

# Variable Beam Shaper

## Overview:

The PowerPhotonic Variable Beam Shaper is an advanced refractive optical element engineered to transform a single mode Gaussian beam into one of three different output profiles. The output profiles are (i) a Gaussian spot; (ii) a flat top circular spot; (iii) a ring shaped spot. The different output profiles are generated simply and only by varying the input beam diameter. Furthermore, the tuning of the output profile is continuous as the input beam diameter is varied between its minimum and maximum limits.

The Variable Beam Shaper enables users to achieve dynamic beam shaping in their application. This is particularly relevant to industrial laser processes such as laser welding and laser additive manufacturing.

Dynamic beam shaping allows a new level of process enhancements and benefits to be realised. Existing techniques for dynamic beam shaping involve complex and expensive laser systems, or at the very least, complex and expensive laser processing heads.

The Variable Beam Shaper is made from fused silica and inherits the high power handling capabilities (pulsed and CW) of other PowerPhotonic optics.

## The PowerPhotonic Effect:

**>5:1**

Extinction ratio  
(ring to centre spot output)

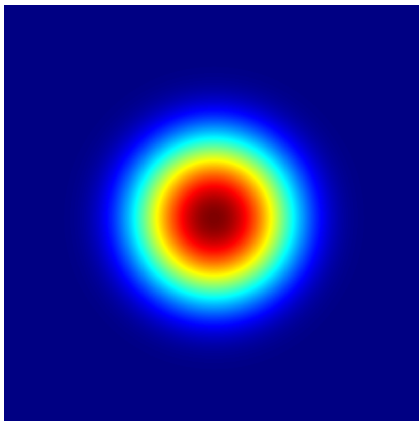
**>0.7**

Flat top flatness factor  
(flat top output)

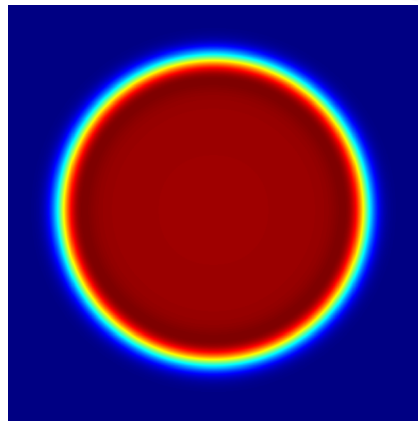
**0.5J/cm<sup>2</sup>**

LIDT at 1030nm, 500fs Pulse  
Duration and 50kHz Rep Rate

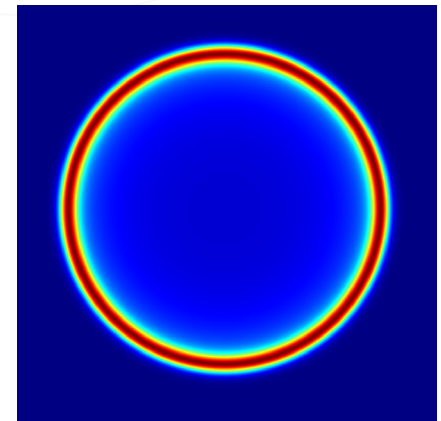
## Output Profile:



$d=D_{\min}$



$d=D_{\text{intermediate}}$



$d=D_{\max}$

## Key Features:

- Variable output profile, tunable with input beam diameter
- High shaping conversion efficiency
- High Power Handling for CW and Pulsed Lasers

## Target Applications:

- Laser Welding
- Laser Additive Manufacturing
- Laser Surface Treatment

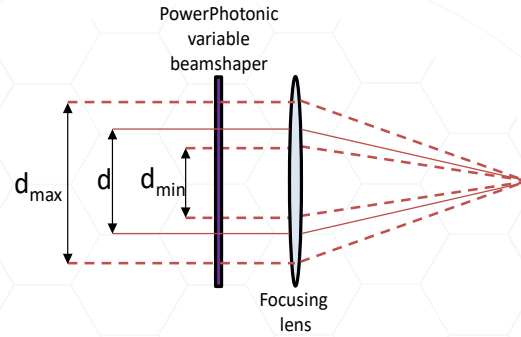


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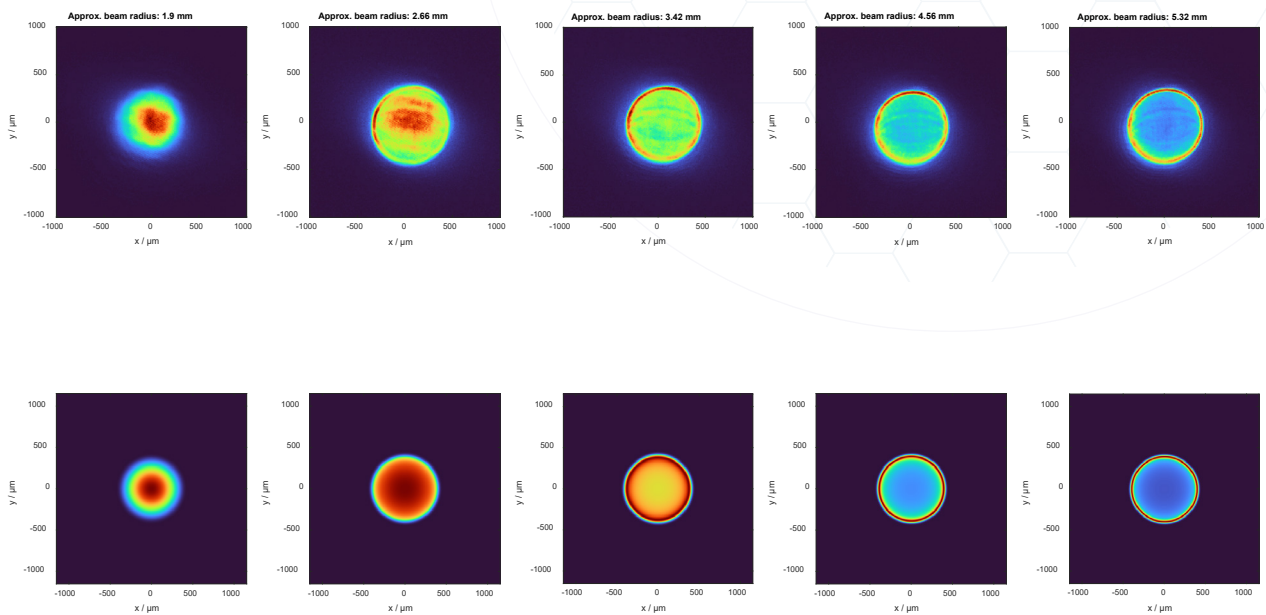
## Typical Part Specifications

Parameter	Selectable Value
Wavelength Options	400 - 1300nm
Input Beam Diameter Range ( $1/e^2$ )	2 to 8mm
Input Beam	single mode
Operation	fs-ps-ns- $\mu$ s-ms-CW

## Typical System Set Up



## Measured & modelled performance:



Other variable output spot configurations are available. These include a trident spot, where the ratio of power in the central spot to the power in the ring varies as a function of input beam diameter.

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