



WIRE GRID POLARIZERS

The highly efficient Harrick Wire Grid Polarizers consists of a wire grid that is holographically deposited onto a KRS-5 substrate. This polarizer has a wide spectral range from 5000 cm^{-1} to 285 cm^{-1} . The thin profile of these polarizers make it convenient for applications in which there are space constraints.

The general-purpose model is mounted into a fully 0° to 360° rotatable slide plate. Accessory-specific configurations of this polarizer are designed to fit the Harrick Seagull, VariGATR/GATR, and FastIR accessories.

APPLICATIONS

- ▶ Ideal for removing interference fringes from transmission spectra recorded at Brewster's angle.
- ▶ Excellent for obtaining optimum sensitivity for reflectance measurements.

FEATURES

- ▶ Spectral range: 5000 cm^{-1} to 285 cm^{-1} .
- ▶ KRS-5 substrate.
- ▶ High extinction ratio.
- ▶ Clear Aperture: 22 mm.
- ▶ General purpose model slide plate mounted in a fully rotatable (0° to 360°) holder with an angular scale.
- ▶ Accessory-specific models with a two-position holder (0° and 90°) provide p- and s-polarization.



ORDERING INFORMATION

Wire Grid Polarizer, 0-360°.....	CATALOG NO. PWG-U1R
Wire Grid Polarizer, 0° and 90° for the Seagull (includes slide plate mount).....	PWG-SEA
Wire Grid Polarizer, 0° and 90° for the FastIR (includes slide plate mount).....	PWD-FAS-XXX*
Wire Grid Polarizer, 0° and 90° for the VariGATR and GATR (includes slide plate mount).....	PWD-GATR-XXX*

*XXX indicates spectrometer make and model



A Wire Grid Polarizer consist of regularly spaced thin strips of parallel conductive wires. When the polarizer is placed perpendicular to the incoming radiation, the wires transmit the component of the electric field that is perpendicular to the wires, and reflect the component parallel to the wires.

The efficiency of a wire grid polarizer depends on the conductivity of the wire and also on the ratio of the grid spacing (d) to the wavelength of interest (λ). In theory, all types of parallel grids are efficient polarizers when the ratio of the grid spacing to the wavelength of interest (d/λ) is $\ll 1$. In practice, good agreement is obtained between measured and theoretical values when $d/\lambda < 0.5$ and when higher conductivity wires are used.

Polarizer performance is generally characterized by:

K1: The transmission efficiency for normal incidence polarized light whose electric field vector is perpendicular to the wires, also known as the wanted component. For a perfect polarizer, $K1=1$.

K2: The transmission efficiency for normal incidence polarized light whose electric field vector is parallel to the wires, also known as the unwanted component. For a perfect polarizer, $K2=0$.

Other commonly used measures of performance deduced from K1 and K2 are the degree of polarization or efficiency and the extinction ratio, whose formulas are shown in Table 1.

Table 1: Wire Grid Polarizer (KRS-5 substrate) Specifications.

Grid Period (μm)		0.25
% Transmission Efficiency (K_1)	2.5 μm	71
	5 μm	84
	10 μm	75
% Transmission of Unwanted Radiation (K_2)	2.5 μm	1.5
	5 μm	0.5
	10 μm	0.23
% Degree of Polarization $\frac{(K_1 - K_2)}{(K_1 + K_2)}$	2.5 μm	95.8
	5 μm	98.8
	10 μm	99.7
Extinction Ratio $\frac{K_1}{2K_2}$	2.5 μm	23:1
	5 μm	84:1
	10 μm	160:1
Maximum Temperature ($^{\circ}\text{C}$)		110

Our Wire Grid Polarizers offer high efficiency in a compact form. With their holographically deposited wire grid on a KRS-5 substrate, they are suitable for use from 5000cm^{-1} to 285cm^{-1} . Table 1 summarizes their specifications. The transmission efficiency from the wanted and unwanted components, in addition to the degree of polarization and

extinction ratio, from a typical polarizer are shown in Figures 1 and 2 respectively. Note that there are some artifacts from the manufacturing process that appear as absorption bands in the wanted component ($K1$, Table 1).

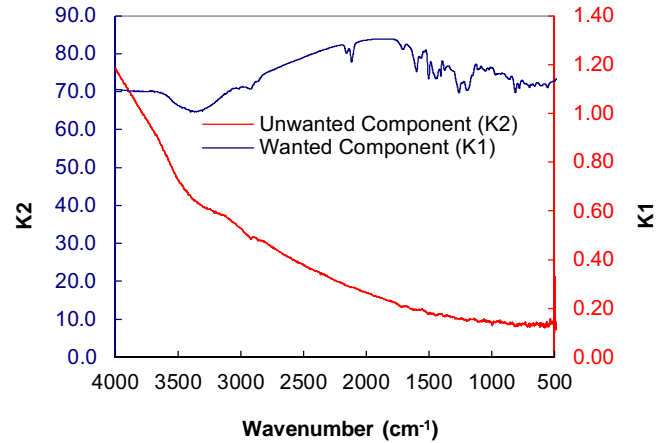


Figure 1. Transmission efficiency for the wanted ($K1$) and unwanted ($K2$) components of a typical wire grid polarizer (KRS-5 substrate).

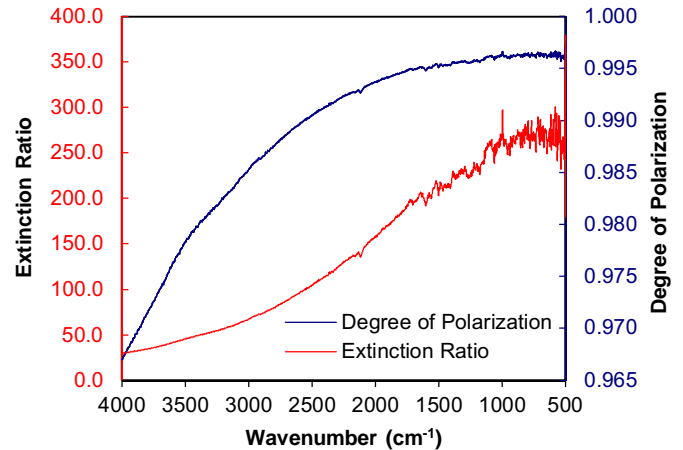


Figure 2. Degree of polarization (efficiency) and extinction ratio of a typical wire grid polarizer (KRS-5 substrate).