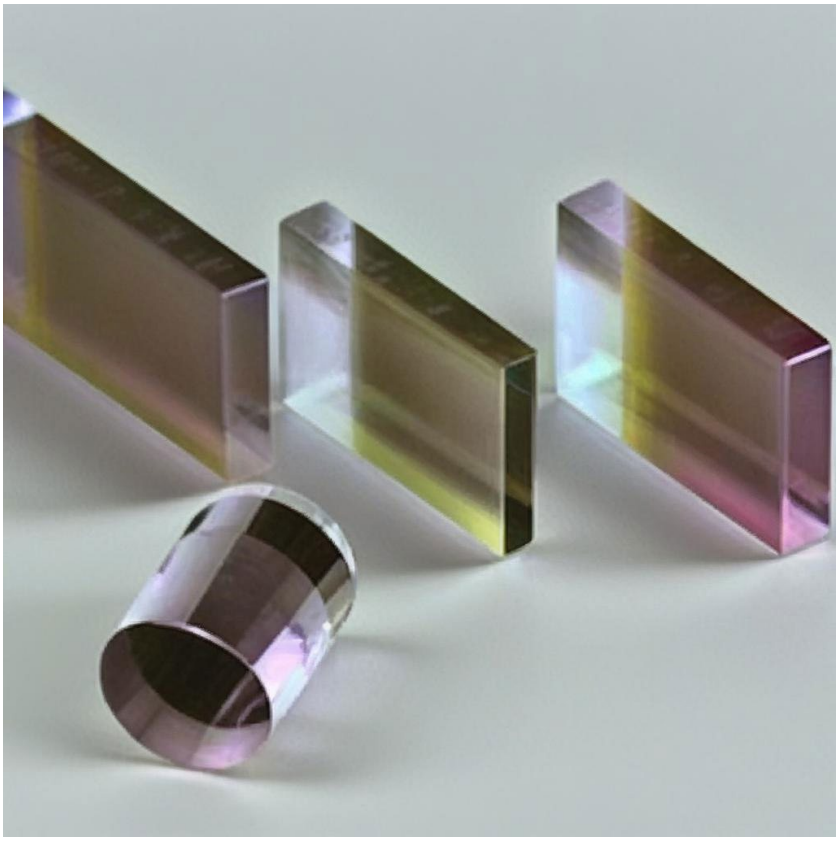
Photonics On Crystals

POC-OC-122492-LGS Switch Crystal Datasheet

1 Main Features

- High electro-optic and piezoelectric performance, making it ideal for advanced laser applications.
- Broad transmission range from UV to infrared (180 nm–8 µm).
- Exceptional laser damage threshold (>1 GW/cm² at 1064 nm).
- Low acoustic velocity and high optical homogeneity for precision laser modulation.
- Excellent thermal and mechanical stability, suitable for high-power and pulsed laser systems.



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2. Material General Description

The **LGS Switch Crystal (Langasite, $La_3Ga_5SiO_{14}$)** is a multifunctional crystal widely used in laser modulation and frequency conversion systems. With high electro-optic coefficients and a broad transmission range spanning ultraviolet to infrared (180 nm–8 µm), LGS crystals are a versatile solution for applications requiring fast laser pulse modulation and precise beam control.

LGS is highly favored for its robust thermal and mechanical stability, making it an excellent candidate for high-power laser systems, even under extreme environmental conditions. Additionally, it possesses a low acoustic velocity, minimizing acoustic losses and enabling high-performance Q-switching and electro-optic modulation. The high laser damage threshold (>1 GW/cm²) further

ensures reliability in demanding applications like scientific research, medical laser systems, and industrial laser processing.

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3. General Applications and Examples

LGS Switch Crystals are designed for applications in high-energy and precision laser systems, including:

- **Electro-Optic Q-Switches**: LGS is an excellent material for Q-switching in lasers used for material processing, micromachining, and laser marking. Its high optical transparency and robust mechanical properties allow it to operate reliably under high power.
- **Laser Modulation**: Ideal for precision control of laser pulses in research and medical laser systems, such as in dermatology and ophthalmology.
- **Acousto-Optic Devices**: LGS crystals, with their low acoustic velocity, are ideal for acousto-optic modulators used in high-resolution imaging and spectroscopy.
- **Scientific Research**: Its high optical homogeneity and damage threshold make LGS a preferred choice for cutting-edge scientific experiments involving high-power laser systems.
- **Industrial Applications**: Widely used in manufacturing processes like laser drilling, cutting, and micromachining, where high accuracy and reliability are paramount.

For instance, in industrial laser micromachining, LGS-based Q-switches enhance production speed and precision by enabling rapid pulse modulation, improving efficiency and reducing material waste.

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4. Chemical, Physical, or Structural Properties

The chemical, physical, and structural properties of **LGS Switch Crystals** are summarized below:

Property	Value
Chemical Formula	$La_3Ga_5SiO_{14}$
Crystal Structure	Trigonal
Transmission Range	180 nm–8 µm
Melting Point	~1470°C
Density	5.75 g/cm³
Thermal Expansion Coefficient	6.1×10^{-6}/°C
Laser Damage Threshold	>1 GW/cm² @ 1064 nm
Acoustic Velocity	~2800 m/s
Refractive Index	~1.87 (at 1064 nm)

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5. Optical, Laser, or Nonlinear Optical Properties

The optical and nonlinear properties of LGS Switch Crystals make them suitable for high-performance laser systems. Key properties are listed below:

Optical Property	**Value**
Transparency Range	180 nm–8 µm
Electro-Optic Coefficients	r11 = 2.3 pm/V, r41 = 1.8 pm/V
Refractive Index	1.87 (at 1064 nm)
Dielectric Constant	ε = 18 (static dielectric constant)
Laser Damage Threshold	>1 GW/cm² @ 1064 nm
Acoustic Loss Coefficient	Low
Piezoelectric Coefficient	$d11 = 6.8 \times 10^{-12}$ m/V

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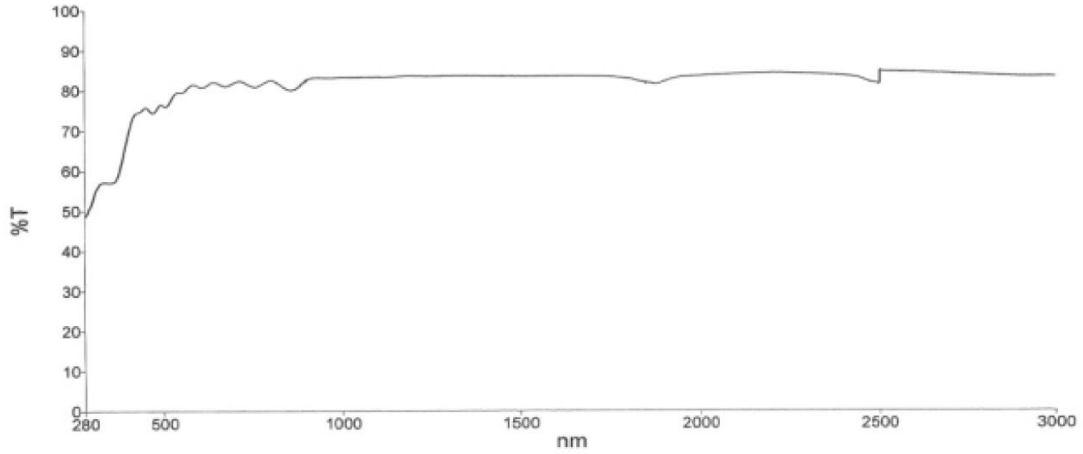
6. Spectrum Transmission Curves

Note: Transmission curve data is available upon request. Please contact POC for detailed spectral transmission performance or customized spectral data.



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7. Coating Specifications

Standard coatings are available to enhance the optical performance of **LGS Switch Crystals**:

- **Anti-Reflective Coating**: AR coatings for 1064 nm or other custom wavelengths with reflectance <0.2%.
- **High-Damage Threshold Coatings**: Coatings to sustain power densities >1 GW/cm². Customized coating options are available upon request for specific applications.

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8. Standard Fabrication Specifications

POC provides LGS Switch Crystals with the following standard fabrication specifications:

Parameter	Specification
Clear Aperture	90% of central diameter
Surface Flatness	<λ/8 @ 632.8 nm
Surface Quality	10-5 Scratch-Dig
Parallelism	<10 arc seconds
Perpendicularity	<5 arc minutes
Wavefront Distortion	<λ/8 @ 632.8 nm
Thickness Tolerance	±0.1 mm

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9. POC Strength and Capabilities

Photonics On Crystals (POC) specializes in the processing and customization of **LGS Switch Crystals** to meet various industry demands.

- **Customization Options**: POC offers tailored solutions for dimensions, coatings, and application-specific requirements.
- **Quality Assurance**: All crystals undergo rigorous quality checks to ensure optical and physical homogeneity.
- **Expertise**: POC's advanced manufacturing capabilities ensure precision and high-performance outcomes, even for challenging laser environments.
- **Global Reach**: POC serves industries worldwide, providing reliable and scalable solutions for laser systems.

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10. Standard Products

POC offers a range of standard LGS Switch Crystal products, with customization options available for unique requirements.

Product Code	Dimensions (mm)	Coating Option	Price (USD)
LGS-001	10x10x5	AR @ 1064 nm	$2500
LGS-002	15x15x10	Custom Coating	$3200
LGS-Custom	Custom Dimensions	Application Specific	Contact Us

Note: Pricing is approximate and may vary based on order quantity and customization requirements.