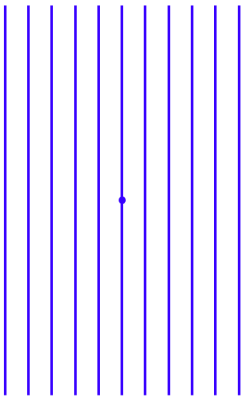
DE 847 Diffractive Optical Element



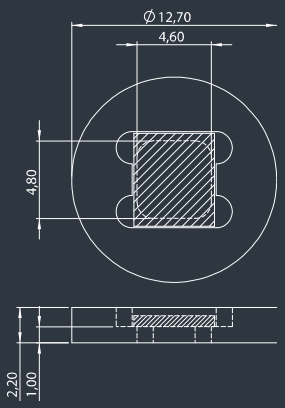
- **Element Number: DE 847**
- **Current Product Revision: A**
- Description: 11 Lines (Rectangular)
- Substrate Material: Fused Silica
- AR coating on rear side of the substrate: R < 0.5% at recommended wavelength range
- Substrate Size: 5 mm x 5.75 mm
- Thickness: 0.725 mm
- Design Wavelength: 450 nm
- Recommended Wavelength Range: 420-470 nm *
- Minimum Recommended Beam Diameter: min. 3 mm

This Large-angle pattern is subject to geometrical distortion due to its symmetry properties, if the DOE is used at laser wavelengths significantly different (Δλ > 50nm) from the design wavelength. If the DOE is used at laser wavelengths close to the design wavelength (Δλ < 50nm) the geometrical distortion is usually tolerable (see table below). Pattern size and pattern angles and the intensity in the undiffracted central spot ('zero order intensity', see reverse page) will vary most with the wavelength.

Diffraction efficiencies given on this datasheet have been measured using elements of product revision A.

MOUNTED VERSION

For testing or setups under laboratory conditions, we offer a version mounted in a black anodized 12.7 mm aluminum frame for use with standard laboratory holders. For other frame sizes (e.g. 8mm) please contact us at the given contact address.



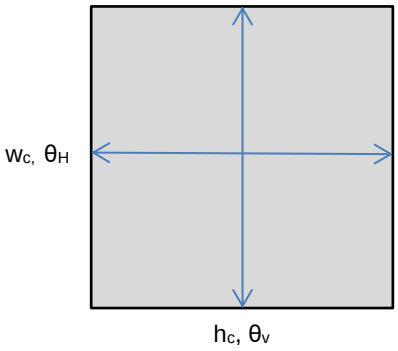
12.7 mm anodized aluminum lens adapter

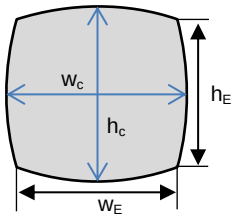
COLLIMATED / CONVERGING LASER

The laser can be collimated for long-range use or converging for a fixed working distance. Please note that the size/thickness of each spot or line depends on the focusing of the laser.

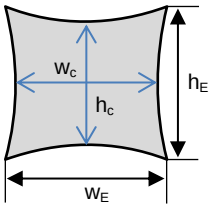
Pattern geometry & diffraction angles

Pattern Size and Pattern Angles (deg)





Barrel Distortion ($\lambda < \lambda_{Design}$)



Cushion Distortion ($\lambda > \lambda_{Design}$)

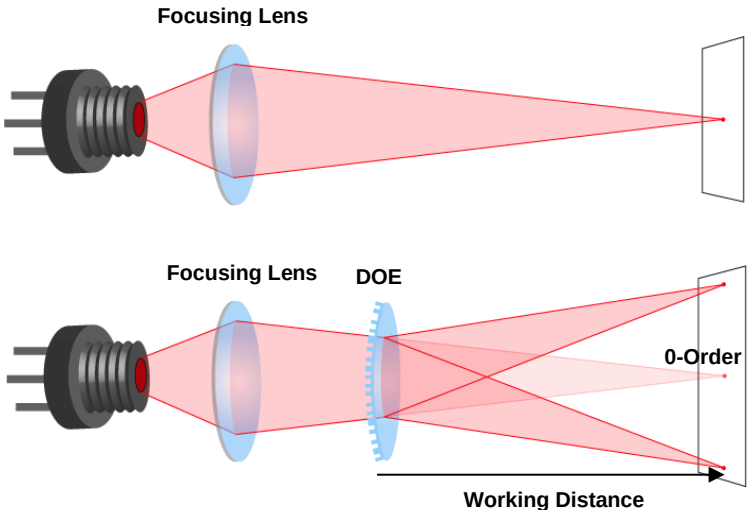
θ_H= horizontal angle, θ_V= vertical angle, h_C= center height, w_C= center width, h_E= edge height, w_E= edge width

Wavelength	Pattern Size @ 100 mm Distance				Ratio corner-to-center		Pattern Angles	
λ [nm]	w_c [mm]	h_c [mm]	w_E [mm]	h_E [mm]	Width	Height	θ_H [°]	θ_V [°]
375	44.5	72.8	43.2	72.0	97.1%	99.0%	25.1	40.0
405	48.3	79.5	47.4	79.0	98.2%	99.3%	27.1	43.3
450	**54.0**	**90.0**	**54.0**	**90.0**	**100.0%**	**100.0%**	**30.2**	**48.5**
488	58.9	99.4	60.0	100.1	101.9%	100.7%	32.8	52.8
520	63.2	107.7	65.5	109.2	103.7%	101.3%	35.1	56.6
532	64.8	111.0	67.7	112.8	104.4%	101.6%	35.9	58.0

Table 1: Pattern size and pattern angle depending on the wavelength

*within the recommended wavelength range the zeroth order is usually ≤1%

Setup



Laser diodes are the most common light source to be used with diffractive optical elements, but other laser light sources may also be used.

The DOEs are best used with collimated or convergent laser sources. The microstructure surface should be oriented towards the laser.

The 0-order spot is equivalent in size and shape to the original beam, but its power is attenuated.

Zero order diffraction intensity

The intensity of the zeroth order of this multi-line pattern is polarization dependent. At the recommended polarization state, the minimum of the zeroth order can be found at the design wavelength.

At the recommended polarization state the electric field component is:

- Parallel to the generated (dot) lines and the longer substrate side

At the orthogonal polarization state the electric field component is:

- Perpendicular to the generated (dot) lines
- Parallel to the shorter substrate side

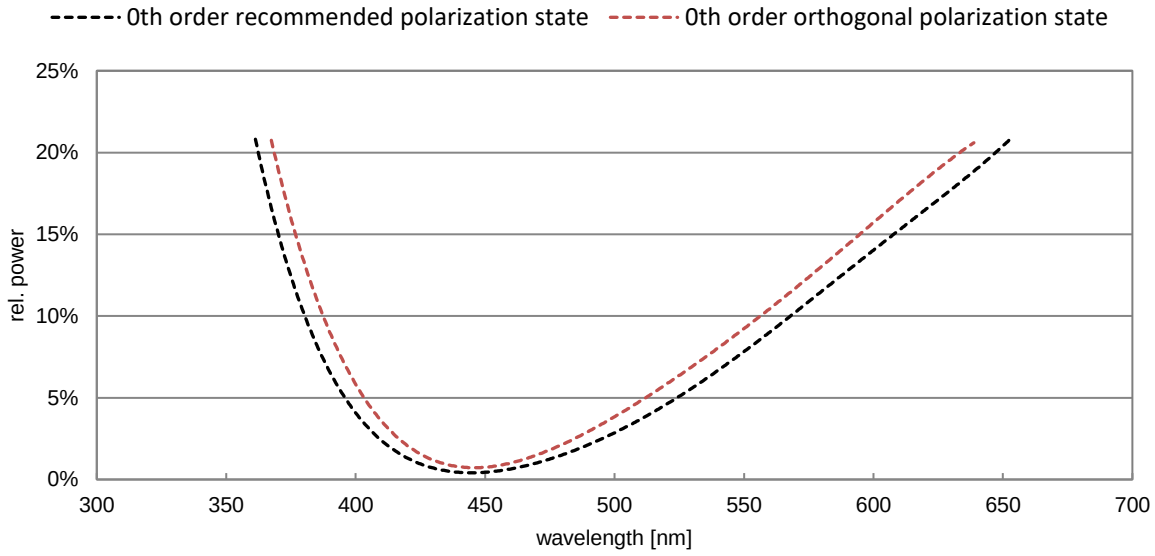


Figure 1: Zero order curve as a function of wavelength, example curves, the curves may differ slightly for different DOEs of the same type

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