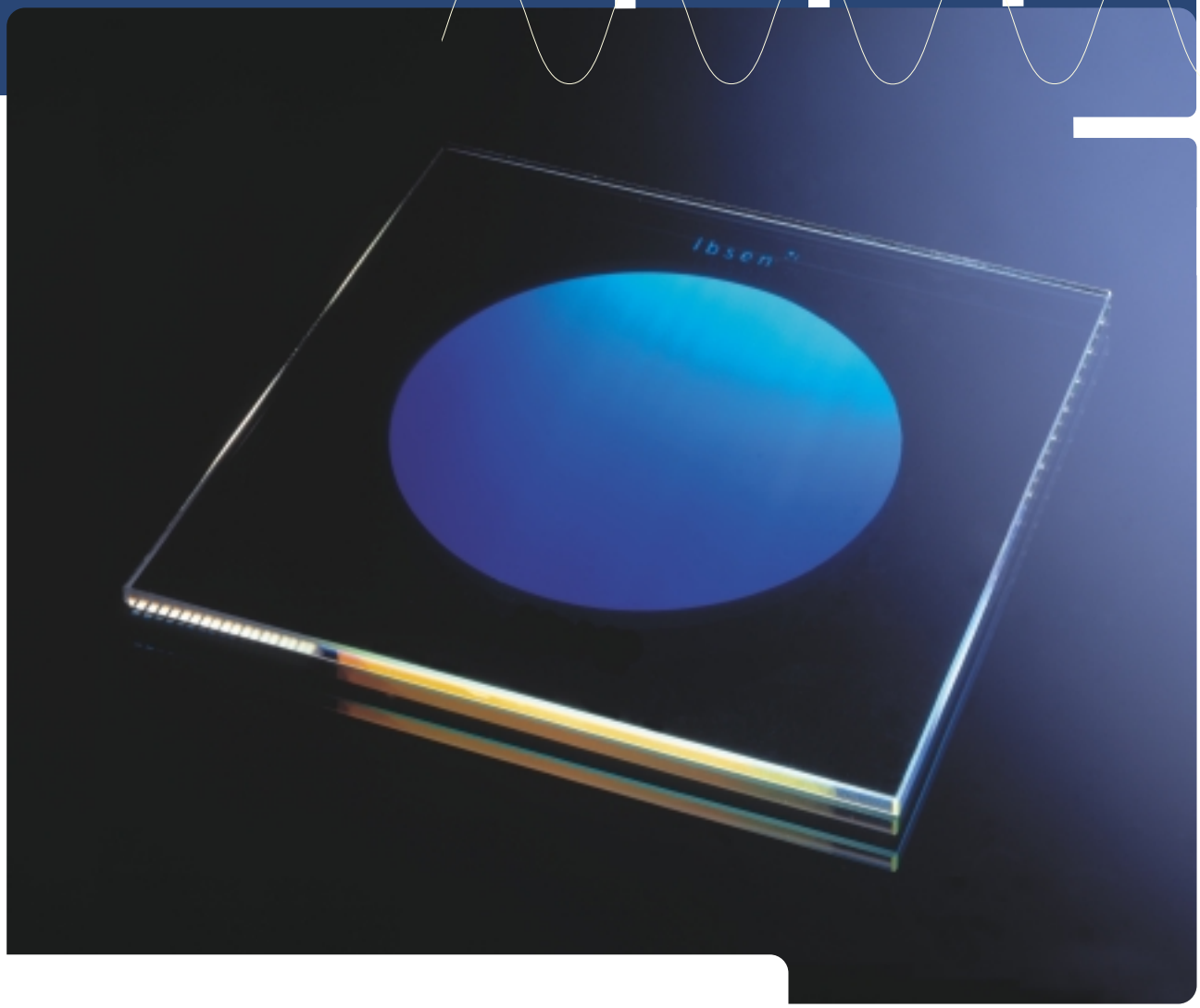


NFH Phase masks

Zero and minus first order principle

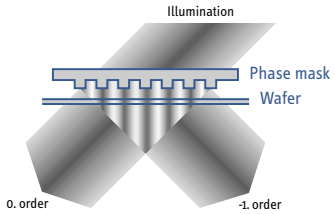
Enabling volume manufacturing of gratings on semiconductor wafers and integrated optics with very low periods down to 200 nm, high accuracy and large grating areas.

Holographically produced NFH Phase masks combined with a mask aligner provide volume manufacturing of very small grating periods. Ibsen's period accuracy of +/- 0.1 Ångström and large grating areas further enhance customer manufacturing performance and yield. Optional NFH services can kick-start process automation at customers, while clear on-mask identification leads to straightforward handling in a manufacturing environment.

Features
Holographically produced in 100% cleanroom environment
Very low periods down to 200 nm
Period accuracy and uniformity of +/- 0.01 nm
High fringe visibility
Low defect count
Clear on-mask identification

Applications
DFB lasers
DBR lasers
Integrated planar optics
Sensors
Biochips

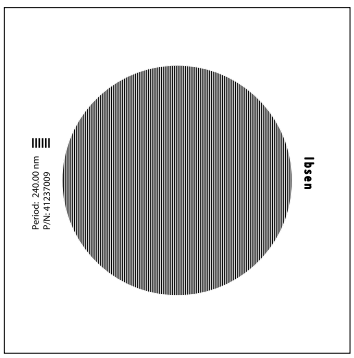
Sheet No. 300220



The principle behind 0/-1 order Phase masks

The 0/-1 order Phase mask is optimized to diffract Bragg angle incident light equally into the zero and minus first orders. Self-interference between the two orders creates an interference pattern with a period equal to the Phase mask period. When the criteria of suitability (below) is fulfilled, the 0/-1 order Phase mask completely eliminates unwanted orders.

Clear on-mask identification



Product Range and Specifications	
Grating periods	200 nm – 600 nm
Illumination wavelengths	193 nm – 435 nm
Material	Fused Silica
Period accuracy	+/- 0.01 nm
Period uniformity	+/- 0.01 nm
Fringe visibility	>98%

Standard Grating and Substrate Sizes	
Grating size	Substrate size
Ø2"	3" x 3" x 2 mm
Customized	5" x 5" x 90 mil

Options

- Custom specifications

Criteria of suitability

In order to ensure a high fringe visibility the zero order and minus first order – and only these two orders – must exist. This can be translated to a necessary relationship between Phase mask period Λ and illumination wavelength λ:

$$\frac{2}{3} \times \Lambda <= \lambda <= 2 \times \Lambda$$

Calculation of Bragg angle: $\text{Sin}\ \Theta_B = \lambda/(2 \times \Lambda)$

Ibsen photonics

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