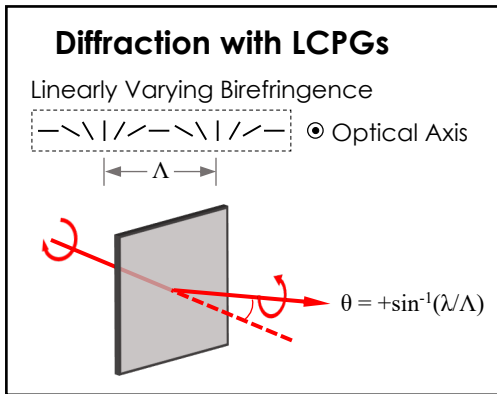


Liquid Crystal Polarization Gratings

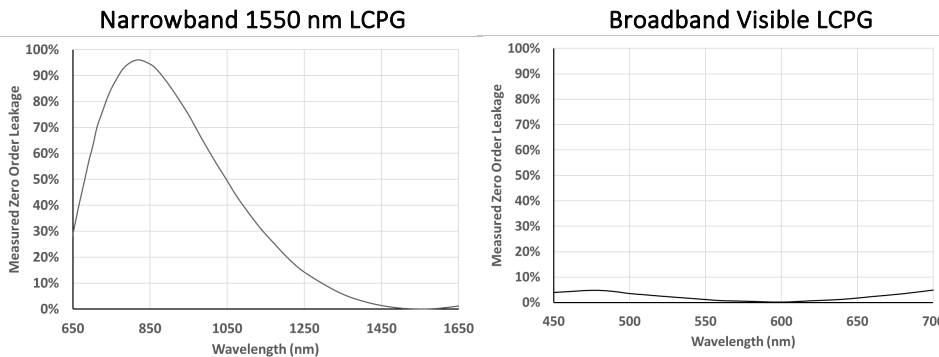
Meadowlark Optics' Liquid Crystal Polarization Gratings utilize spatially varying birefringence to create highly efficient polarization-sensitive gratings. Liquid crystal polarization gratings are also known as geometric phase gratings, Pancharatnam-Berry phase gratings, and diffractive waveplates.

At the wavelength(s), where the birefringent layer provides a half wave of retardation, these transmissive gratings efficiently (> 99.5% typical) diffract circularly polarized light to either the +1 or -1 order depending on the handedness of the incident light. Because of the half wave of retardation, the diffracted light also changes handedness relative to the incident light. Meanwhile, when linearly polarized light is used, the light is evenly split into the two diffracted orders.

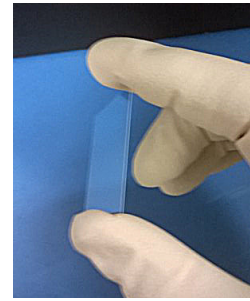


Meadowlark Optics offers a commercial product line of LCPGs at common laser wavelengths and a variety of diffraction angles. Broadband visible LCPG options are also available.

Typical Diffraction Spectra



The plots above illustrate the typical diffraction spectra of narrowband (left) and broadband (right) LCPGs by measuring the leakage into the 0th order (i.e., undiffracted transmission). Peak diffraction efficiency occurs where the plots have a null, representing >99.5% diffraction efficiency in both cases.



Applications of Liquid Crystal Polarization Gratings

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- Thin polarized beamsplitter
- Pair with variable retarders for non-mechanical beam steering
 - Spectral imaging
 - Polarimetry
 - Phase microscopy

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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

Controllers

- Analog Controller
- FLC Controller
- LC Digital Interface Controller
- Temperature Controller
- Two Channel High Voltage Controller



NARROWBAND LCPG SPECIFICATIONS

Design Wavelengths	532 nm, 1064 nm, 1550 nm (please specify)
Diffraction Angles	532 nm: $\pm 1^\circ, \pm 2^\circ, \pm 4^\circ$ 1064 nm: $\pm 1^\circ, \pm 2.5^\circ, \pm 5^\circ$ 1550nm: $\pm 1^\circ, \pm 2.5^\circ, \pm 5^\circ, \pm 10^\circ$
Diffraction Efficiency	$\geq 99\%$
Total Efficiency	$\geq 90\%$

BROADBAND VISIBLE LCPG SPECIFICATIONS

Wavelength Bandwidth	450 – 700 nm
Diffraction Angles at 532 nm / (Grating Pitches)	$\pm 1^\circ, \pm 2^\circ, \pm 4^\circ$ / (30.5 μm , 15.2 μm , 7.6 μm)
Diffraction Efficiency	$\geq 90\%$ over 450 nm – 700 nm $\geq 95\%$ over 550 nm – 650 nm
Total Efficiency	$\geq 80\%$ over 450 nm – 700 nm $\geq 85\%$ over 550 nm – 650 nm

SHARED SPECIFICATIONS

Substrate Material	Corning EAGLE XG	
Substrate Sizes / Clear Apertures	0.5 in. \times 0.5 in. (12.7 mm \times 12.7 mm) 1.0 in. \times 1.0 in. (25.4 mm \times 25.4 mm)	0.34 in. \times 0.34 in. (8.7 mm \times 8.7 mm) 0.76 in. \times 0.76 in. (19.4 mm \times 19.4 mm)
Substrate Thickness	0.02 in. (0.5 mm)	
Transmitted Wavefront Distortion	$\leq \lambda/4$ RMS at 532 nm (Typical)	
Surface Quality	60 – 40 scratch-dig	

†Diffraction Efficiency defined as the power in the desired first-order beam divided by the sum of all power in all diffracted orders. Assumes circularly polarized incident light.

‡Total Efficiency defined as the power in the desired first-order beam divided by the power in the incident beam. Includes surface reflection losses.

Don't see what you're looking for?

Our commercial product line consists of unmounted LCPGs without integrated anti-reflection (AR) coatings so that we can provide customers with the best price. Please contact our knowledgeable Solutions Engineers regarding custom options, including custom diffraction angles, aperture sizes, and wavelengths through the visible to mid-wave infrared.