CANUNDA PULSE

SPECIFICATION SHEET

High quality beam shaper for ultra fast lasers

CANUNDA-PULSE

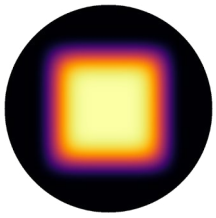
CANUNDA-PULSE main features:

- Optimum beam shaping quality
- Extended depth of field
- Preservation of pulse duration
- Passive beam stabilization through mode-cleaning
- Compatible with standard industry optical equipment

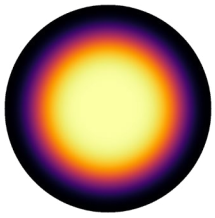
Main applications:

- Laser cutting
- Micro-drilling
- Surface functionalization
- Thin film laser ablation
- Femtosecond laser stabilization

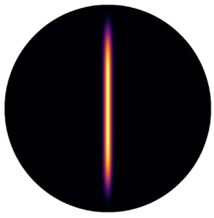
For now, 4 modules are available:



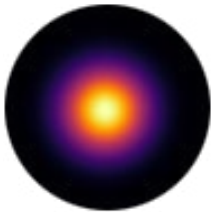
Square
top-hat



Round
top-hat



Line
top-hat



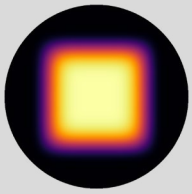
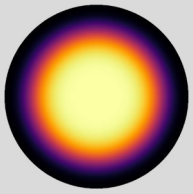
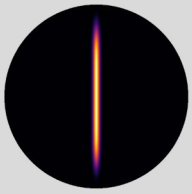
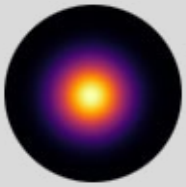
Mode cleaning
only

CANUNDA-PULSE beam shaping modules provide high-quality ultrashort laser beam shaping: micrometer-sized dimensions in the machining plane, exceptional depths of field equivalent to a Gaussian beam, and sharpness at the diffraction limit. This quality of beam shaping improves the quality (e.g. conicity) and efficiency of micromachining processes.

Using its mode-cleaning feature, CANUNDA-PULSE passively compensates for laser fluctuations and ensures that the laser is always stable in the processing plane.

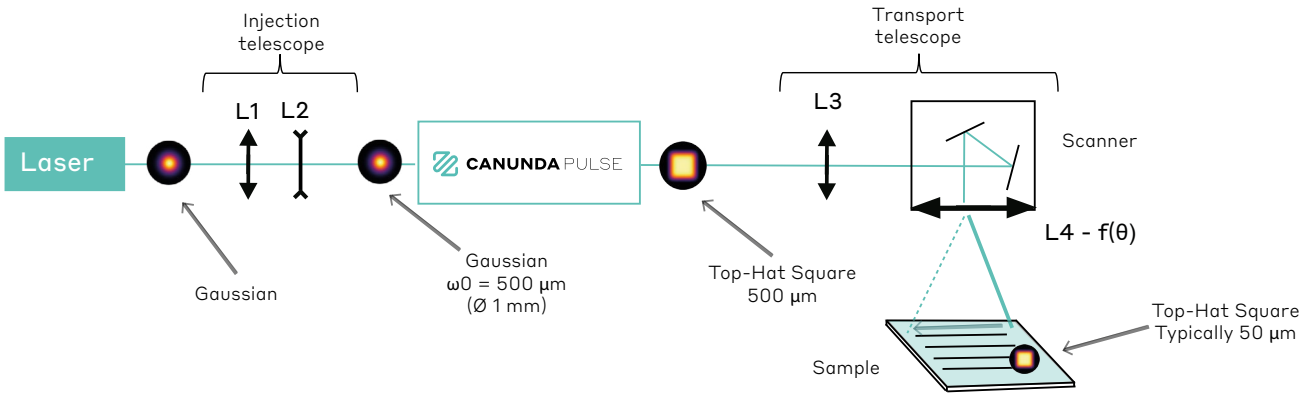
The fully reflective architecture of the modules allows high peak power, up to 100 µJ for femtosecond pulses. The CANUNDA-PULSE modules can be easily integrated into micromachining machines and have been proven to maintain their performance over the full field of view of an F-theta lens.

Specifications

PARAMETER	S-03501	S-01001	R-03501	R-01001	L-01002	G-00003
Shape	 Square top-hat		 Round top-hat		 Line top-hat	 Gaussian (Mode cleaning only)
Output shape dimensions (±10%)	500 x 500 µm²		500 µm diameter		3500 x 180 µm²	500 µm waist
Sharpness (±0.05)	0.33	0.10	0.33	0.10	0.1	N/A
Plateau Uniformity (ISO 13694-2018)	< 0.2					N/A
Transmission with TEM00 input	> 90 %					
Nominal input beam waist	500 µm					
Nominal input M²	< 1.3					
Tilt stability	Output stable with tilt < 0.35 mrad					
Transmission with tilt	> 70 % with tilt < 0.35 mrad					
Shift stability	Output stable with shift < 250 µm					
Transmission with shift	> 70% with shift < 250 µm					
Size stability	Output stable with input beam size < 2x smaller or bigger					
Transmission with size variation	> 60% with input beam size < 2x smaller or bigger					
Central wavelength	1030 nm or 1064 nm					
Pulse duration	300 fs (typical)					
Pulse energy	< 100 µJ @ 300 fs					
Average power	< 100 W					
Module dimensions	350 x 150 x 70 mm³					

Possible use configurations

In order to perform micro-processing with a USP (ultra-short pulse) laser, the following configuration may be used (all details of lens choice and tuning are given in the installation procedure):



The injection telescope aims at magnifying the beam waist to 500 µm and adjusting its position to the module. The transport telescope aims at imaging the top-hat beam onto the sample through a standard F-theta lens.

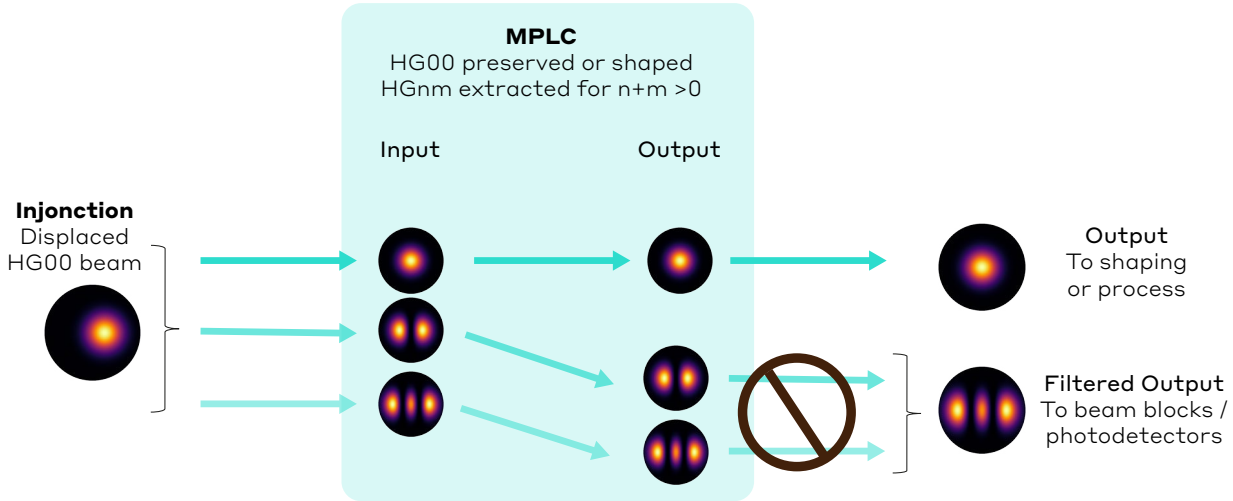
Many dimensions onto the sample are possible depending on the set-up to be used, some are given in the below table, other possibilities might be advised by Cailabs on request:

Square / Round dimensions (µm)		F-theta focal length (mm)				
		50	80	100	160	250
L3 focal length (mm)	500	50	80	100	160	250
	750	33	53	67	107	167
	1000	25	40	50	80	125

Line length/width (µm)		F-theta focal length (mm)				
		50	80	100	160	250
L3 focal length (mm)	500	350/18	560/29	700/36	1120/58	1750/90
	750	230/12	375/19	470/24	750/39	1170/60
	1000	175/9	280/14	350/18	560/29	875/45

Principle of mode-cleaning

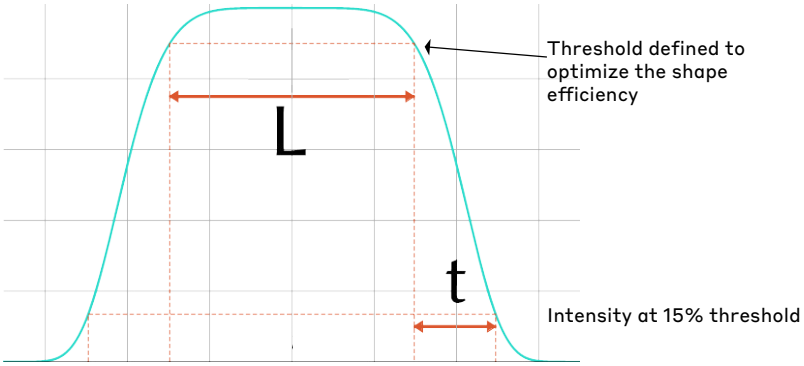
The mode cleaning feature is a passive laser beam stabilizer that procures a unique solution against the various fluctuations of single mode laser beams, such as tilt, shift or astigmatism. It efficiently suppresses beam instabilities and provides a perfect and steady Gaussian or top-hat beam. This allows for more reliable and robust industrial processes where precision is crucial.



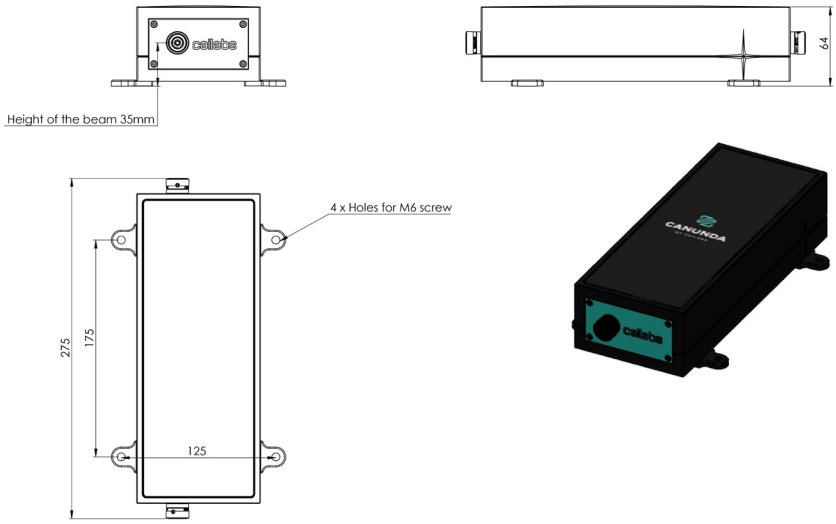
Top-hat shape characteristics

The shape quality is given by the following metrics:

- Plateau Uniformity : per ISO standard 13694-2018.
- Shape Efficiency: the maximum ratio between the energy contained in an ideal 3D shape (cuboid, cylinder ...) inscribed in the beam shape and the total energy of the beam shape.
- Dimensions L: the dimensions of the base surface of the inscribed 3D shape used in the computation of the Shape Efficiency.
- Sharpness: the t/L ratio as defined in the below scheme



Physical dimensions



Ordering information

- CAPU-X-YYYYY-ZZZZ
- X-YYYYY: Shape code
  - X: S – Square ; R – Round ; L- Line ; G – Gaussian
  - YYYYY : 03501 – Sharpness of 0.35 ; 03501 – sharpness of 0.10 ; 01002 of 180 µm x 3600 µm ; 0.003 6-modes mode-cleaner
- ZZZZ: Central wavelength - 1030 or 1064 (nm)

cailabs
SHAPING THE LIGHT

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