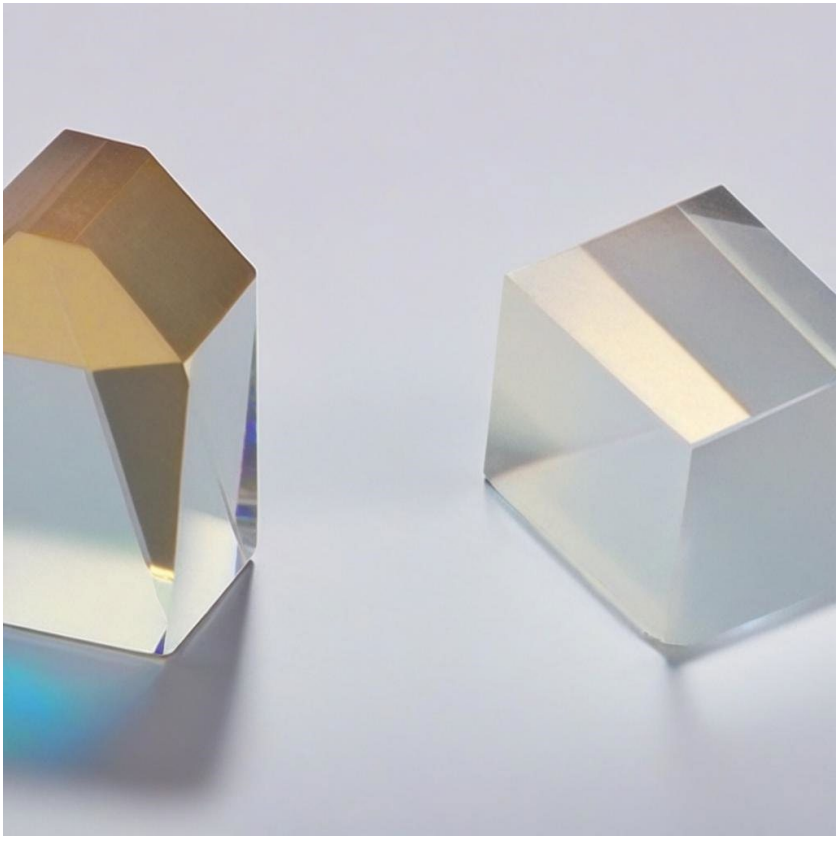
Photonics On Crystals

POC-OC-122493-Co:Spinel Crystal Datasheet

1 Main Features

- Exceptional performance for passive Q-switching in the 1.3 µm – 1.6 µm wavelength range.
- High laser-induced damage threshold and low optical losses.
- Excellent absorption cross-section enabling effective Q-switch operation.
- Negligible excited-state absorption, ensuring high contrast operation.
- Custom fabrication available upon request.



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2. Material General Description

Co:Spinel Crystal (Cobalt-doped Magnesium Aluminate) is a versatile and reliable material for passive Q-switching in laser systems. It exhibits low optical losses and a high laser-induced damage threshold, making it an ideal choice for lasers emitting in the wavelength range of 1.3 µm to 1.6 µm. Its high absorption cross-section enables precise Q-switching without the need for intracavity focusing, providing a robust solution for Er:Glass lasers and other laser systems. With a negligible excited-state absorption, Co:Spinel ensures high contrast between initial and saturated absorption states, supporting efficient energy modulation.

This crystal has a cubic structure, high thermal stability, and excellent mechanical durability, making it well-suited for demanding applications. POC offers tailored specifications to meet various laser requirements.

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3. General Applications

Co:Spinel Crystal is used in the following applications:

- **Passive Q-switching for Er:Glass lasers** operating at 1.54 µm.
- **Laser pulse modulation** in both flash-lamp and diode-pumped systems.
- **High-power solid-state laser systems** requiring stable and efficient energy modulation.
- **Military and medical lasers**, including rangefinders and medical imaging systems.
- **Laser-based communication systems**, where reliability and precision are critical.

Example Use Case:
In Er:Glass laser systems, Co:Spinel's high absorption cross-section enables precise Q-switching, resulting in efficient and repeatable pulse generation. Its durability ensures stable operation even in high-power environments, making it a preferred choice for demanding industrial and defense applications.

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4. Chemical, Physical, and Structural Properties

Property	Value
Crystal Structure	Cubic
Density	3.58 g/cm³
Thermal Expansion Coefficient	6.14 × 10^-6 K^-1
Thermal Conductivity	17 W/m·K
Mohs Hardness	8
Refractive Index	1.6 – 1.75

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5. Optical, Laser, and Nonlinear Optical Properties

Parameter	Value
Wavelength Range	1.3 µm – 1.6 µm
Initial Transmission (T_o)	50%-99% @ 1535 nm
Ground-State Absorption (σg)	3.5 × 10^-19 cm² @ 1.54 µm
Excited-State Absorption (σe)	0.1 × 10^-19 cm² @ 1.54 µm

Recovery Time (T_3)	220–350 ns
Laser-Induced Damage Threshold	>8 J/cm² @ 1535 nm, 10 ns

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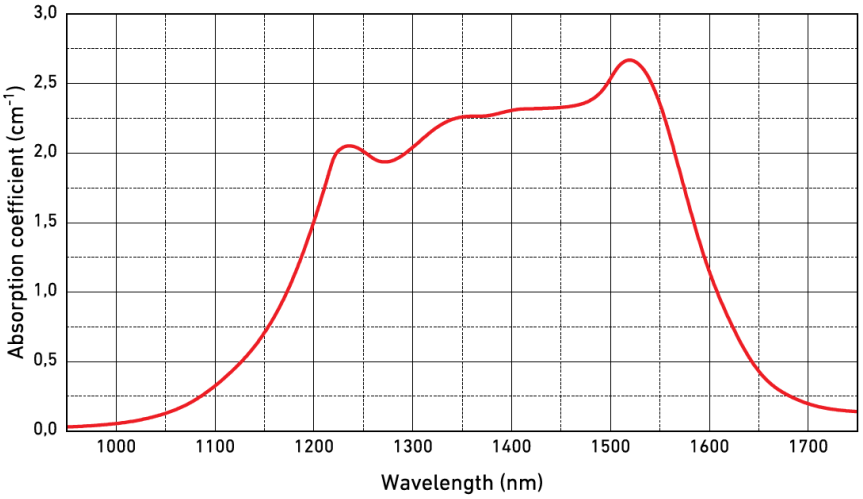
6. Spectrum Transmission Curves

Spectral transmission curves for Co:Spinel Crystal indicate low absorption losses and high transmission efficiency in the 1.3 µm to 1.6 µm range. The data supports its use in high-performance laser systems requiring passive Q-switching.



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7. Coating Specifications

- **Standard Coating:** AR/AR @ 1535 nm.
- **Other Coatings:** Custom coatings available upon request.

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8. Standard Fabrication Specifications

Specification	Value
Dimensions (Face)	3 × 3 mm, 5 × 5 mm
Clear Aperture	>90%
Surface Flatness	λ/4 @ 632.8 nm
Wavefront Distortion	λ/8 @ 632.8 nm
Parallelism	<20 arcseconds
Perpendicularity Error	<5 arcminutes
Surface Roughness	<0.1 nm @ 45°

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9. POC Strengths and Capabilities

- **Customization:** POC offers tailored specifications, including size, coating, and transmission properties.
- **Expertise in Fabrication:** Advanced fabrication techniques ensure precision and quality.
- **High-Quality Standards:** Rigorous quality checks ensure durability and performance.
- **Technical Support:** POC provides comprehensive customer support and consultation services.

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10. Standard Products and Pricing

Face Dimensions	Initial Transmission	Coating	SKU	Price (USD)
3 × 3 mm	80% @ 1535 nm	AR/AR	7331	$370
5 × 5 mm	97% @ 1535 nm	AR/AR	7343	$420
Custom Sizes	Custom Transmission	Custom	Custom	Request Quote