

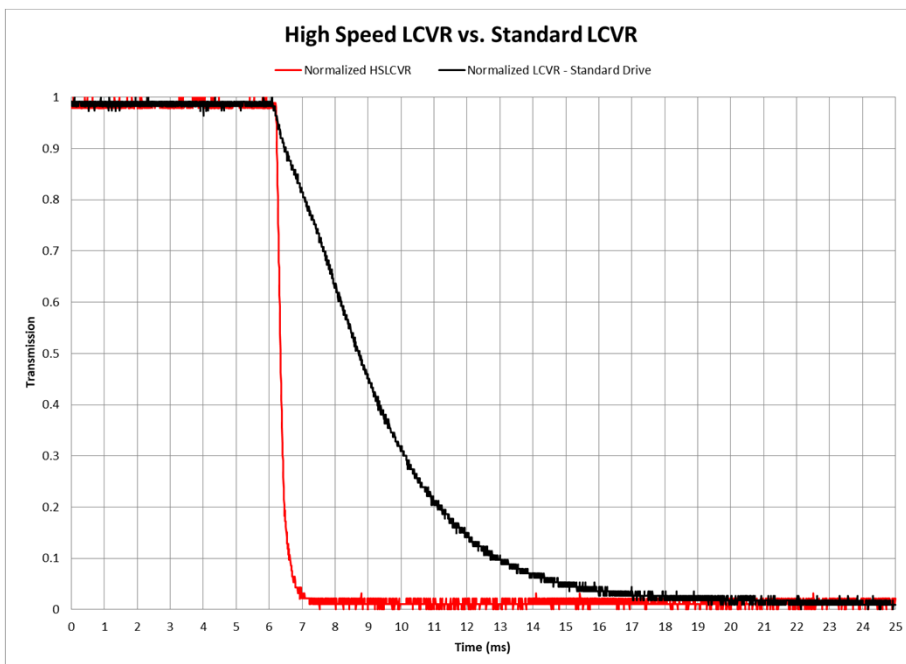
## High Speed Liquid Crystal Variable Retarder System

Meadowlark's newest liquid crystal (LC) product, the high speed LC variable retarder (HS LCVR) has a 10X speed improvement over our award winning standard LCVR. The sub-millisecond speeds are achieved without the 50/50 duty cycle drive scheme required by our ferroelectric liquid crystal components, but are nearly as fast. The new HS LCVR uses nematic liquid crystal materials to electrically control polarization and provide tunable retardation by changing the effective birefringence of the material with applied voltage, thus altering the input polarized light to any chosen elliptical, linear or circular polarization.

Our precision HS LCVR requires unique fabrication and assembly steps. We construct these retarders using optically flat fused silica windows coated with our transparent conductive Indium Tin Oxide (ITO). Our ITO coating is specially designed for maximum transmission over the operating wavelength.

### Response Time

Meadowlark's HS LCVR utilizes unique surface alignment procedures coupled with precise temperature control and a new drive scheme to achieve the fastest possible switching times. The HS LCVR reaches switching speeds of  $\sim 50$  microseconds to switch from one-half to zero waves (low to high voltage) and  $\sim 500$  microseconds to switch from zero to one-half wave (high to low voltage) at 532nm.



### Key Features

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- Sub-millisecond speeds
- Standard LC Drive Schemes
- Includes heated housing
- Precision non-mechanical retardation control

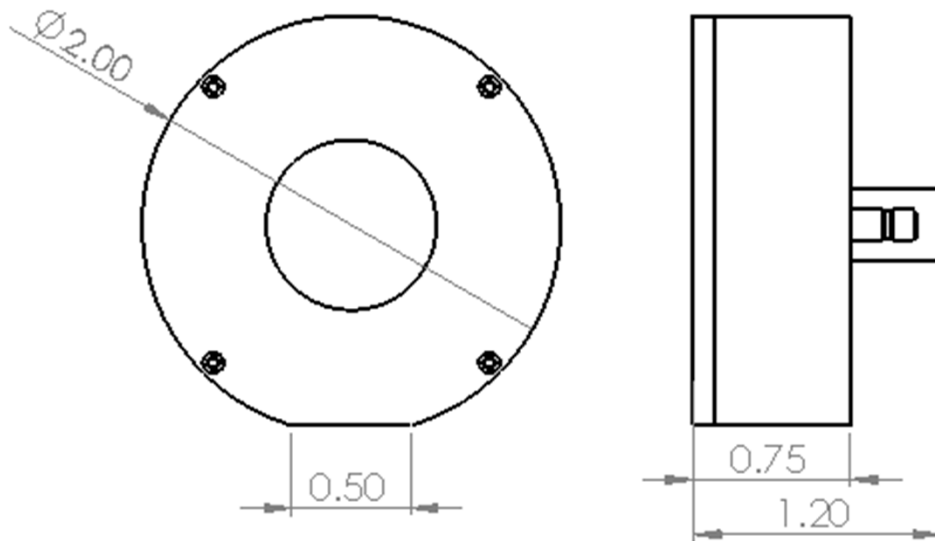
### Liquid Crystal Suite

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- Variable Retarders**
  - Liquid Crystal Variable Retarder
  - UV Variable Retarder
  - MWIR Variable Retarder
  - OEM LCVR
- Rotators**
  - Achromatic High Speed Rotator
  - Binary Rotator
  - Polarization Rotator
- Shutters / Attenuators**
  - Achromatic High Speed Shutter
  - High Contrast Shutter
  - Variable Attenuator



Meadowlark Optic's HS LCVR must be paired with a HSD5020 digital interface. The HSD5020 will keep the HS LCVR at optimum temperature and voltage ranges for best performance. The driver features 4 separate drive schemes and has the ability to drive two HS LCVR cells at the same time.



SPECIFICATIONS	
<b>Retarder Material</b>	Nematic liquid crystal
<b>Substrate Material</b>	Optical quality synthetic fused silica
<b>Wavelength Range</b>	450 - 700 nm
<b>Typical LC Rise Time (10 – 90%)</b> <b>Typical LC Fall Time (90 – 10%)</b>	50 $\mu$ s @ 532 nm 500 $\mu$ s @ 532 nm
<b>Retardance</b>	0 to $\lambda/2$
<b>Transmitted Wavefront Distortion (at 632.8 nm)</b>	$\leq \lambda/4$
<b>Surface Quality</b>	40 – 20 scratch-dig
<b>Beam Deviation</b>	$\leq 2$ arc min
<b>Reflectance (per surface)</b>	$\leq 0.5\%$ at normal incidence
<b>Temperature Range</b>	50°C
<b>Recommended Safe Operating Limit</b>	500 W/cm <sup>2</sup> , CW 300 mJ/cm <sup>2</sup> , 10 ns, visible

ORDERING INFORMATION			
<i>Diameter, D (in.)</i>	<i>Clear Aperture, CA (in.)</i>	<i>Thickness, t (in.)</i>	<i>Part Number</i>
2.00	0.70	0.75	HSLRC – 200

Driver Specifications	
<b>Fundamental Drive Waveform</b>	10 KHz AC square wave
<b>Modulation Amplitude</b>	0-10 V rms
<b>DC Offset</b>	<5 mV
<b>Communication Interface</b>	USB
<b>Output Channels</b>	2 Cells
<b>Modulation Waveforms</b>	Chop, Gate, Steady State, Idle
<b>CE Compliance</b>	Compliant