



## Overview

PowerPhotonic's Psuedo Random Intensity Mapping Element (PRIME) beamshapers use a unique freeform direct-write process to fabricate a highly non-uniform surface in fused silica.

These quasi-random optics are designed to impart a well-defined and tightly controlled divergence angle which can range from fractions of a degree up to 10 degrees (FWHM) with potential transmission efficiencies in excess of 99%.

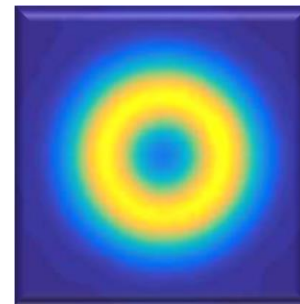
The PRIME beamshapers can be used to create highly arbitrary intensity distributions specific to an application, while remaining highly insensitive to beam alignment and input distribution. Examples include of intensity distributions include annuli, tridents, ramps, skewed Gaussians and more.

## Key Features

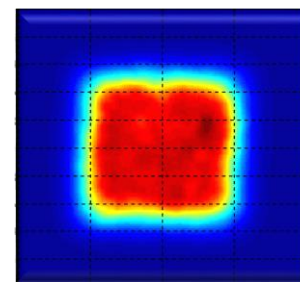
- All fused silica optics
- Customizable divergence ( $<1^\circ$  to  $10^\circ$ )
- Customizable intensity and spatial distributions
- Highly variable edge steepness
- Very low divergences achievable
- Suitable for multi-mode lasers ( $M^2 > 5$ )

## Benefits

- Highest system efficiency possible  $>98\%$
- Dramatic increase in beam uniformity
- High power handling,  $>20\text{kW CW}$
- High laser damage threshold,  $>100\text{J/cm}^2$
- No focal plane shift
- Good through-focus performance
- Insensitive to input beam properties



Gaussian Annulus

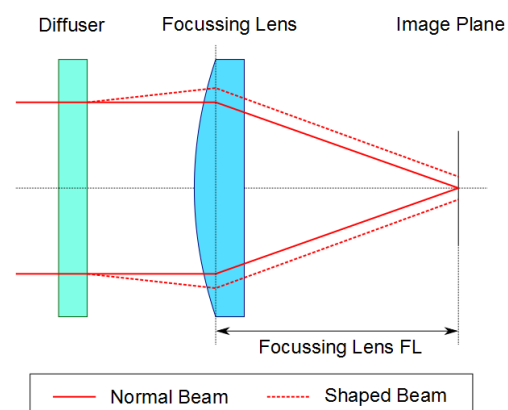


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## Target Applications

- **Materials processing: high power**
  - Regime switch (thin  $\leftrightarrow$  thick) laser cutting
  - Laser peening and slow cool annealing
  - Welding, brazing and cladding
  - Metal polishing
- **Pump beam homogenization**

## How they are Used



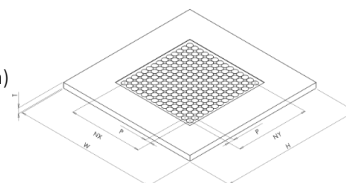
## Standard Product Selection – PRIME Beamshaper

| Part Number        | Divergence Angle (FWHM - Degrees) | Shape*   | Clear Aperture H (mm) | Clear Aperture W (mm) | Height H (mm) | Width H (mm) | Thickness T (mm) |
|--------------------|-----------------------------------|----------|-----------------------|-----------------------|---------------|--------------|------------------|
| PP-PRIME-CI-D10-V1 | 1.00                              | Circular | 15.0                  | 15.0                  | 25.40         | 25.40        | 1.00             |
| PP-PRIME-CI-D30-V1 | 3.00                              | Circular | 15.0                  | 15.0                  | 25.40         | 25.40        | 1.00             |
| PP-PRIME-CI-D70-V1 | 7.00                              | Circular | 15.0                  | 15.0                  | 25.40         | 25.40        | 1.00             |
| PP-PRIME-XX-DXX-V1 | Custom                            | Custom   | Custom                | Custom                | Custom        | Custom       | Custom           |

\*Image shape can be specified as Circular = CI, Square = SQ, Annular – AN  
For custom image shapes please contact PowerPhotonic

Optical coating on request at extra cost  
All custom parameters can be customer specified




W: Width (+/-0.10mm)  
H: Height (+/- 0.10mm)  
T: Thickness (+/- 0.02mm)



## Customization Program

Due to the unique nature of the PowerPhotonic manufacturing process, our standard products can be easily modified to meet specific requirements. Please contact PowerPhotonic for additional information.

## Options

-  Clear Aperture Width and Height
-  Substrate Width, Height and Thickness
-  Divergence Angle

## About Us

PowerPhotonic is a global leader in precision micro-optics products. Our business was founded with the objective of providing unsurpassed excellence in all aspects of design and manufacture of micro-optics for optical and laser applications. Our world-class design skills are supported by an innovative and flexible manufacturing process that allows the company to design both a broad range of state-of-the art standard micro-optics products and uniquely, to offer a low cost and rapid fabrication service for creating completely freeform optical surfaces

## For Sales and Technical Support

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**PowerPhotonic**  
Enhancing Beam Performance

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