

Optical Shutters

Features

- Mounted and unmounted design options
- Unlimited OEM sizes and shapes
- Portable and lightweight
- No mechanical motion
- Broad thermal range
- High extinction ratio

Applications

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

Benefits

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

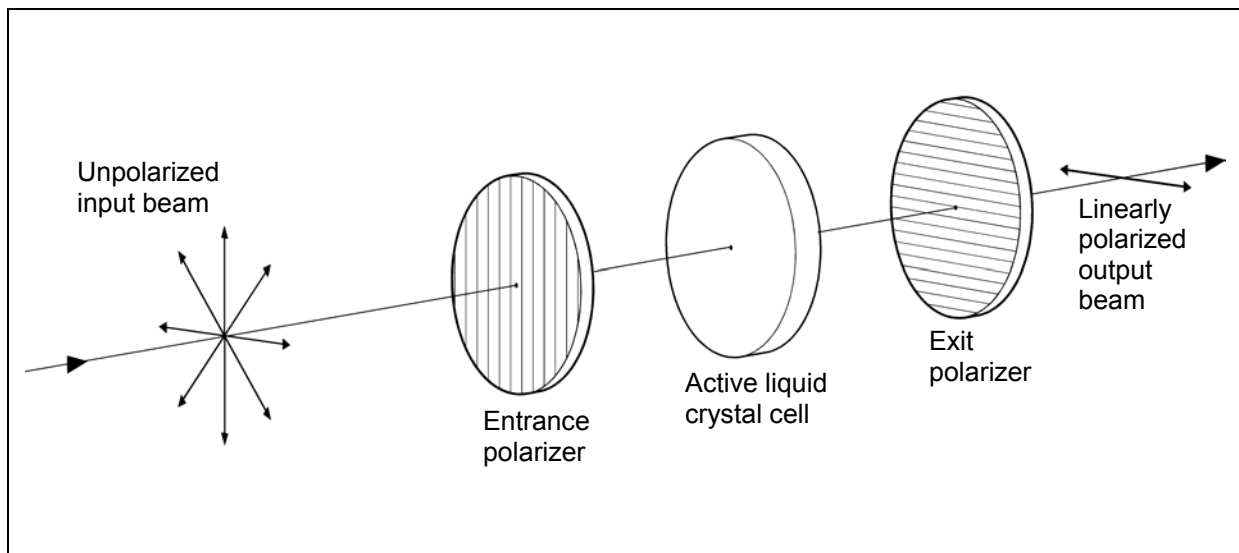


Figure 1 ~ Conceptual illustration of an Optical Shutter function.

XT Series Optical Shutters

Maximum extinction ratio performance over a broad thermal range

XT 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 possible. Our most popular OEM Optical Shutter line, the XT Series has a broad operating temperature range, designed to meet the thermal demands of most instrumentation applications.

Device Construction

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

XT Series Optical Shutters begin with polished, optically flat windows. 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 between glass substrates. External glass surfaces are usually coated with a broadband antireflection coating, to maximize transmittance. With this crossed polarizer orientation, XT 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.

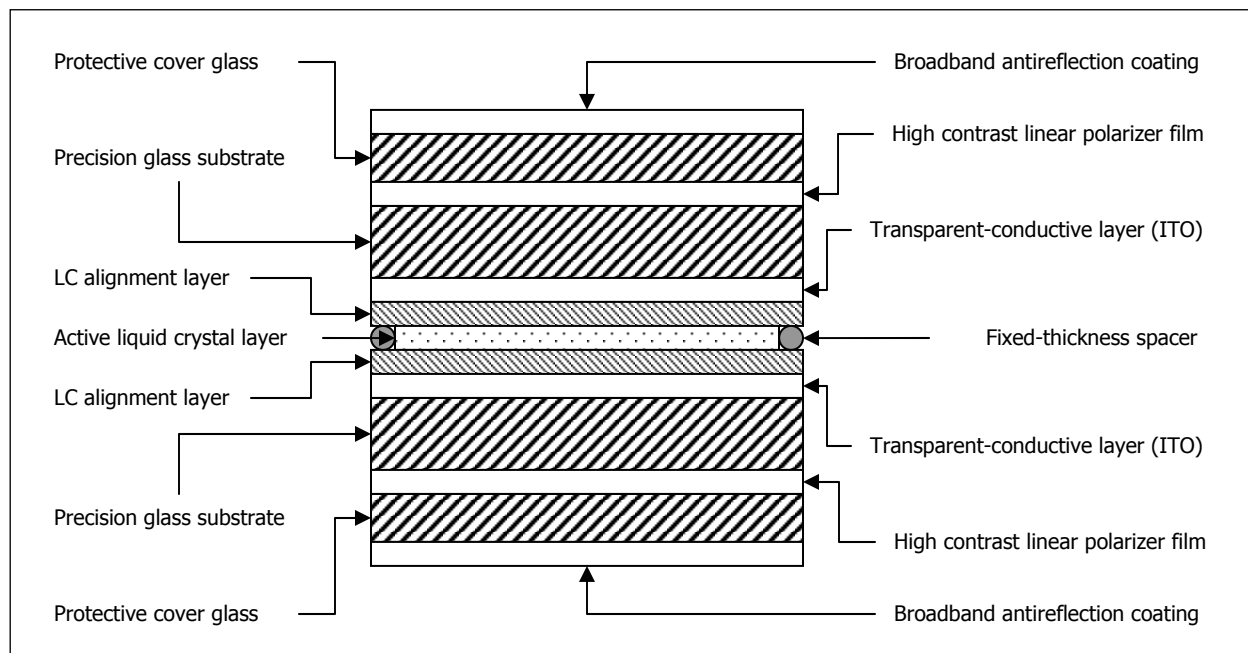


Figure 2 ~ Cross sectional representation of an XT Series Optical Shutter.

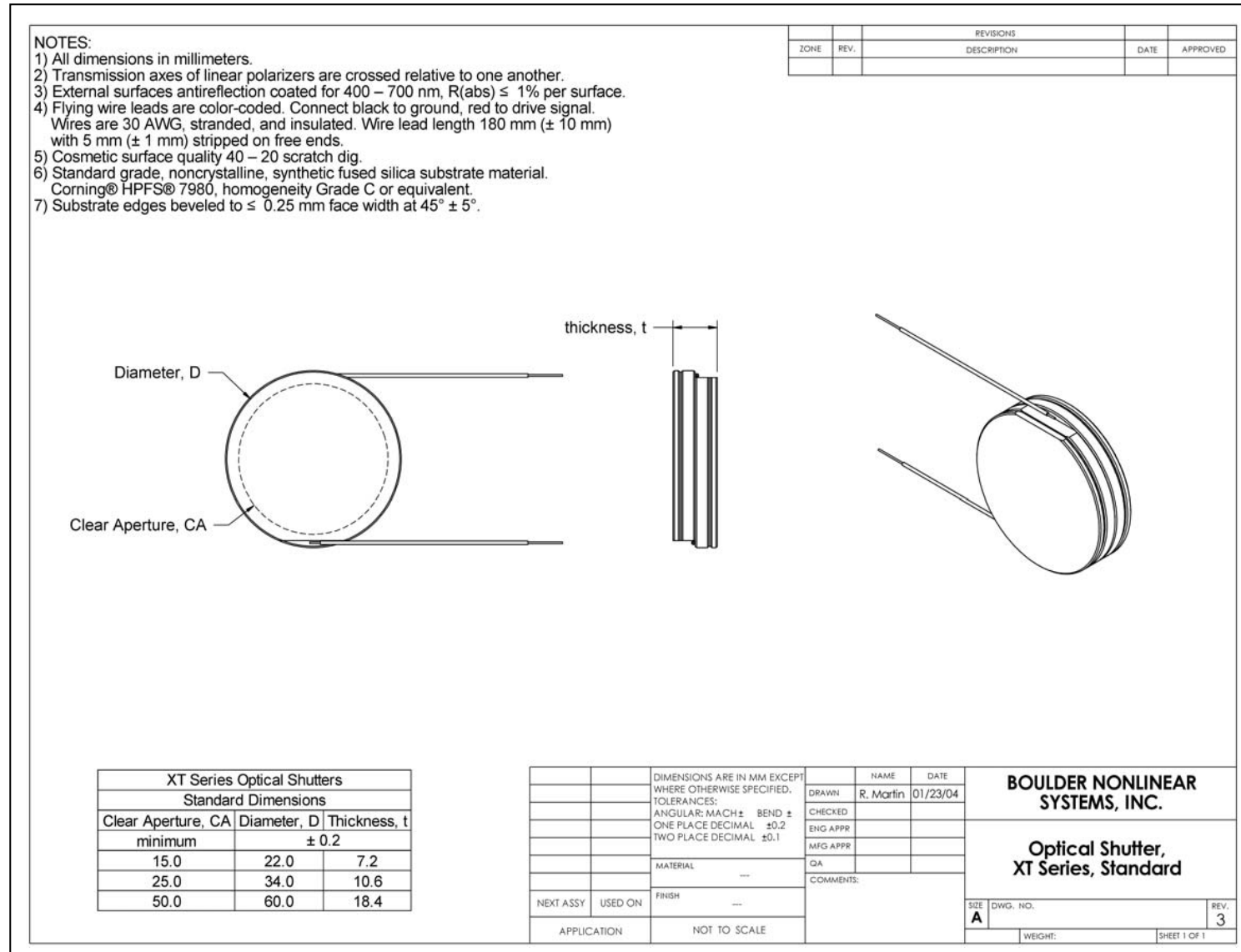


Figure 3 ~ Top level assembly drawing for standard XT Series Optical Shutters.

Optical Shutters

XT Series

Specifications (Preliminary)

Clear Aperture		5 – 95 mm	
Wavelength Range		425 – 675 nm	
Pixel Count		1 – 256	
Pixel Pitch		5.0 μm (minimum)	
Open State Transmission		30%	
Contrast Ratio		<i>Minimum</i> 200:1	<i>Average</i> 1000:1
Response Time	open to closed (90 – 10%)	<i>Minimum</i> ¹ 40 μs	<i>Maximum</i> ² 650 μs
	closed to open (10 – 90%)	<i>Minimum</i> ³ 3 ms	<i>Maximum</i> ³ 10 ms
Driver Requirement		± 5 to ± 20 volts (faster response at higher voltage)	
Duty Cycle		100% (maximum)	
Switching Frequency ¹		60 Hz (maximum)	
Operating Temperature		10 to 60° C	
Storage Temperature		- 40 to + 90° C	

1. At room temperature, ± 20 V ac.
2. At room temperature, ± 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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