

Bessel Beam Generator

Overview:

The PowerPhotonic Bessel Beam Generator is an advanced refractive optical element engineered to transform a single mode Gaussian beam into a Bessel beam. The Bessel beam it produces has a flattened intensity profile in the direction of propagation. When paired with customer-supplied de-magnification optics, this provides high performance laser processing of glass and other transparent materials.

By generating a uniform intensity profile as the light propagates, the PowerPhotonic Bessel Beam Generator ensures a consistent interaction with materials. For transparent material processing, the uniform profile improves the efficiency of non-linear processing, yielding precise cuts and modifications.

For glass cleaving, the flattened Bessel beam's extended focal range produces clean and controlled modifications. It also offers high power handling, which leads to increased processing speeds and higher cleave quality. The PowerPhotonic Bessel Beam Generator has the added advantage of wavelength flexibility due to its refractive design.

The PowerPhotonic Effect:

>95%

Conversion Efficiency

>0.9

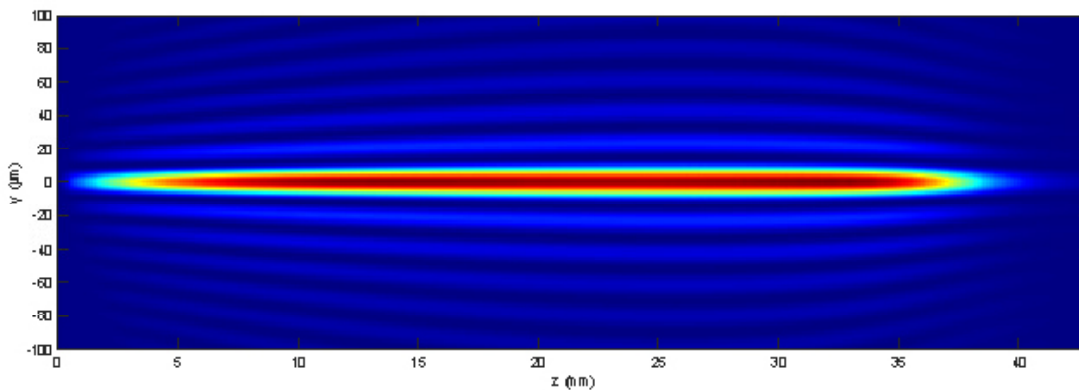
Flatness Factor

As defined in ISO 13694:2019

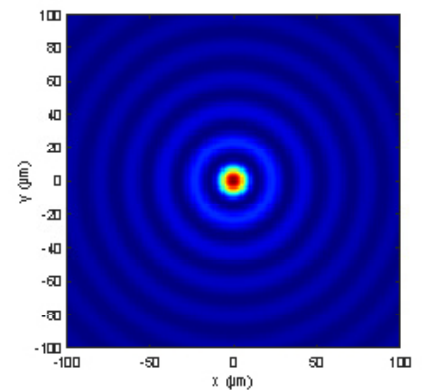
0.5J/cm²

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

Output Profiles:



Intensity Profile of Bessel beam along propagation direction



Profile at Z=25mm

Key Features:

- Flattened Intensity Profile along propagation direction
- High Aspect Ratio of Central Lobe Size to Beam Length
- High Power Handling for CW and Pulsed Lasers

Target Applications:

- Laser Glass Cleaving
- Transparent Material Processing
- Medical Imaging

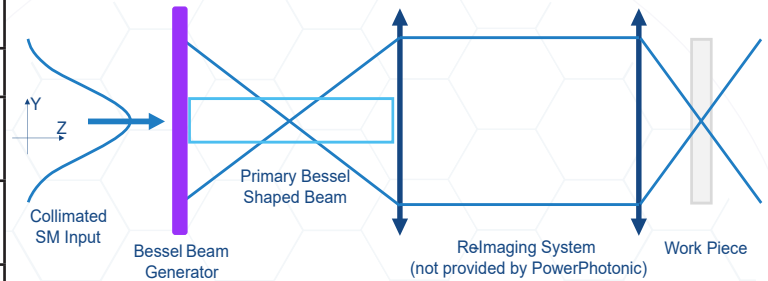


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Product code PP-SM-BSL-1031-V1-AR

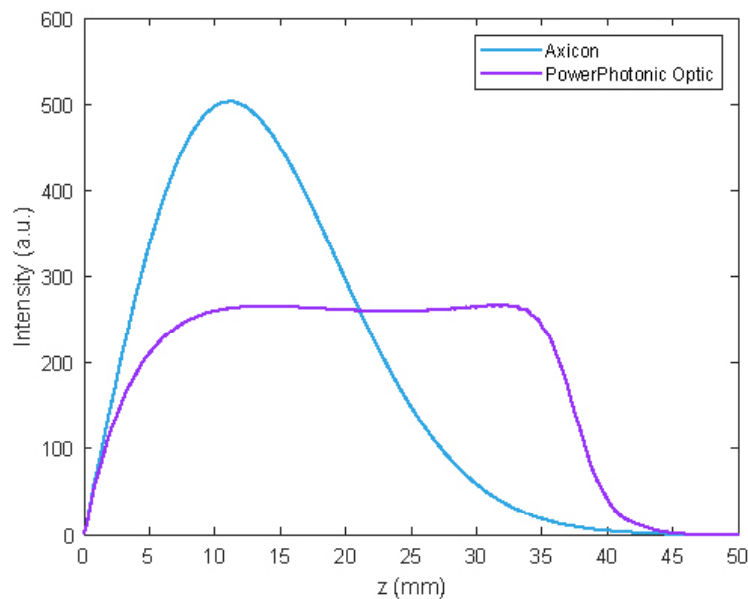
Parameter	Selectable Value
Design Wavelength	1030 nm
Input Beam Diameter	4mm
Primary Bessel Beam Length	160 mm
Primary Central Lobe FWHM	<40 μm
Coating (Each Side)	R<0.25%

Typical System Set Up



Other Bessel beam lengths and lobe sizes can be generated by demagnifying the system. Bessel Beam length will be reduced by the magnification squared. Central Lobe Size will be reduced by the magnification of the de-magnification system.

Axicon Comparison:



Bessel beams generated with a conventional axicon have a peaked axial intensity profile, resulting in non-uniform material interactions. The PowerPhotonic Bessel Beam Generator produces a uniform axial profile resulting in homogenous processing in the propagation direction.

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PowerPhotonic
Enhancing Beam Performance