Photonics On Crystals

POC-OC-122452-Yb:KYW Crystal Datasheet

1 Main Features

- Large gain bandwidth supporting ultra-short pulse durations (<100 fs).
- High emission cross-sections for efficient laser operation.
- Small quantum defect for reduced thermal effects.
- Excellent thermal conductivity (3–4 W/m·K) suitable for high-power applications.
- Customizable doping levels and crystal dimensions available on request.

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2. Material General Description

The **Yb:KYW Crystal** (Ytterbium-doped Potassium Yttrium Tungstate) is a leading gain medium known for its extensive gain bandwidth and high emission cross-sections. Its properties make it suitable for femtosecond and mode-locked laser systems, achieving ultra-short pulse durations below 100 femtoseconds. Compared to other Yb-doped materials, Yb:KYW exhibits superior performance due to its high doping levels without concentration quenching, enabling reliable high-power output. The thermal conductivity of Yb:KYW ensures stability in high-energy applications, making it an excellent choice for regenerative amplifiers and continuous-wave lasers.

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3. General Applications and Examples

The **Yb:KYW Crystal** serves as a robust medium in:

- **Femtosecond Laser Systems**: Ideal for precision material processing and high-resolution imaging.
- **Regenerative Amplifiers**: Used in industrial micromachining for metals and semiconductors.
- **Medical Applications**: Enables precise surgical cutting with minimal thermal damage.
- **Continuous-Wave (CW) Lasers**: For high-power and highly stable beam generation.
- **Scientific Research**: Utilized in spectroscopic studies and laser-based experiments.

Example Application:
A Yb:KYW crystal doped with 5% ytterbium ions can produce a stable output of ultrashort pulses with a center wavelength of 1020 nm, supporting advanced micromachining for nanotechnology and biophotonics.

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4. Chemical, Physical, or Structural Properties

Property	Value
Chemical Formula	KY(WO4)2 doped with Yb^3+
Crystal Structure	Monoclinic
Density	6.41 g/cm³
Mohs Hardness	5
Thermal Conductivity	3–4 W/m·K
Thermal Expansion Coefficient	α_a = 9.8 × 10^-6 /°C
Doping Levels	2–10% Yb^3+

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5. Optical, Laser, or Nonlinear Optical Properties

Parameter	Value
Absorption Peak Wavelength	980 nm
Emission Peak Wavelength	1030 nm
Laser Wavelength Range	1020–1050 nm
Absorption Cross-Section	1.4 × 10^-20 cm²
Emission Cross-Section	2.5 × 10^-20 cm²
Lifetime of Yb^3+ Level	230 µs

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6. Spectrum Transmission Curves

The absorption and emission spectra of **Yb:KYW Crystals** display strong peaks at 980 nm and 1030 nm, respectively, ensuring efficient energy conversion and high performance in laser systems.

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7. Coating Specification

Custom anti-reflective (AR) coatings are available, optimized for:

- 970–1070 nm wavelengths with R < 0.5%.
  Uncoated options are also provided upon request.

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8. Standard Fabrication Specifications

Parameter	Specification
Orientation	Np-cut, Nm-cut, and other orientations available.
Clear Aperture	>90%
Length Tolerance	±0.1 mm
Surface Flatness	λ/10 @ 632.8 nm
Surface Quality	20-10 scratch/dig
LIDT	>10 J/cm² @ 1040 nm, 10 ns

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9. POC Strength and Capabilities

Photonics On Crystals (POC) is a leading supplier of premium laser crystals, specializing in advanced fabrication and customization. With state-of-the-art facilities and expertise, we deliver solutions tailored to the needs of researchers and industry professionals globally. Key strengths include:

- Customized doping and crystal dimensions.
- Precision fabrication ensuring minimal losses.
- Expertise in AR coatings for optimal performance.

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10. Standard Products

Face Dimensions	Length	End Faces	Doping	Coatings	Price (USD)
3 × 3 mm	5 mm	Brewster-angle cut	2%	AR@970–1070 nm	540
5 × 5 mm	5 mm	Right-angle cut	10%	AR@970–1070 nm	590

Customizable	Custom	Customizable	Up to 10%	Customizable	Upon Request

For customized dimensions or specifications, please contact POC for consultation and pricing.