



Optometrics LLC

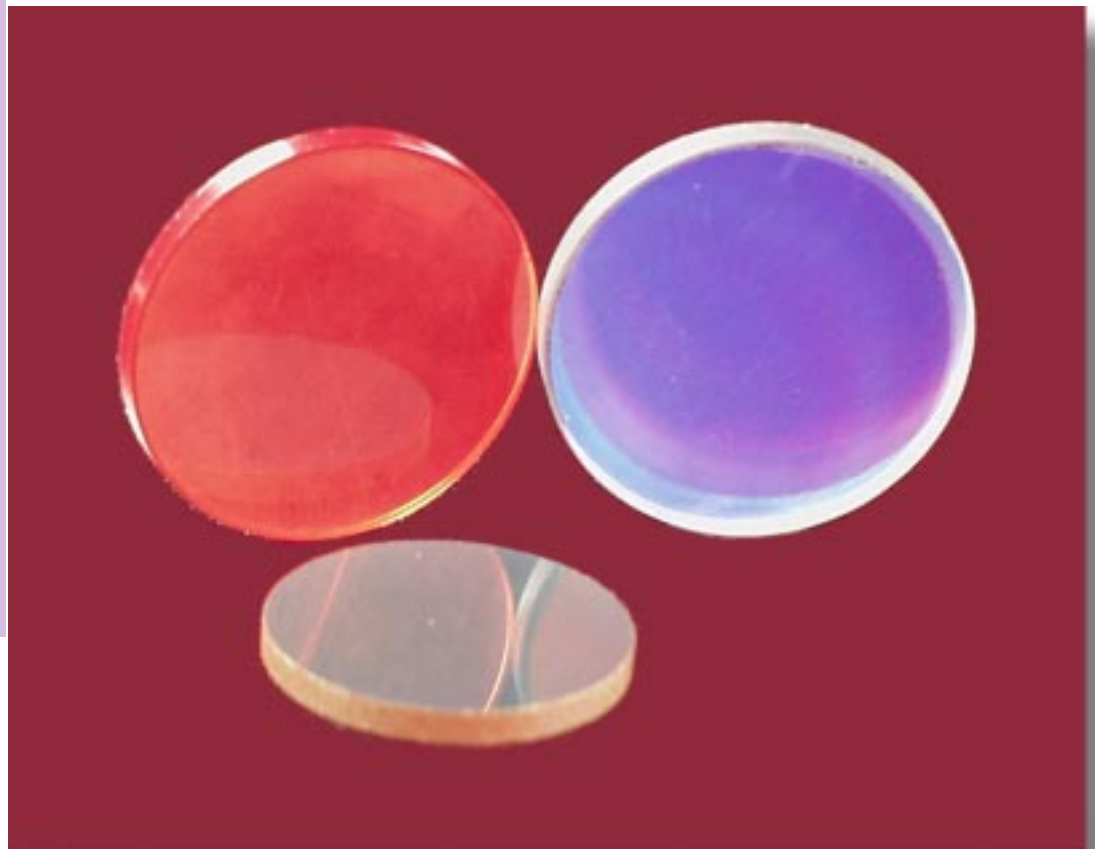
HOLOGRAPHIC WIRE GRID POLARIZERS... *for Infrared Applications*

Highlights

- 2400 Grooves per mm
- On Calcium Fluoride (CaF₂), Barium Fluoride (BaF₂), Zinc Selenide (ZnSe) and KRS-5
- For improved short wavelength performance
- For performance beyond 30 microns (KRS-5)
- Extended infrared range
- High transmission
- High extinction ratios
- Customize for higher transmission or higher extinction ratios

Working with experts in the field, Optometrics has developed a special holographic technique to produce Infrared Polarizers with a sub-micron grid spacing.

In the Company's holographic laboratory, an interferometrically generated interference fringe pattern is produced from monochromatic light and exposed onto a photo-resist coated substrate. Once developed, the resist has a regular sinusoidal profile which is vacuum aluminized at an oblique angle to create the array of parallel conductors.



Optometrics manufactures wire grid polarizers using two methods.

- 1- Ruling precisely spaced grooves directly into a highly polished CaF_2 or ZnSe substrate and then aluminizing the substrate, allowing the use of the polarizers with relatively high power lasers.
- 2- Holographic method of producing grooves allowing the use of a wider array of infrared materials such as BaF_2 , KRS-5 as well as the traditional CaF_2 and ZnSe.

Wire grid polarizers can be used at angles of incidence up to 45 degrees with collimated, diverging or converging beams without loss of efficiency and little lateral displacement of the transmitted beam. The optical path of a wire grid polarizer is simply the thickness of the substrate.

The fabrication of holographic wire grids permits the use of a wide variety of infrared materials that do not lend themselves to the ruling process. They are available with a spacing of 2400 g/mm for optimum short-wavelength efficiency.

PERFORMANCE

Wire grid polarizers transmit radiation when the "E" vector is perpendicular to the wire (EI). Radiation with the "E" vector parallel to the wire (EII) is reflected. Due to surface reflections, the reflected beam contains both polarizations.

The extinction ratio of a polarizer is a measure of its ability to attenuate a plane polarized beam. Two principle transmissions are necessary to calculate an extinction ratio, T_1 and T_2 . Assuming a perfectly plane polarized beam, T_1 is defined as the maximum transmission for which the polarizer can be oriented. Minimum transmission (T_2) is the transmission through the polarizer when it is rotated 90 degrees from T_1 . The extinction ratio is given as $E=T_2/T_1$ and expressed as a decimal or percentage. The inverse of E, expressed as a ratio (R=100:1), is used in our specifications. Wire grid polarizers can also be characterized by the degree of polarization, defined as $P=(T_1 - T_2)/(T_1+T_2)$.

Extinction ratios greater than 40,000:1 can be achieved by the use of two wire grid polarizers in series with their grids parallel (the overall extinction ratio is the product of the extinction ratio of the individual polarizers).

HOLOGRAPHIC POLARIZERS.....

• • • Compliments Optometrics' existing line of ruled wire grid polarizers on CaF_2 and ZnSe .

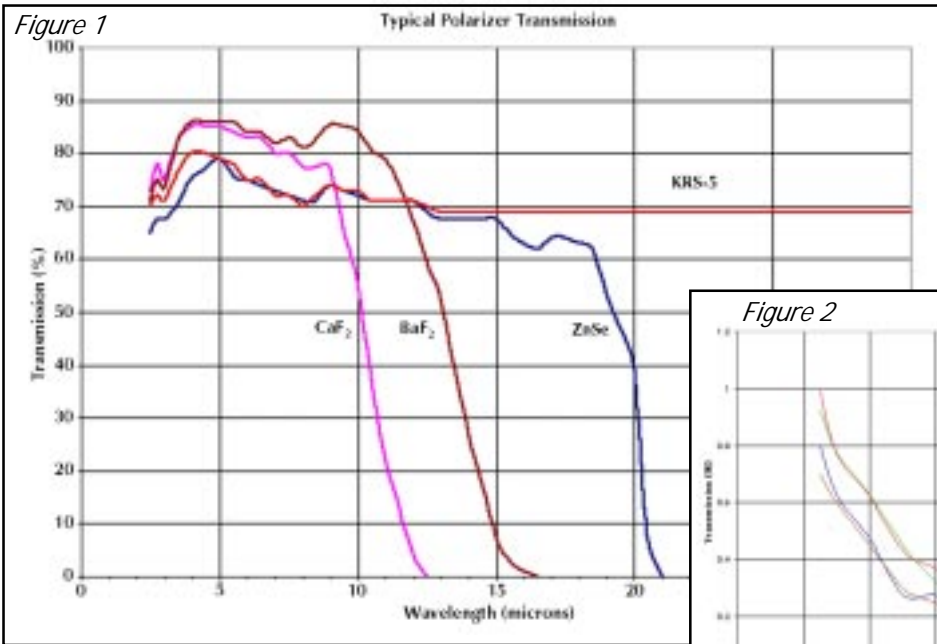
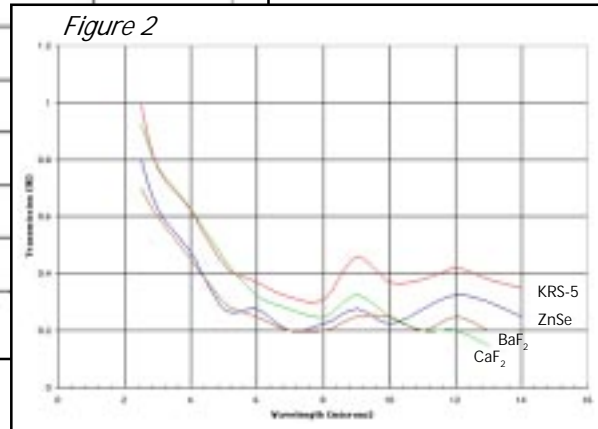


Figure 1 - Typical transmission in linear polarized light with wire grid polarizers oriented for maximum transmission.

Figure 2 - Typical transmission in linear polarized light with wire grid polarizers oriented for minimum transmission.



Material	Wavelength (microns)	Typical Extinction Ratio
CaF ₂	3	100
	8	250
BaF ₂	3	100
	10	300
ZnSe	3	100
	10	300
KRS-5	3	100
	15	200

OVERCOATINGS

Calcium Fluoride and Barium Fluoride have low refractive index (high Tx) values and do not require anti-reflective (AR) coatings.

Zinc Selenide has a high refractive index and transmission at specific wavelength regions which can be enhanced by AR coating on one or both sides. Zinc Selenide is usually optimized for transmission at specific laser lines, typically from 9 to 11 microns.

KRS-5 is not normally AR coated, because this would limit its broad transmission range, which is its primary advantage.

CAUTION

The surface of a wire grid polarizer, like any diffraction grating, is extremely delicate. Nothing should ever be allowed to touch the surface of the polarizer. Handling, when necessary, should be by the edge only and with protected fingers. Careful removal of dust by gentle air flow is the only cleaning procedure recommended by Optometrics. Particular care should be used when handling KRS-5.

STANDARD SIZES AND OPTIONS

All polarizers are available unmounted, mounted in a protective ring or mounted in a bench mountable stage which allows 360° rotation, in several standard sizes. If your application requires a different size or shape, please contact us for price and delivery. OEM inquiries are welcome.

Our process allows us to tailor extinction ratios or transmission to suit your application needs. Call Optometrics for details.

HOLOGRAPHIC WIRE GRID POLARIZERS


For information on our ruled polarizers, see our Laser Optics & Products Brochure.

SPECIFICATIONS

- Mounted polarizers are potted in a double protective ring
- Wire grid spacing 2400 g / mm
- Parallelism - ≤ 3 arc. min
- Substrate thickness - 2 mm
- Dimensional Tolerance - ± 0.5 mm

 **Gratings**
Ruled, Holographic, Grazing Incidence, Echelles; Originals and Replicated; Telecom and Transmission Gratings

 **Optical Components**
Mirrors, Lenses, Windows, Toroids, Flats, Beamsplitters, Prisms


 **Filters**
Near Ultraviolet, Visible, Near Infrared, Neutral Density, Laser Line

 **Laser Optics & Products**
Laser Gratings, Holographic and Wire Grid Polarizers, Tunable Grating Filter

 **Monochromators**
Mini-Chrom Monochromators

 **Systems & Accessories**
Monochromatic Light Modules, Sample Compartments, Detectors, Light Sources, Modular Recording Spectrophotometers

 **SPF-290S**
Spectrophotometer for determining Sunscreen Protection Factors

 **Telecom Components**
Telecom Gratings, V-Groove spacers, Transmission Gratings, Monochromators

HOLOGRAPHIC POLARIZERS

Catalog No.	Substrate Material	Outside Dimension	Clear Aperture	Mounted or Unmounted
5-8001	ZnSe	25 mm dia.	18 mm	Mounted
5-8101	CaF ₂	25 mm dia.	18 mm	Mounted
5-8201	BaF ₂	25 mm dia.	18 mm	Mounted
5-8301	KRS-5	25 mm dia.	18 mm	Mounted
5-8003	ZnSe	25 mm dia.	22.5 mm	Unmounted
5-8103	CaF ₂	25 mm dia.	22.5 mm	Unmounted
5-8203	BaF ₂	25 mm dia.	22.5 mm	Unmounted
5-8303	KRS-5	25 mm dia.	22.5 mm	Unmounted
5-8004	ZnSe	29 mm dia.	25 mm	Unmounted
5-8104	CaF ₂	29 mm dia.	25 mm	Unmounted
5-8204	BaF ₂	29 mm dia.	25 mm	Unmounted
5-8304	KRS-5	29 mm dia.	25 mm	Unmounted
5-8011	ZnSe	38 mm dia.	34 mm	Unmounted
5-8111	CaF ₂	38 mm dia.	34 mm	Unmounted
5-8211	BaF ₂	38 mm dia.	34 mm	Unmounted
5-8311	KRS-5	38 mm dia.	34 mm	Unmounted
5-8021	ZnSe	50 mm dia.	30 mm	Mounted
5-8121	CaF ₂	50 mm dia.	30 mm	Mounted
5-8221	BaF ₂	50 mm dia.	30 mm	Mounted
5-8321	KRS-5	50 mm dia.	30 mm	Mounted

HOLOGRAPHIC POLARIZERS

mounted in a 360 degree rotary mount with adapter, post and breadboard screws suitable for breadboards, bench mounting and FTIR spectrometer applications.

Catalog No.	Substrate Material	Clear Aperture
5-8005	ZnSe	25 mm dia.
5-8105	CaF ₂	25 mm dia.
5-8205	BaF ₂	25 mm dia.
5-8305	KRS-5	25 mm dia.



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