

Optical Shutters

Features

- Mounted and unmounted design options
- Unpolarized input and output states
- Maximum open state transmittance
- Unlimited OEM sizes and shapes
- Portable and lightweight
- No mechanical motion

Applications

- Free space optical communication
- Three-dimensional imaging
- Optical instrumentation
- Telecommunications
- Projection systems
- Holography

Benefits

- Meets your application-specific requirements
- Perfect for large clear aperture demands
- Low absorption, non-polarizing design
- Solid state device construction
- Quiet, vibration-free operation
- Lowest cost Optical Shutter

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 LF Series 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, maximum open state transmittance, and high extinction ratio performance. Since these devices are solid state – undesirable mechanical motion, associated noise, and vibration problems are eliminated.

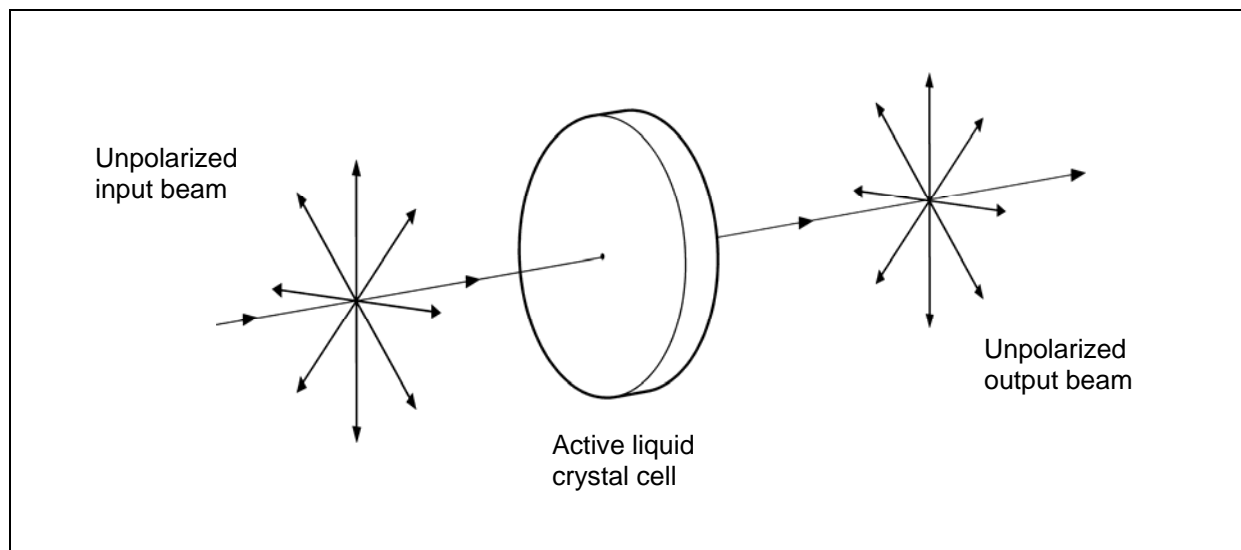


Figure 1 ~ Conceptual illustration of an LF Series Optical Shutter function.

LF Series Optical Shutters

Designed for large format applications with maximum open state transmission

The LF Series of Optical Shutters provides a cost-effective solution for applications requiring throughput optimization. This unique LF Optical Shutter design enables up to 80% open state transmittance across the visible wavelength range. Drive voltage requirements range from ± 60 to ± 70 V ac. Large aperture sizes (up to 150 mm) are easily accommodated with the LF Series. Broad thermal performance is also characteristic of the LF Series Optical Shutters.

Device Construction

Manufacture of LF Series Optical Shutters follows greatly simplified design and construction. Figure 2 below illustrates a cross sectional view of the LF Series Optical Shutter.

Production and assembly of LF Series Optical Shutters starts with cost-effective, sheet glass substrates. External window surfaces are antireflection coated across the visible wavelength range. Internal surfaces include a transparent-conductive layer, typically indium-tin oxide (ITO).

The LF Series eliminates two common Optical Shutter production process steps, greatly simplifying their manufacture and reducing production costs. No polymer alignment layers are required, avoiding size limitations inherent in the buffing process.

Maximum open state transmission is achieved with a novel Optical Shutter design that eliminates the need for linear polarizers, their careful alignment demands, and associated expense.

This simplified device design enables large area Optical Shutter requirements to be addressed with an economical solution.

LF Series Optical Shutters have an appearance similar to frosted or ground glass in the power off (zero volt) condition.

Always keep in mind that the LF Series Optical Shutters require relatively high drive voltage levels for maximum transmittance and optimum extinction ratio performance.

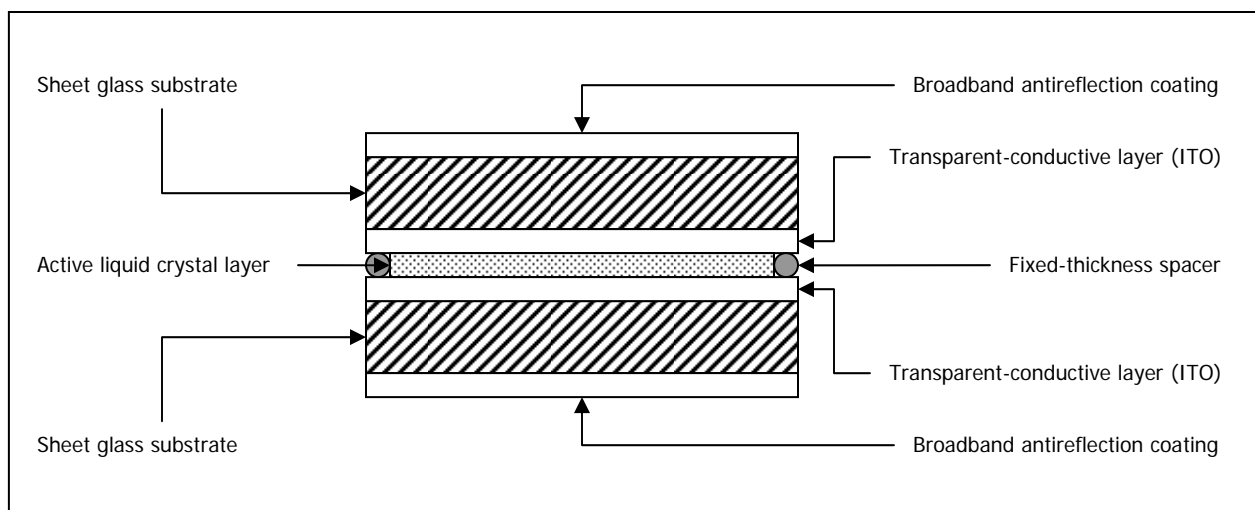


Figure 2 ~ Cross sectional representation of an LF Series Optical Shutter.

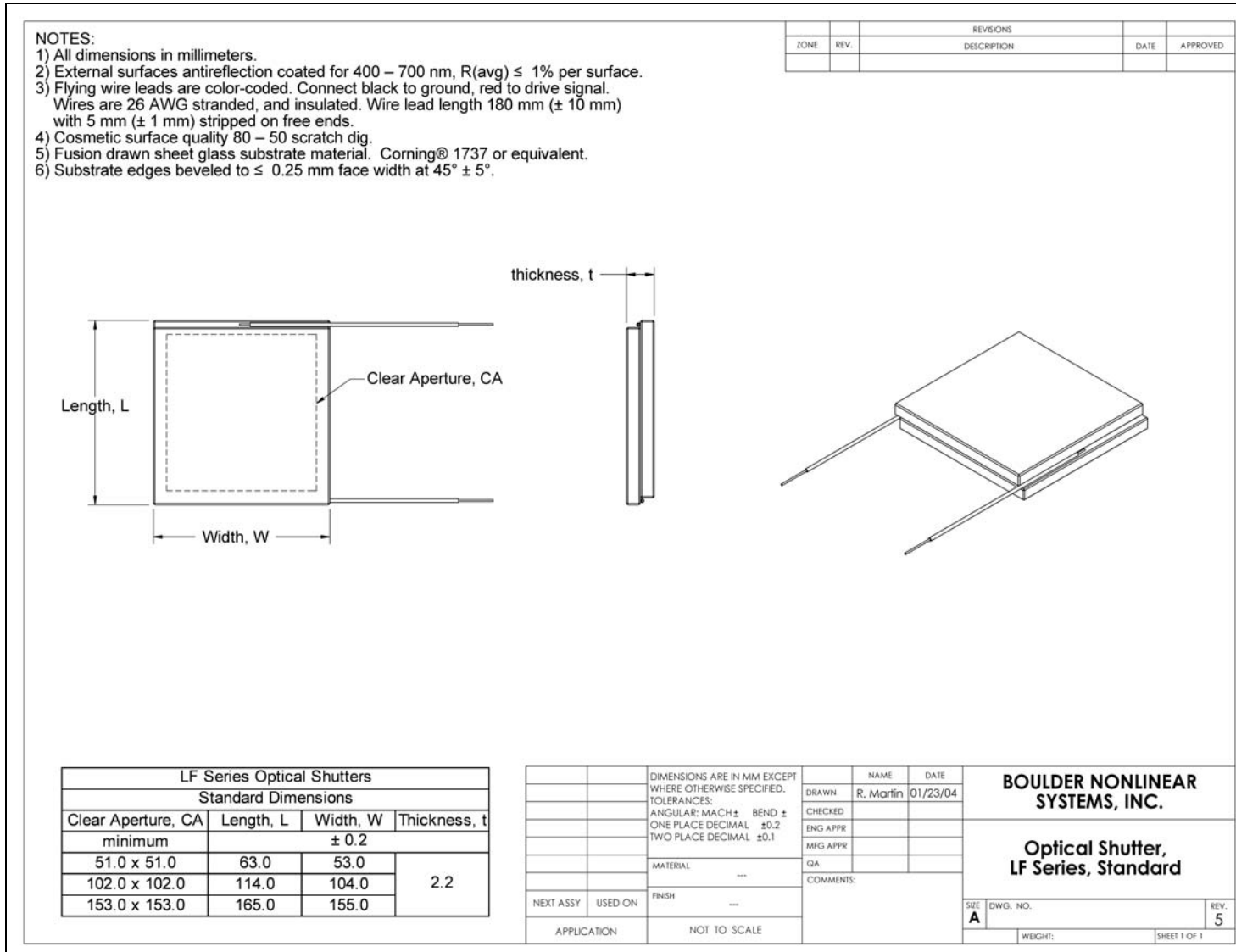


Figure 3 ~ Top level assembly drawing for standard LF Series Optical Shutters.

Optical Shutters

LF Series

Specifications (Preliminary)

Clear Aperture		5 – 150 mm	
Wavelength Range		400 – 700 nm	
Pixel Count		1 – 256	
Pixel Pitch		20 μ m (minimum)	
Open State Transmission		80%	
Contrast Ratio		<i>Minimum</i> 50:1	<i>Average</i> 150:1
Response Time	open to closed (90 – 10%)	<i>Minimum</i> 10 ms	<i>Maximum</i> 30 ms
	closed to open (10 – 90%)	<i>Minimum</i> 1 ms	<i>Maximum</i> 3 ms
Driver Requirement		\pm 60 to \pm 70 volts (higher transmission at higher voltage)	
Duty Cycle		100% (maximum)	
Switching Frequency¹		30 Hz (maximum)	
Operating Temperature		20 to 60° C	
Storage Temperature		- 15 to + 60° C	

1. At room temperature, \pm 70 V ac.

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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