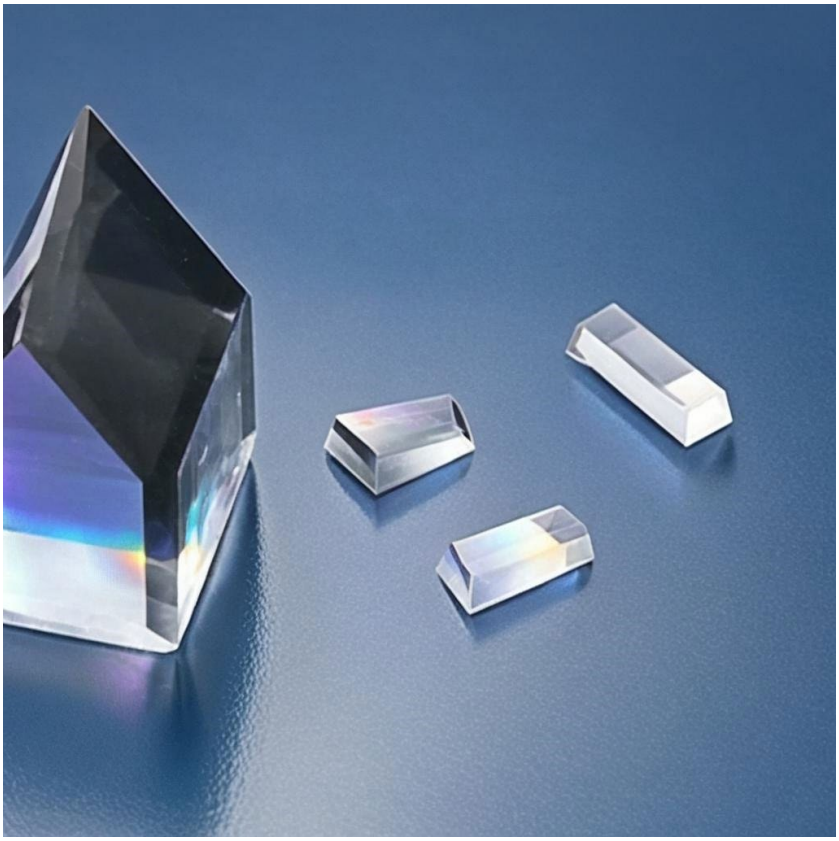
Photonics On Crystals

POC-OC-122463-Er:KYW Crystal Datasheet

1 Main Features

- Strong absorption bandwidth near 1534 nm, ideal for InGaAsP/InP laser diode emission.
- Wide emission bandwidth near 1600 nm for high versatility.
- High energy conversion efficiency with low quantum defect (>80% slope efficiency).
- Enables "eye-safe" laser operations in CW and Q-switched modes.
- Custom crystal sizes and orientations available upon request.



---

2. Material General Description

Er:KYW (Erbium-doped Potassium Yttrium Tungstate) crystals are a promising active laser medium for "eye-safe" wavelength emissions, particularly in the 1570-1630 nm spectral range. These crystals are tailored for diode-pumped solid-state lasers, benefiting from their broad absorption and emission bands. Their high efficiency in energy transfer, coupled with excellent thermo-mechanical properties, makes them suitable for high-power and pulsed laser systems. Er:KYW crystals exhibit a low quantum defect, allowing superior slope efficiencies when pumped by InGaAs/InP diode lasers. The broad emission spectrum also supports the generation of mode-locked laser pulses.

---

3. General Applications and Examples

Er:KYW crystals find applications across a wide range of laser systems, including:

1. **In-Band Pumped "Eye-Safe" Lasers**: With emissions in the 1530-1600 nm range, these lasers are ideal for applications where eye safety is a critical concern, such as:
    - Medical diagnostics and therapeutic procedures.
    - Environmental monitoring and industrial process control.
2. **Waveguide Lasers**: Their wide absorption and emission capabilities allow efficient integration into waveguide lasers, providing compact and efficient designs.
3. **Diode-Pumped Solid-State Lasers**: Er:KYW crystals can be resonantly pumped using fiber or diode lasers, achieving high slope efficiencies for CW and Q-switched operations.
4. **Mode-Locked Lasers**: The broad and smooth emission spectra support the generation of ultra-short laser pulses for femtosecond applications.

---

4. Chemical, Physical, and Structural Properties

Property	**Value**
Chemical Formula	$Er:KY(WO_4)_2$
Absorption Peak Wavelength	1534 nm
Emission Wavelength	1609 nm
Absorption Bandwidth (at peak)	3 nm
Emission Cross-Section	0.4 × 10^-20 cm^2
Lifetime of Er^{3+} Upper Laser Level	3.1 ms
Refractive Index	n_p = 2.05, n_m = 2.01, n_g = 1.97
Crystal Structure	Monoclinic
Density	6.5 g/cm^3
Mohs Hardness	5
Thermal Conductivity	3.5 W/m·K
Typical Doping Level	<20 at.%

---

5. Optical, Laser, and Nonlinear Optical Properties

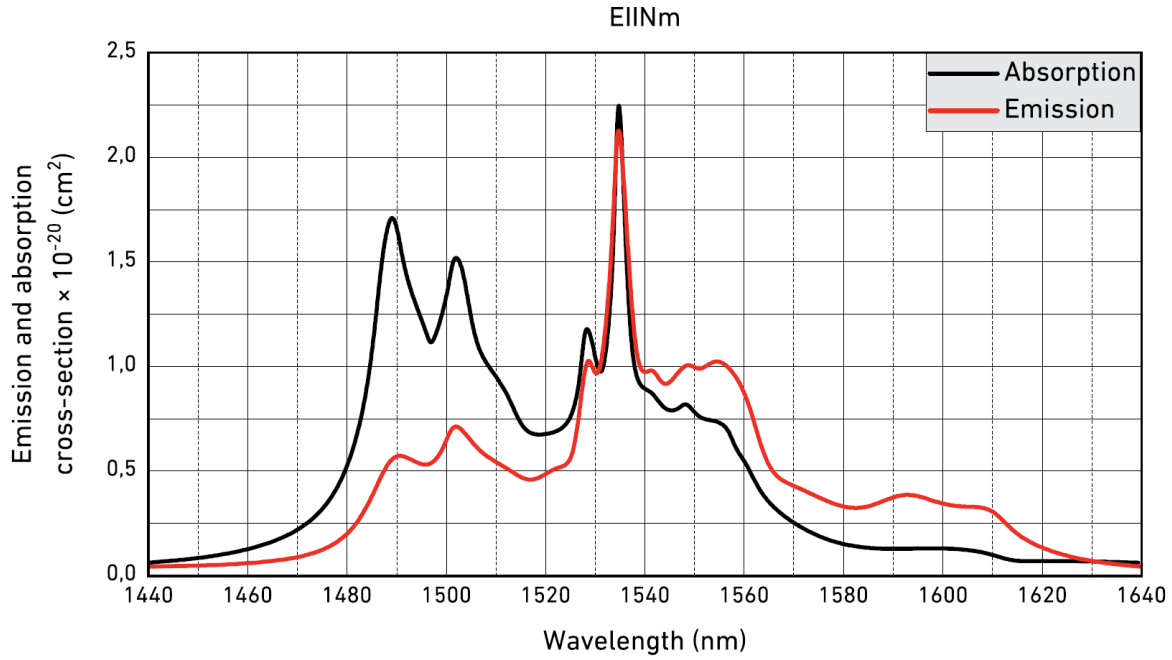
Optical Property	**Value**
Absorption Coefficient at Peak	2.4 × 10^-20 cm^2
Absorption Wavelength Range	1520-1540 nm

Emission Cross-Section	0.4 × 10^-20 cm²
Emission Bandwidth	3 nm
Laser Wavelength	1570-1630 nm
Efficiency	>80% (High slope efficiency)
Transparency Range	400 nm to 5 µm

---

6. Spectrum Transmission Curves

The absorption and emission spectra indicate strong absorption at 1534 nm and significant emission near 1609 nm. This aligns well with the emission wavelengths of InGaAs/InP diode lasers, making Er:KYW ideal for these systems.



---

7. Coating Specifications

- **AR Coating**: Custom coatings available for optimized transmission between 1520-1640 nm.
- **Standard Coatings**:
  - AR/AR@1530-1600 nm for both crystal faces.
  - Reflectance <0.25% at specified wavelength ranges.

---

8. Standard Fabrication Specifications

Specification	Value

Orientation	N_p-cut (standard), other cuts available
Clear Aperture	>90%
Face Dimensions Tolerance	+0/-0.1 mm
Length Tolerance	±0.1 mm
Parallelism Error	<20 arcsec
Perpendicularity Error	<10 arcmin
Surface Flatness	<λ/10 @ 632.8 nm
Surface Quality	20-10 S-D
Laser Damage Threshold	>10 J/cm² @1530 nm, 10 ns
Mount	Unmounted

---

9. POC Strengths and Capabilities

Photonics On Crystals (POC) specializes in precision fabrication of high-quality laser crystals tailored for cutting-edge applications. Our expertise includes:

- Custom orientation, doping, and dimensions.
- Advanced AR/HR coating capabilities.
- Strict quality control ensuring surface flatness and damage threshold adherence.
- Quick delivery times with excellent customer support for customized solutions.

---

10. Standard Products and Customization

Face Dimensions (mm)	Length (mm)	Coating	Price (USD)
3 × 3	5	AR/AR@1530-1600 nm	Request
3 × 3	10	AR/AR@1530-1600 nm	Request
Customization	Available	Upon Request	Request

For inquiries about custom designs or other specifications, please contact POC directly.