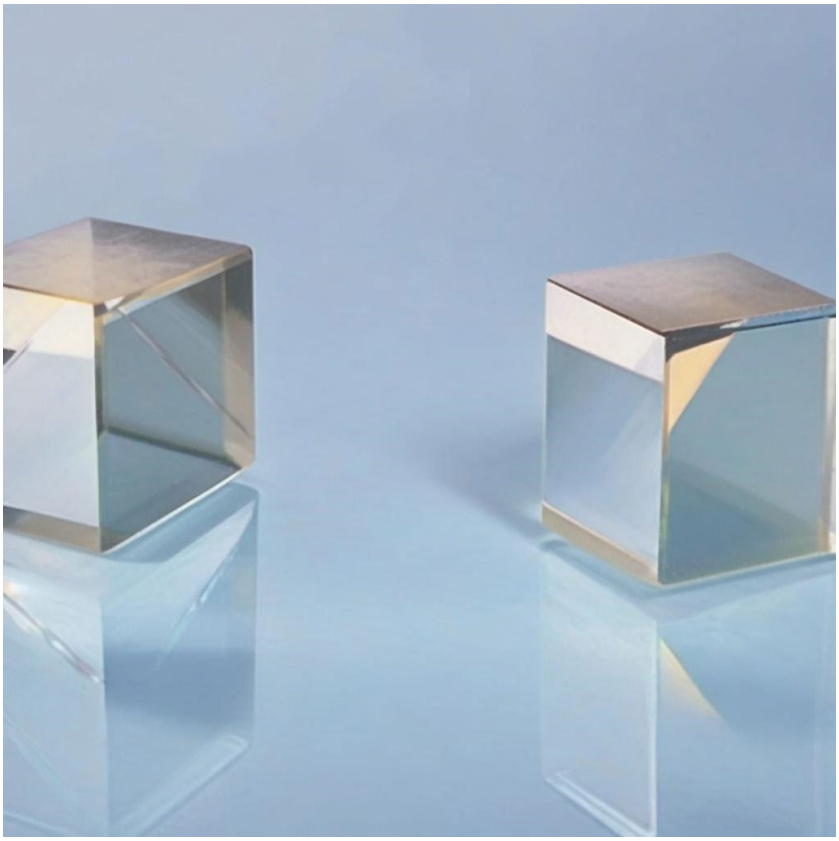
Photonics On Crystals

POC-OC-122469-KGW Crystal Datasheet

1 Main Features

- Broad transparency range from 300 nm to 5 µm.
- Two pump polarization-dependent Raman shifts at 768 cm^{-1} and 901 cm^{-1}.
- Excellent Raman shifter for picosecond applications.
- Custom dimensions, orientation, and coatings available upon request.
- High mechanical stability with superior thermal conductivity.



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2. Material General Description

Potassium gadolinium tungstate ($KGd(WO_4)_2$, KGW) crystals are monoclinic crystals known for their excellent mechanical and optical properties. With a broad transparency range (0.3 µm to 5 µm) and significant thermal conductivity values, KGW crystals are a reliable choice for demanding applications in Raman lasers and nonlinear optics. They offer two prominent Raman modes at 768 cm^{-1} and 901 cm^{-1}, making them particularly effective for picosecond laser applications. KGW's mechanical stability and ease of fabrication, combined with their strong polarization-dependent Raman effects, provide users with a versatile tool for advanced photonic applications.

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3. General Applications and Examples

KGW crystals are extensively utilized in advanced photonic systems. Key application examples include:

- **Raman Laser Generators**: KGW crystals serve as an active Raman medium in Raman laser systems, delivering high power with two distinct polarization-dependent Raman modes.
- **Nonlinear Optics**: KGW's excellent transparency and polarization properties make it a suitable candidate for second and third harmonic generation processes.
- **Picosecond Raman Shifters**: The two prominent Raman shifts at 768 cm^{-1} and 901 cm^{-1} allow for frequency conversion in picosecond laser systems.
- **Laser Pumping**: KGW crystals are often employed in commercial Nd:YAG laser systems to achieve efficient Raman gain.
- **Scientific Research**: KGW crystals are used in experimental setups requiring precise optical manipulation, especially in material science and physics.

These features make KGW an ideal crystal for Raman shifters, nonlinear optics, and other cutting-edge photonic applications.

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4. Chemical, Physical, and Structural Properties

Property	**Value**
Chemical Formula	$KGd(WO_4)_2$
Crystal Structure	Monoclinic, Space Group C2/c
Lattice Parameters	a = 10.6542(4) Å, b = 10.374(6) Å, c = 7.5820(2) Å
Density	7.27 g/cm^3
Mohs Hardness	4-5
Transparency Range	0.3 µm - 5 µm
Thermal Conductivity (k_a)	2.6 $W{\cdot}m^{-1}{\cdot}K^{-1}$
Thermal Conductivity (k_β)	3.8 $W{\cdot}m^{-1}{\cdot}K^{-1}$
Thermal Conductivity (k_C)	3.4 $W{\cdot}m^{-1}{\cdot}K^{-1}$
dn/dT (Temp Coefficient)	$dn/dT_a = -15.7 \times 10^{-6}\ K^{-1}$
	$dn/dT_\beta = -18.3 \times 10^{-6}\ K^{-1}$
	$dn/dT_C = -17.3 \times 10^{-6}\ K^{-1}$

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5. Optical, Laser, or Nonlinear Optical Properties

Property	**Value**

Refractive Indices (n_a)	n_a = 1.982
	n_β = 2.096
	nC = 2.061
Raman Frequency Shifts	901 cm^{-1}, 768 cm^{-1}
Raman Linewidth	5.4 cm^{-1} (polarization pump lp mlp)
	6.4 cm^{-1} (polarization pump gp lgp)
Raman Gain	11 cm/GW@532 nm
	3 cm/GW@1064 nm
Dephasing Time	2 ps

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6. Spectrum Transmission Curves

KGW crystals exhibit high transmission in the range of 0.3 µm to 5 µm, allowing effective Raman shifting and nonlinear optical processes. The two Raman modes at 768 cm^{-1} and 901 cm^{-1} are distinctly visible in Raman scattering experiments, confirming the crystal's excellent optical performance.

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7. Coating Specifications

- Anti-Reflection (AR) coatings available for 450-800 nm, 500-650 nm, or other custom wavelengths upon request.
- High damage threshold coatings exceeding >10 J/cm^2 @ 1064 nm, 10 ns.

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8. Standard Fabrication Specifications

Specification	**Value**
Orientation	b-cut
Clear Aperture	>90%
Face Dimension Tolerance	±0.0/-0.1 mm
Length Tolerance	±0.1 mm
Parallelism Error	<20 arcsec
Perpendicularity Error	<10 arcmin
Surface Quality (Scratch/Dig)	10-5 S-D
Surface Flatness	<λ/8 @ 632.8 nm

Coatings	ARR@450-800 nm; 500-650 nm
Mount	Unmounted

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9. POC Strength and Capabilities

Photonics On Crystals (POC) is a leading supplier of high-quality crystals designed for advanced photonic applications. Key strengths include:

- **Customizability**: POC provides custom dimensions, orientations, and coating specifications tailored to customer needs.
- **Precision Fabrication**: POC ensures rigorous quality control with tight tolerances and high damage threshold coatings.
- **Technical Expertise**: POC offers comprehensive technical support for all products and applications.
- **Global Reach**: With a global network, POC serves industries ranging from research to commercial laser systems.

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10. Standard Products

Face Dimensions	Length	Coatings	Price (USD)
5 x 5 mm	15 mm	Uncoated	440
5 x 5 mm	30 mm	ARR@450-800 nm	600
5 x 5 mm	45 mm	Uncoated	610
5 x 5 mm	50 mm	ARR@450-800 nm	900
8 x 8 mm	50 mm	ARR@450-800 nm	1120

Customization Available: Additional dimensions, coating specifications, and mounted options available upon request.