Diffractive Gratings

Gratings, Beam Splitters, Pattern Generators for Structured Light Patterns

Features

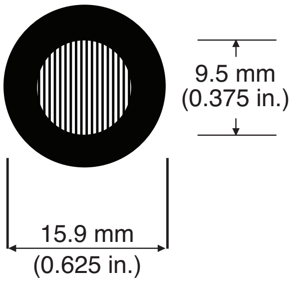
- Standard or custom
- Sinusoidal, binary, or other grating profiles
- Photoresist on silica, or etched silica
- Other substrate materials available
- High diffraction efficiency
- Uniform interbeam intensity
- Operating wavelengths 250 nm to 1550 nm

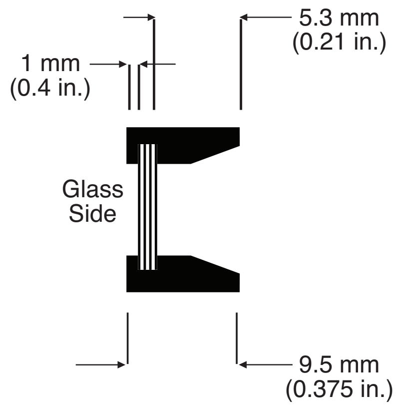
Applications

- General or high-precision beamsplitting
- Machine vision systems
- Multiple imaging
- Spectrometry
- Beam sampling
- Metrology

Mechanical Specifications

Typical Dimensions

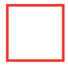




Some Available Patterns

Multiple Dots

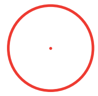
Single Square



Multiple Lines

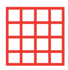
7x7 Dot Matrix

Single Circle



7 Concentric Circles

4x4 Grid



More patterns available

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Multiple Dot Patterns[1]

Number of Dots	DOE Period (µm)	Interbeam Angle[2] (°)	Spreading Angle[2] (°)
5	25	1.54	6.14
	169	0.23	0.91
	170.6	0.23	0.90
9	338.2	0.11	0.91
	532	0.07	0.58
11	25.7	1.49	14.94
15	16.4	2.34	32.78
19	33	1.16	20.94
	50.4	0.76	13.71
33	100	0.38	12.28
	426.1	0.09	2.88
99	260	0.15	14.47

[1] Multiple line patterns are also available with similar specifications. Please call for information on other patterns.
[2] At 670 nm.

Custom Diffraction Optical Elements (DOE)

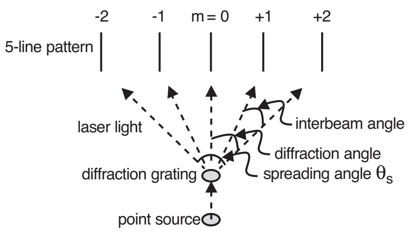
Custom elements are also available to satisfy a wide range of wavelengths, interbeam angles, number of beams, and structured light patterns. Wavelengths can be between 250 nm and 1550 nm. Interbeam angles vary between 0.05° and 20° (in some case, up to 30°). Contact us for more information.

Diffraction Equation

The following equation is used to calculate the diffraction angle of the pattern (lines or dots).

$$d(\sin \theta m) = m\lambda \text{ or } \theta m = \arcsin\left(\frac{m\lambda}{d}\right)$$

where d = DOE period (µm)
θm = diffraction angle of the mth beam (°)
λ = wavelength (µm)



Note that θm is the diffraction angle measured from the normal to the mth beam (assuming the incident laser beam is normal to the DOE plane). It is different from the interbeam angle, which is the angle between two neighboring beams (you can calculate the interbeam angle by letting m = 1). The beams (or orders) are numbered starting from the central beam (order 0) with the positive orders on one side (+1, +2, +3...) and the negative orders on the other side (-1, -2, -3...). The spreading angle θs between the two outmost beams (or lines, when a line generating lens is added) is twice the angle of the higher order beam.

For example, for a 5-line pattern at 670 nm with a period d = 25 µm, the spreading angle θs is twice the diffraction angle of the second order beam.

$$\theta s = 2\theta m = 2\theta 2 = 2\arcsin\left(\frac{2 \times 0.670\ \mu m}{25\ \mu m}\right) \qquad \theta s = 6.14°$$

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