

Optical Shutters

Features

- Unlimited OEM sizes and shapes
- Portable and lightweight
- No mechanical motion
- Broad thermal range
- High extinction ratio
- Unmounted

Applications

- Three-dimensional imaging
- Optical instrumentation
- Medical imaging
- Holography
- Printing

Benefits

- Meets your application-specific requirements
- Silent, vibration-free, low-voltage operation
- Solid state construction
- Value priced

Description

An Optical Shutter is a two-state device used to rapidly open and close a light path (from lens to film, for example). Optical Shutters are typically used to control the amount of time that a light-sensitive material is exposed to optical radiation. Figure 1 provides a conceptual illustration of the function of an Optical Shutter.

Boulder Nonlinear Systems (BNS) manufactures and sells liquid crystal based Optical Shutters for applications requiring active timing control of beam transmittance. Key features of our Optical Shutters include high-speed binary operation, high purity linear polarized output, and maximum extinction ratio performance. Since these devices are solid state – undesirable mechanical motion, associated noise, and vibration problems are eliminated.

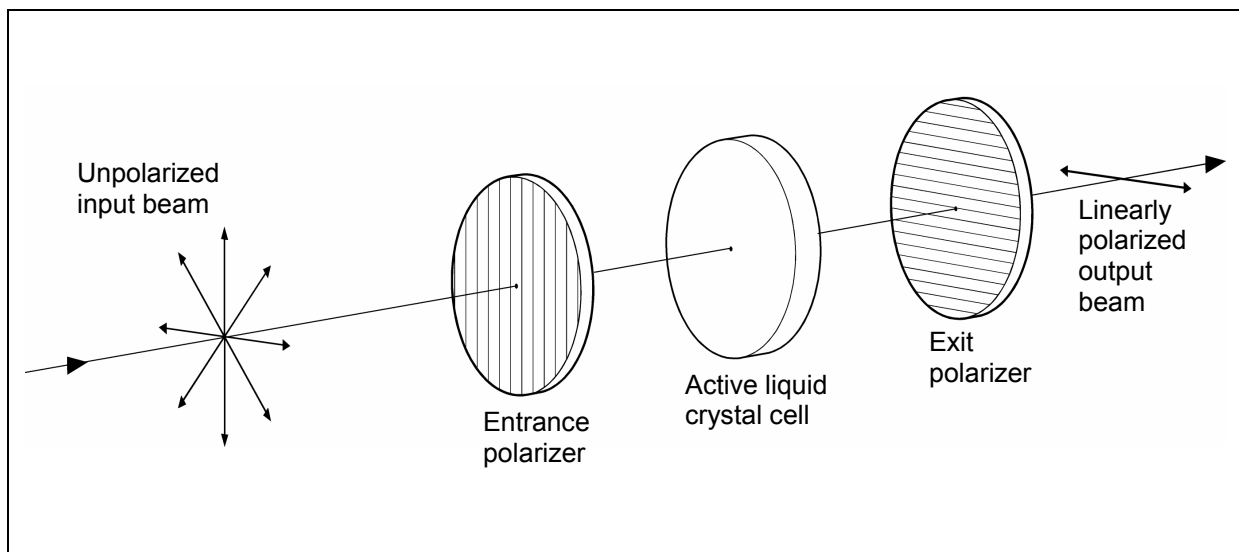


Figure 1 ~ Conceptual illustration of an Optical Shutter function.

VX Series Optical Shutters

Maximum extinction ratio performance over a broad thermal range at an affordable price

VX Optical Shutters deliver optimum extinction ratio performance, often greater than 400:1 across the visible wavelength range. Even higher extinction performance is achieved over narrower bandwidths or for single laser line applications. Up to 100% duty cycle operation is standard. The VX Series has a broad operating temperature range, designed to meet applications requiring low cost components with negligible impact on performance.

Device Construction

Figure 2 below provides a typical VX Series Optical Shutter cross section.

VX Series Optical Shutters begin with fusion-drawn, sheet glass. After deposition of a transparent conductive coating layer (indium-tin oxide or ITO, typically) these window substrates

are then evenly covered with a polymer layer, which is then rubbed or buffed, forming tiny microgrooves in the polymer layer. These microgrooves provide the alignment directionality critical in liquid crystal device production.

The coated and buffed windows are then spaced a few microns apart. The cavity between substrates is now filled with liquid crystal material and sealed.

High extinction linear polarizers are crossed, and then laminated to the liquid crystal cell substrates. External surfaces are left uncoated to minimize cost. With this crossed polarizer orientation, VX Series Optical Shutters exhibit full optical transmittance at the zero voltage state. Minimum transmission occurs at the full drive voltage level, as specified with your device.

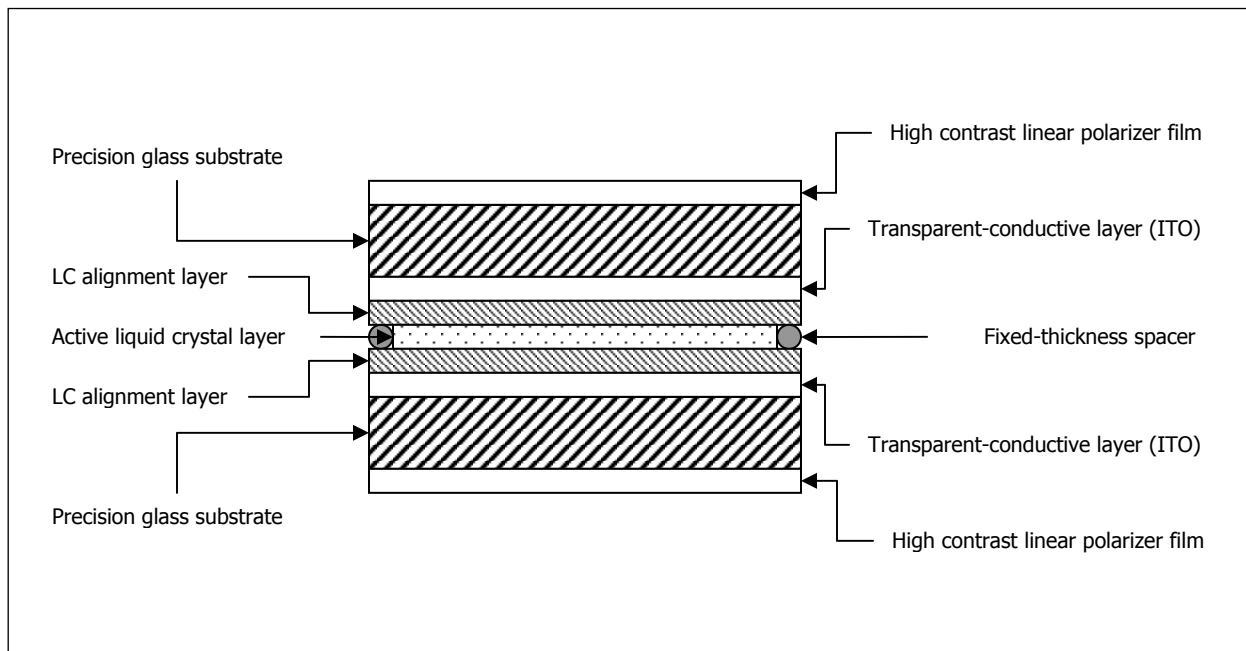


Figure 2 ~ Cross sectional representation of a VX Series Optical Shutter.

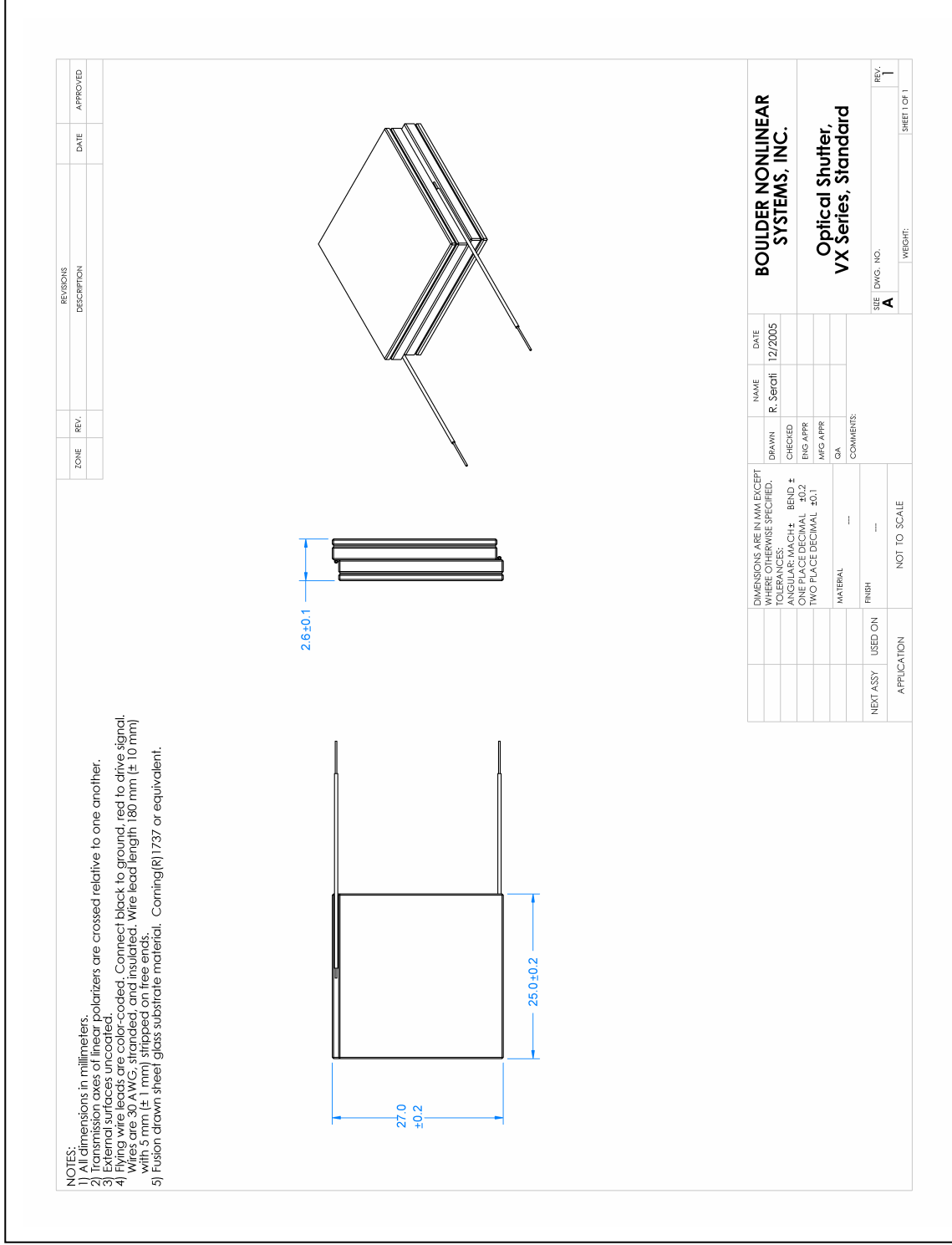


Figure 3 ~ Top level assembly drawing for standard VX Series Optical Shutters.

Optical Shutters

VX Series

Specifications (Draft)

Clear Aperture		22 x 20 mm (standard) 2 – 100 mm (custom)	
Wavelength Range		425 – 675 nm	
Open State Transmission		25%	
Contrast Ratio		<i>Minimum</i> 200:1	<i>Average</i> 500:1
Response Time	open to closed (90 – 10%)	<i>Minimum</i> ¹ 40 μ s	<i>Maximum</i> ² 650 μ s
	closed to open (10 – 90%)	<i>Minimum</i> ³ 3 ms	<i>Maximum</i> ³ 5 ms
Driver Requirement		\pm 5 to \pm 20 volts (faster response at higher voltage)	
Duty Cycle		100% (maximum)	
Switching Frequency ¹		150 Hz (maximum)	
Operating Temperature		10 to 60° C	
Storage Temperature		- 40 to + 90° C	

1. At room temperature, \pm 20 V ac.
2. At room temperature, \pm 5 V ac.
3. At room temperature, independent of drive voltage.

Above specifications are subject to change without notice. Please contact Boulder Nonlinear Systems for additional updates.

Company Profile

Boulder Nonlinear Systems, Inc. (BNS) is an innovative technology company specializing in dynamic liquid crystal polarization control solutions for both laser-based and imaging systems. Company strengths in scientific research and development are leveraged into OEM and standard product offerings targeted for astronomy, biomedical, defense, microscopy, optical computing, optical storage, and telecommunications applications.

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