



ILLUMINATION

Flat Top Projector

FEATURES

- Very efficient all glass optics
- Achromatic (from UV to near IR)
- Very smooth low ripple uniformity profile with no high frequency noise
- Uniformity coefficient of variation of better than 1% achievable
- High aspect ratios available off the shelf
- High uniformity edge steepness

APPLICATIONS

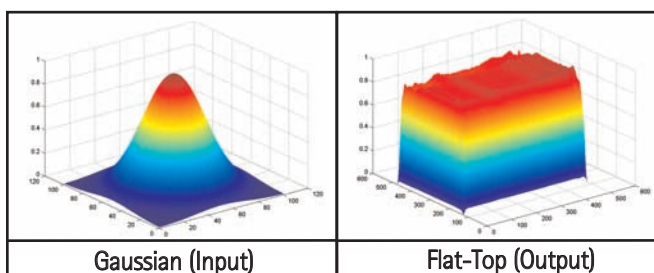
- Flow cytometry
- Confocal microscopy
- DNA sequencing
- LIF & Scattering
- Imaging
- Microscopy
- Micromachining
- Biohazards
- Semiconductor
- Analytics
- Lithography
- Spectroscopy
- CTP



GAUSSIAN TO FLAT-TOP USING REFRACTIVE BEAM SHAPING OPTICS

StockerYale's Flat Top Projector provides true flat top performance with no compromise. It offers very smooth spatial variations with very low ripple, unlike other technologies that use overlapping creating unwanted high frequency interference noise.

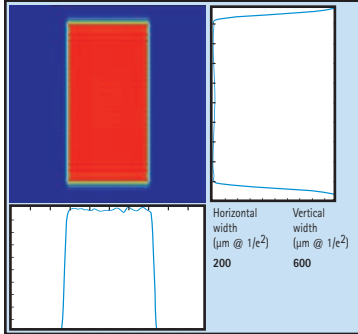
In combination with conventional optics and StockerYale's vast array of beam splitting DOEs a wide variety of patterns can be projected very efficiently. The flat top optics is all glass with losses due to reflections only. Using AR coatings, efficiencies of over 98% can be achieved giving you all the power where you want it.



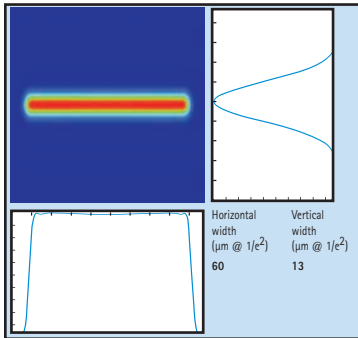
StockerYale

OPTIONS

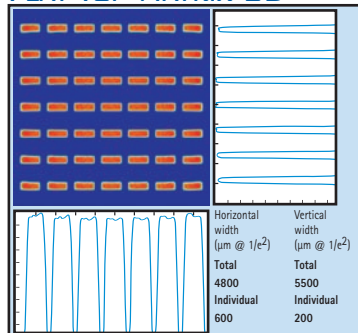
FLAT-TOP 2D



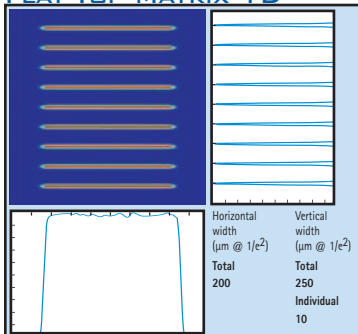
FLAT-TOP 1D



FLAT-TOP MATRIX 2D



FLAT-TOP MATRIX 1D



FLAT TOP OPTIONS

The flat top is a diverging optical element that provides a uniform intensity profile in the far field. It can be imaged or offered simply as a diverging optical element.

Being cylinder based, it can be readily offered acting on only one axis or crossed pairs creating the desired aspect ratio for your application.

The dimension of the flat top at the focal plane of an imaging lens, f , is directly proportional to its effective focal length and can be calculated by:

$$FTS \text{ (flat top size)} = 2 * \tan\left(\frac{DIVERGENCE}{2}\right) * f$$

The flat top can be further enhanced by adding StockerYale series of binary phase beam splitters to create a complex array of flat tops. The beam splitters are highly stable binary masters etched directly in fused silica offering very low stray light. They have excellent beam to beam uniformity and have efficiencies in the order of 80%.

AVAILABLE DIVERGENCES FOR 1 OR 2 DIMENSIONAL DIVERGING FLAT TOPS

DIVERGENCES
0.2
0.3
0.6
1
2
3
5
8
10
15
20
30

AVAILABLE FOCAL LENGTHS FOR THE IMAGED FLAT TOPS OPTION

FOCAL LENGTH
14
17.5
20
25
30
35
40
45
50
60
75
80
90
100

Note: working distance will be a few mm shorter

GRATINGS FOR BEAM SPLITTING OPTION:

2 Beams:	3.33 um, 7.77 um, (zero order minimized) 26.3 um, 338.6 um
3 Beams:	3.33 um, 7.77 um, 26.3 um, 338.6 um
5 Beams:	25 um, 169 um
9 Beams:	338.2 um, 532 um
11 Beams:	25.7 um
15 Beams:	16.4 um
19 Beams:	50 um
33 Beams:	110 um, 426.1 um
99 Beams:	260 um

The angle between each beam is operating wavelength dependent and can be found via the grating formula:

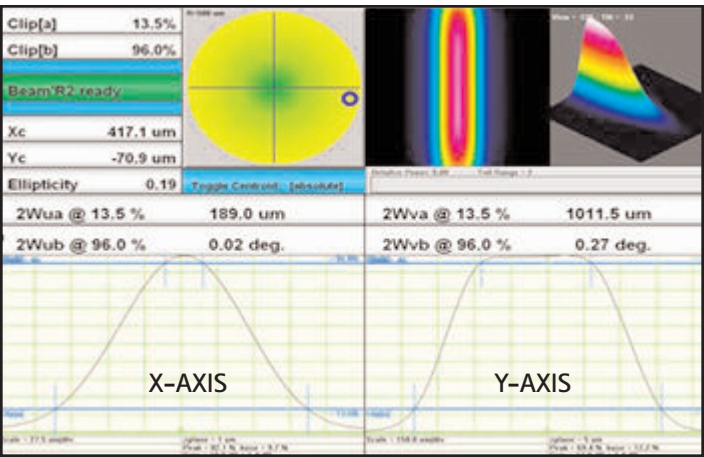
$$d \sin \theta = n \lambda$$

(d=period in um, θ angle in degrees, n = diffraction order, 0, +/-1, +/- 2,)

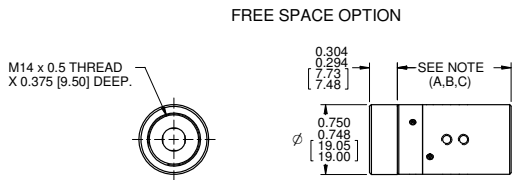
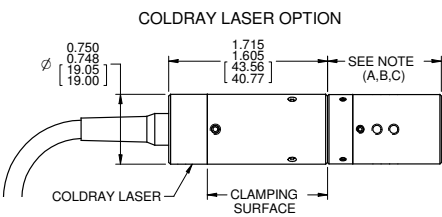
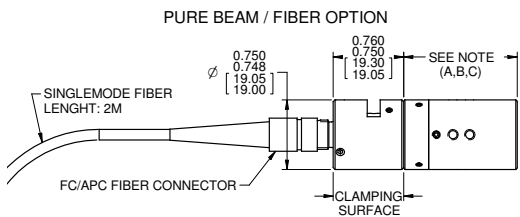
FLOW CYTOMETRY OPTION:

StockerYale has been very successful in promoting its flat top for flow cytometry applications. Our standard flow cytometry option is available with the following specifications:

Working distance:	45 mm
Flat top dimension:	60 um @ 1/e2
Gaussian dimension:	10 um @ 1/e2
CV under 1% fiber coupled, under 1.5% free space	
Contained power in the order of 40%	



DIMENSIONAL DIAGRAMS



NOTE: (A) ADD 1.220 +0.010/-0.010 [31.0 +0.25/-0.25] FOR DIVERGING FLAT-TOP (1D AND 2D)
(B) ADD 3.480 +0.020/-0.020 [88.4 +0.50/-0.50] FOR FLOW CYTOMETRY FLAT-TOP
(C) ADD 0.890 +0.005/-0.005 [22.6 +0.12/-0.12] FOR FOCUSED FLAT-TOP

in [mm]

ORDERING PARAMETERS

To order, choose: Input type - Flat Top Type - Beam Splitter Type. E.g., PUR-660-50-DFT-0.3°x0.6°

INPUT TYPE

Purebeam Laser Option: StockerYale TEC fiber coupled single mode laser

Order code: go to www.stockeryale.com/i/lasers/products/purebeam.htm

(i.e. PB-640-80)

ColdRay Laser Option: StockerYale TEC Direct Semiconductor free space laser

Order Code: go to www.stockeryale.com/i/lasers/products/coldray.htm

(i.e. CR-640-80)

Free space option: M14 threaded holder

Requires Input beam dimension (IBD): 0.5 mm up to 6 mm Gaussian @ 1/e²

Order Code: FS-IBD

(i.e. FS-6)

Fiber option: FC/PC input end, 2 meters shielded, NA:0.12,FC/APC exit end.

Requires operating wavelength between 405-830 nm

Order CODE: FIB-Operating wavelength

(i.e. FIB-640)

FLAT TOP TYPE

One Dimensional Diverging Flat Top

Order Code: 1DDFT-divergence

(ie. 1DDFT-0.3)

Two Dimensional Diverging Flat Top

Order Code: 2DDFT-divergence 1 x divergence 2

(ie. 2DDFT-0.3x2)

Imaged Flat Top

Order Code: FFT-divergence 1 x divergence 2 - focal length

(ie. FFT-0.3°x2°-F50)

BEAM SPLITTER TYPE

Order Code: Number of Beams- Period

(ie. 19B-50um)

For the flow cytometry option, please contact a StockerYale Application Engineer at 1-800-814-9552



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