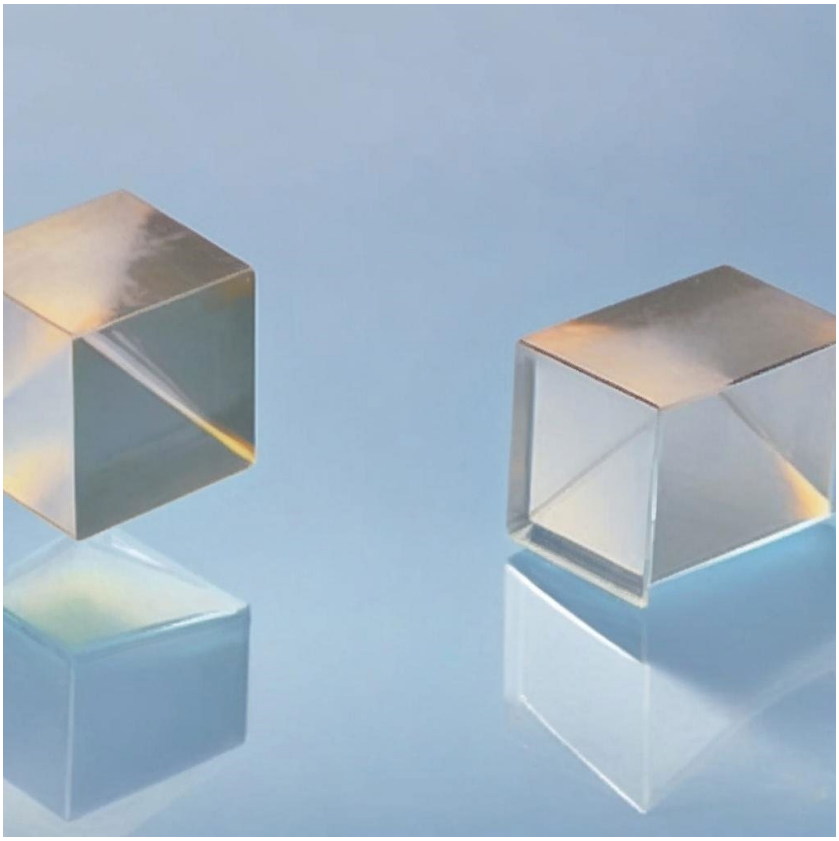
Photonics On Crystals

POC-OC-122456-Yb:YVO4 Crystal Datasheet

1 Main Features

- Broad and smooth emission spectrum with a wide tuning range.
- High absorption cross-section and efficiency.
- Low quantum defect minimizes thermal effects.
- Excellent thermal conductivity for high-power operation.
- Custom crystal solutions available upon request.



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2. Material General Description

Yb:YVO4 crystals, doped with ytterbium ions, are widely recognized for their superior optical and thermal properties, making them ideal for laser applications requiring high efficiency and power stability. These crystals offer a broad emission spectrum and a low quantum defect, significantly reducing thermal effects during operation. The simple electronic structure of Yb:YVO4 eliminates excited-state absorption and quenching processes, ensuring consistent performance. Due to their excellent thermal conductivity, these crystals are suitable for use in high-power thin-disk lasers, providing robust solutions for industrial and scientific applications. Additionally, their stable mechanical properties allow for precision fabrication and integration into complex optical systems.

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3. General Application and Examples

Yb:YVO4 crystals are used across a range of laser-based applications, including:

- **High-Power Lasers**: Yb:YVO4 is used in continuous wave (CW) and Q-switched lasers for precision material processing and scientific research.
- **Mode-Locked Lasers**: Their broad emission spectrum supports the generation of ultrashort pulses, critical for femtosecond laser technology.
- **Thin-Disk Lasers**: Ideal for generating high-power laser beams with excellent beam quality in industrial applications.
- **Telecommunications**: Utilized as a gain medium in fiber amplifiers for optical signal amplification.
- **Scientific Research**: Deployed in experimental setups requiring reliable and stable laser operation, such as spectroscopy and nonlinear optics.

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4. Chemical, Physical, or Structural Properties

Property	**Yb:YVO4**
Absorption peak wavelength	985 nm
Absorption cross-section	7.5 * 10^-20 cm^2
Absorption bandwidth	5 nm
Laser wavelength	1027 nm
Lifetime of Yb^{3+} energy level	250 µs
Emission cross-section	10.5 * 10^-20 cm^2
Refractive index @ 1064 nm	n_a = 1.993, n_e = 2.01
Density	4.22 g/cm^3
Mohs hardness	5
Thermal conductivity	~5 W/m·K
dn/dT	8.41 * 10^-6 K^{-1}
Thermal expansion coefficient	1.5 * 10^-6 K^{-1} (a), 8.2 * 10^-6 K^{-1} (c)
Typical doping level	1–3 at.%

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5. Optical, Laser, or Nonlinear Optical Properties

Parameter	**Value**
Emission spectrum range	~960–1020 nm

Quantum defect	Low
Birefringence	Moderate
Optical transparency range	400–5000 nm
Optical damage threshold	>10 J/cm²

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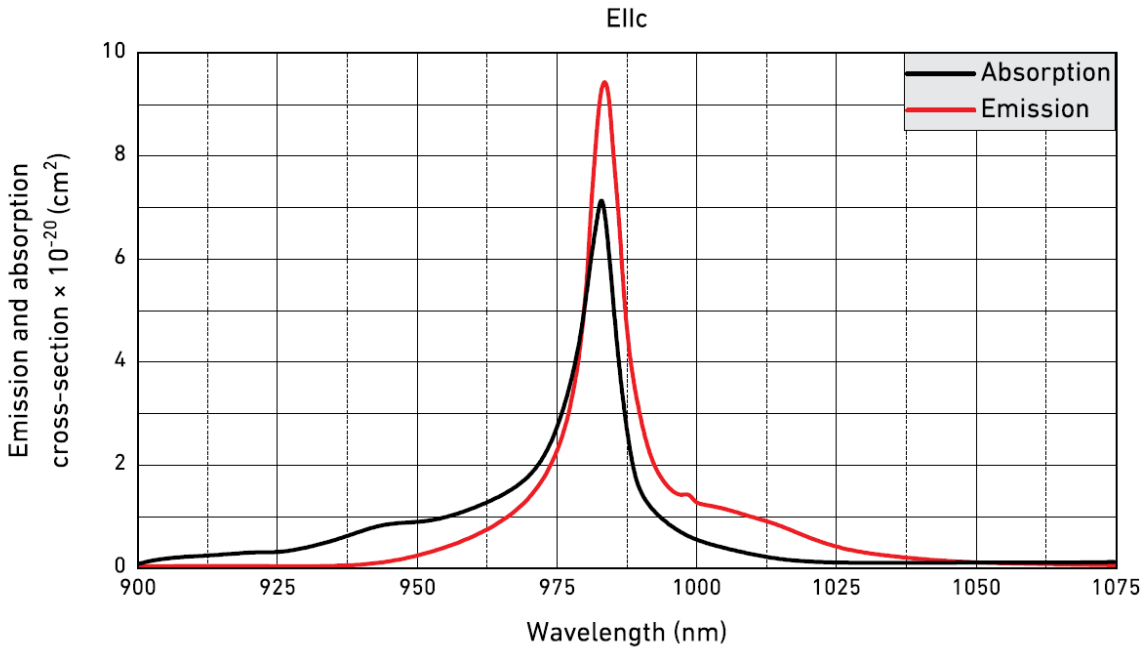
6. Spectrum Transmission Curves

The spectrum demonstrates strong absorption and emission peaks centered around 985 nm and 1027 nm, respectively. These features make Yb:YVO4 suitable for applications requiring high beam quality and stability.



7. Coating Specification

- **AR Coatings**: Anti-reflective coatings are optimized for the 960–1060 nm range, with reflectivity values below 0.2%.
- **Customization**: Additional coatings available upon request for specific laser wavelengths or applications.

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8. Standard Fabrication Specifications

Parameter	**Specification**
Dimensions tolerance	±0.01 mm
Parallelism error	<20 arcsec

Perpendicularity error	<10 arcmin
Surface flatness	λ/10 @ 632.8 nm
Surface quality	20-10 S-D
Protective chamfers	<0.1 mm at 45°
Clear aperture	>90%

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9. POC Strength and Capabilities

Photonics On Crystals (POC) is a leader in crystal technology, offering customized solutions tailored to client needs. Our advanced manufacturing processes ensure high precision and reliability in crystal production. With expertise in optical coatings, POC provides optimized performance for demanding laser and nonlinear applications. POC's robust quality control guarantees superior product consistency and customer satisfaction.

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10. Standard Products

Face Dimensions	**Length**	**End Faces**	**Doping**	**Coatings**	**Price (USD)**
3 × 3 mm	8 mm	Right-angle	5%	AR@960–1060 nm	640
3 × 3 mm	4 mm	Brewster-angle	5%	Uncoated	540
8 × 8 mm	8 mm	Right-angle	10%	AR@960–1060 nm	680
Custom Sizes	Custom	Custom	Up to 20%	Coating options available	Contact us

For tailored products or further inquiries, please contact Photonics On Crystals.