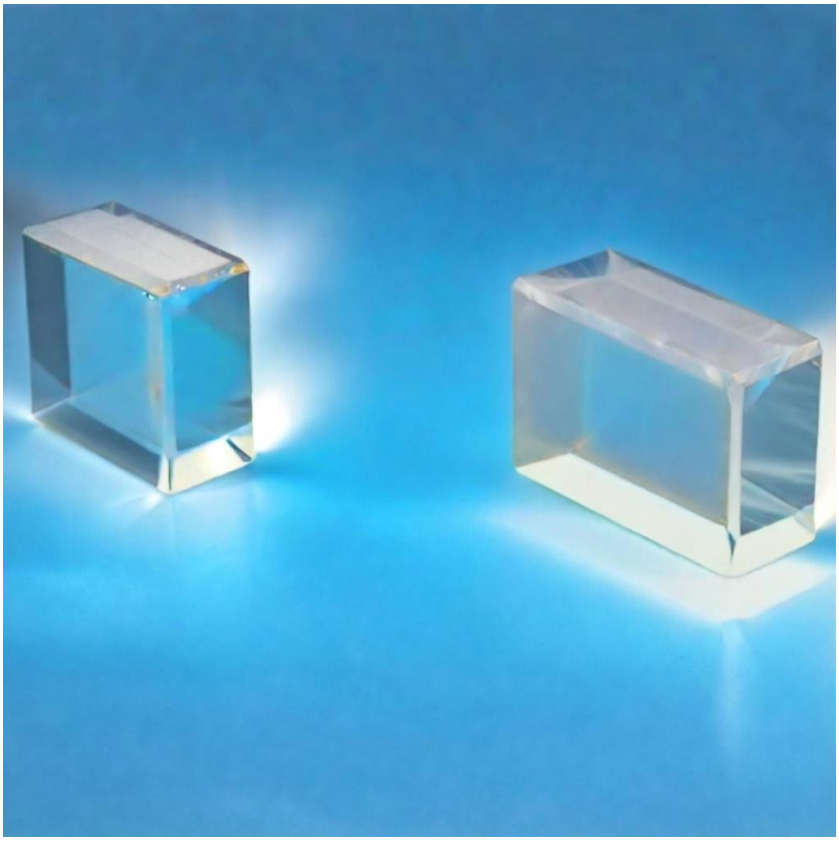
Photonics On Crystals

POC-OC-122458-Er: Yb: Phosphate Glass Datasheet

1 Main Features

- Long lifetime of the **4I11/2** erbium energy level.
- High energy transfer efficiency between Yb to Er ions.
- Wide absorption and emission cross-sections for improved performance.
- Large bandwidth in absorption and emission, enabling versatile laser applications.
- Custom crystals are available on request for specific laser designs.



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2. Material General Description

Er,Yb:Phosphate Glass is a co-doped glass known for its excellent laser performance in the "eye-safe" spectral range of 1.5–1.6 µm. The material combines an extended erbium upper laser level lifetime (~8 ms) with a short lifetime (~2–3 ms) of the energy transfer stage between Yb and Er ions. This unique configuration allows efficient energy transfer, minimizing back-energy losses and improving overall system efficiency. Additionally, phosphate glass exhibits a low phonon energy, reducing non-radiative relaxations and enhancing luminescence quantum efficiency. Due to its superior optical and mechanical properties, Er,Yb:Phosphate Glass is widely used for creating compact, energy-efficient lasers operating in demanding applications.

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3. General Applications and Examples

- **Range Finding**: Ideal for passively Q-switched lasers used in rangefinder systems due to its "eye-safe" wavelength of 1.5–1.6 µm.
- **LIDAR**: Reliable performance in light detection and ranging systems for industrial and environmental monitoring.
- **LIBS Systems**: Suitable for Laser-Induced Breakdown Spectroscopy applications for material analysis.
- **Medical Applications**: Can be implemented in laser treatments requiring precise and safe emission wavelengths.
- **Defense**: Utilized in advanced targeting and distance measurement technologies due to its robust energy transfer efficiency and reliability in extreme conditions.

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4. Chemical, Physical, and Structural Properties

Property	Unit	Value
Absorption Peak Wavelength	nm	970
Absorption Cross-Section	cm^2	1.7×10^{-20}
Absorption Bandwidth	nm	20
Laser Wavelength	nm	1534
Emission Cross-Section	cm^2	8×10^{-20}
Density	g/cm^3	2.93
Mohs Hardness	-	6
Thermal Conductivity	W/m·K	0.65
dn/dT (Refractive Index Change)	K^{-1}	-2.1×10^{-6}
Thermal Expansion Coefficient	K^{-1}	$0.3–1.3 \times 10^{-6}$
Typical Doping Levels	-	0.1–1.0% (Er), 1.7–4% (Yb)

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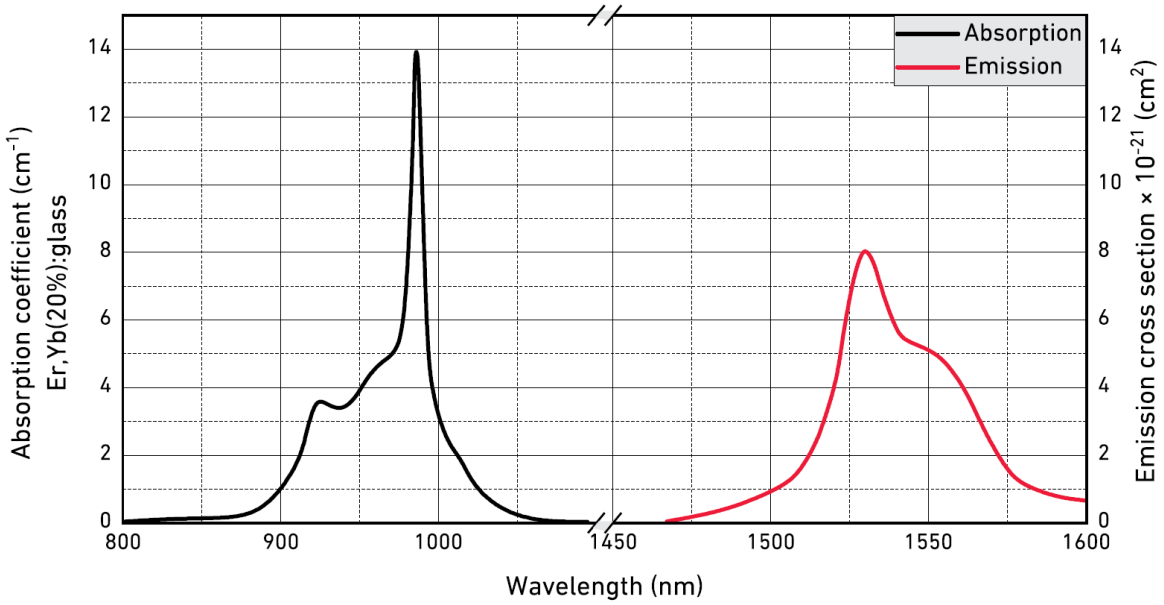
5. Optical, Laser, or Nonlinear Optical Properties

Property	Value
Refractive Index at 1534 nm	1.52
Yb to Er Energy Transfer Efficiency	High
Emission Lifetime (4I11/2 level)	~8 ms
Absorption Edge	~970 nm

6. Spectrum Transmission Curves

A comprehensive transmission spectrum (graph shown) reveals the high absorption at ~970 nm and a strong emission at ~1534 nm, with minimal losses and consistent transmission efficiency over a broad wavelength range.



7. Coating Specification

Standard AR coatings available for dual wavelengths:

- AR(R < 0.2%) @ 940 nm
- AR(R < 0.2%) @ 1535 nm

Customized coatings available upon request.

8. Standard Fabrication Specifications

Property	Value
Clear Aperture	>90%
Face Dimensions Tolerance	±0.01 mm
Length Tolerance	±0.1 mm
Parallelism Error	<20 arcsec
Perpendicularity Error	<10 arcmin
Surface Quality	20–10 S/D

Surface Flatness	λ/10 @ 632.8 nm
Mount	Unmounted

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9. POC Strength and Capabilities

Photonics On Crystals (POC) specializes in high-quality optical crystals, providing tailored solutions for advanced photonics applications. With state-of-the-art facilities and expertise in material engineering, POC offers:

- Customizable crystal dimensions and doping levels.
- Industry-grade AR coatings for optimized optical performance.
- Proven track record in delivering precise and reliable laser components.
- Robust R&D support to meet unique application demands.

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10. Standard Products

Face Dimensions	**Length**	**End Faces**	**Doping**	**Coatings**	**Price (USD)**
3 × 3 mm	5 mm	Brewster-angle cut	Yb: 20%, Er: 1%	Uncoated	370
3 × 3 mm	10 mm	Right-angle cut	Yb: 20%, Er: 0.5%	AR@940 nm + 1535 nm	435
3 × 3 mm	10 mm	Right-angle cut	Yb: 20%, Er: 0.5%	AR@940 nm + 1535 nm	435
Customization	**Any**	**Any**	**Any**	**Upon request**	**Upon Request**

This datasheet consolidates all technical details for **Er,Yb:Phosphate Glass** offered by **Photonics On Crystals (POC)**.