG, Er:YAG, and more.

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2. Material General Description

Bonding Laser Crystals are cutting-edge materials engineered to reduce thermal effects in laser systems, especially in high-power solid-state lasers. These crystals are created by bonding multiple laser materials to achieve superior thermal management and structural compactness. This process enhances thermal conductivity and reduces thermal lensing, improving the beam quality and overall efficiency of the laser system. Bonding Laser Crystals are available in various configurations, including Nd:YVO4+YVO4, YAG+Nd:YAG, Yb:YAG+YAG, and others, ensuring flexibility for diverse laser applications.

These materials are specifically designed to meet the thermal management requirements of solid-state lasers without compromising performance. The bonding technology ensures minimal strain at

the interface, providing excellent optical performance and longevity, making them ideal for applications in scientific research, medical devices, and industrial manufacturing.

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3. General Applications and Examples

1. **High-Power Lasers:**
   Bonding Laser Crystals significantly enhance the thermal stability of high-power solid-state lasers, ensuring consistent performance over prolonged operation.
2. **Medical Laser Systems:**
   Used in medical equipment for precision surgical procedures, Bonding Laser Crystals improve the reliability and accuracy of laser beams in delicate applications.
3. **Industrial Processing:**
   Ideal for high-precision cutting, welding, and marking in industrial settings, where thermal stability and efficiency are critical.
4. **Scientific Research:**
   These crystals are essential for laboratory-based laser systems that require high stability and low thermal distortion for experiments in spectroscopy and particle physics.
5. **Defense and Aerospace Applications:**
   Bonding Laser Crystals enable compact, efficient laser systems suitable for target tracking, laser designation, and LIDAR systems in defense and aerospace fields.

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4. Chemical, Physical, or Structural Properties

Property	Value
Material Composition	Nd:YVO4, Yb:YAG, Er:YAG, Tm:YAG, etc.
Thermal Conductivity	~13 $W \cdot m^{-1} \cdot K^{-1}$
Bonding Strength	>50 MPa
Dimensional Tolerance	±0.05 mm
Hardness	8 Mohs
Melting Point	~1,970°C
Crystal Orientation	<100>, <111>, or customizable

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5. Optical, Laser, or Nonlinear Optical Properties

Property	Value
Laser Wavelengths	1.06 µm (Nd:YAG), 1.03 µm (Yb:YAG), etc.
Thermal Lens Effect	Minimal due to bonded structure

Absorption Coefficient	Low for efficient energy conversion
Beam Quality (M^2)	High (close to 1.0)
Nonlinear Coefficients	Varies by material

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6. Spectrum Transmission Curves

Spectrum transmission curves are specific to the laser crystal composition and configuration. Detailed spectral data for each material type (e.g., Nd:YVO4, YAG+Nd:YAG) can be provided upon request.

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7. Coating Specification

- **Anti-Reflective Coatings:** For wavelengths 1.03–1.06 µm, reflectance <0.2%.
- **High-Damage Threshold Coatings:** Suitable for high-power laser applications.
- **Custom Coating Options:** Available upon request for specialized wavelength ranges or environmental conditions.

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8. Standard Fabrication Specifications

Specification	Value
Dimensional Tolerance	±0.05 mm
Surface Flatness	λ/8 @ 632.8 nm
Surface Quality	20-10 (scratch-dig)
Parallelism	<20 arcsec
Bevel	<0.2 × 45°

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9. POC Strength and Capabilities

Photonics On Crystals (POC) excels in manufacturing advanced Bonding Laser Crystals with state-of-the-art bonding technology. Our crystals are engineered to minimize thermal effects, improve beam quality, and ensure compact laser designs. POC offers a wide range of standard and customized solutions to cater to diverse industries, from scientific research to industrial processing.

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10. Standard Products

Product	Configuration	Dimensions (mm)	Price (USD)
Nd:YVO4+YVO4	0.1–0.3% dopant	2 × 2 × 10–10	$1,000–$5,000

YAG+Nd:YAG	0.1–0.5% dopant	Custom	$1,200–$6,000
Yb:YAG+YAG	0.1–1.0% dopant	3–200 length	$1,500–$8,000
Customization Options	Available upon request	Customizable	Contact for quote