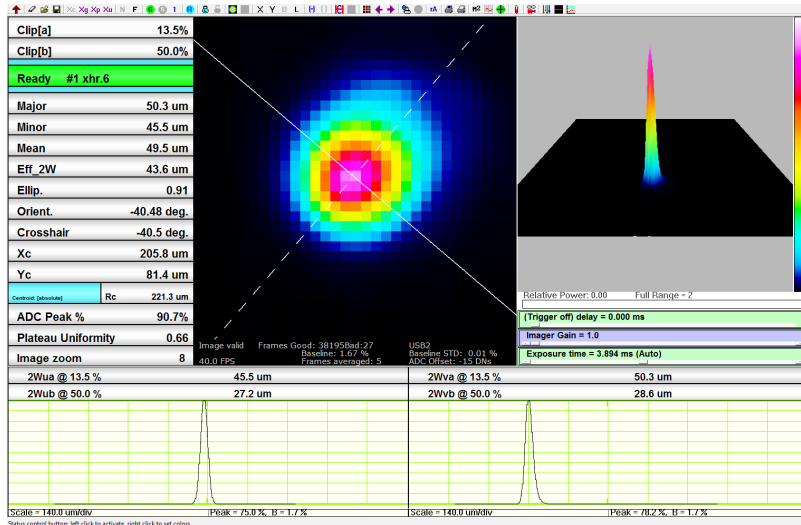# BladeCam
½" CMOS Beam Profiling Camera, Ultra Compact, 190 – 1610* nm

With pixel size to 3.2 µm the high resolution and highly compact BladeCam™ beam profilers have a thickness of only 0.65" (16.5 mm) for insertion into tight optical trains and OEM applications.

S-BC-XHR High Resolution beam profiling
Image of a 675 nm beam, 50 µm diameter
The advantage of 3.2 µm square pixels is clearly seen

The BladeCam™ is paired with DataRay's full-featured, highly customizable, user-centric software which has no license fees, unlimited installations, and free software updates. It is perfect for applications including: CW laser profiling; field servicing of laser systems; optical assembly; instrument alignment; beam wander and logging; R&D; OEM integration; quality control; and M² measurement with available M2DU stage.

BladeCam-XHR/HR
1.8 x .1.8 x 0.65" (with ND filter)
45.72 x 45.72 x 16.5 mm

System Features

- 355 to 1150 nm, CMOS detector, 190 -1610 nm options
- 3.2/1.3 MPixel, 2048 x 1536 or 1280 x 1024 pixels, ½" active area
- 3.2/ 5.2 µm pixels
- Port-powered USB 2.0; 3 m cable, no power brick
- **HyperCal™** – Dynamic Noise and Baseline Correction software
- C-Mounted filters ND 1,2&4 with camera, 0.5, 1,2,3,4,5 options
- Multiple Cameras 1-8
- ISO 11146 compliant
- RoHS, WEE and CE Certified
- 1000:1 Signal to RMS Noise
- Rolling shutter (not suitable for pulsed lasers)
- Electronic auto-shutter, 162 µs to 1 sec 38dB
- 10-bit ADC
- Field-replaceable image sensors
- Window-free sensors standard for no fringing
- M² option – beam propagation analysis, divergence, focus
- 50 mm and 200 mm stage lengths for a wide range of Raleigh ranges

Applications

- **CW & High Rep. Rate Pulsed** laser profiling
- Field servicing of lasers and laser-based systems
- Optical assembly & instrument alignment
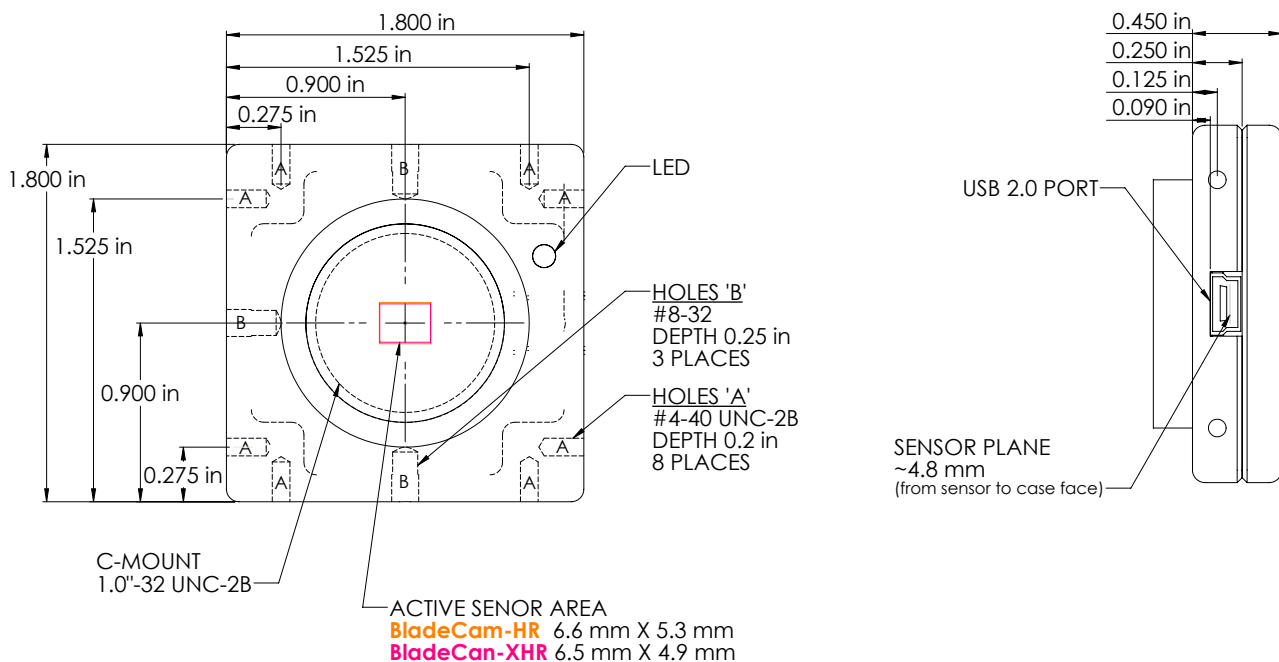- Beam wander & logging
- **M²** Measurements

Additional Software Features

- XY profiles and centroids
- Linear and logarithmic displays
- Gaussian and Top Hat least squares fits
- Ellipse Angle, Major, Minor, Mean Diameters
- ISO 11146 compliant

- Background capture and subtraction
- Image & Intensity Zoom
- Linear and area filters
- Image Averaging, 1 to continuous
- Proprietary HyperCal™ Dynamic Noise and Baseline Correction

BladeCam Series Model Specifications:

BladeCam™	BC-XHR/HR-UV	BC-XHR/HR	BC-XHR/HR -1310	BC-HR-TEL
Pixel Count &	3.2/ 1.3 M Pixel	3.2/ 1.3 M Pixel	3.2/ 1.3 M Pixel	3.2/ 1.3 M Pixel
H x V:	2048 x 1536 /1280 x1024	2048 x 1536 /1280 x1024	2048 x 1536 /1280 x1024	264 x 212*
Sensor image area (mm):	6.5 x 4.9 / 6.6 x 5.3	6.5 x 4.9 / 6.6 x 5.3	6.5 x 4.9 / 6.6 x 5.3	6.6 x 5.3
Pixel dimension (µm):	3.2^2 / x 5.2^2	3.2^2 / x 5.2^2	3.2^2 / x 5.2^2	~25 x 25*
Min. beam (10 pixels):	32 / 52 µm	32 / 52 µm	32 / 52 µm	250 µm
Wavelength Range:	190-1100 nm	355-1100 nm	355-1350 nm	1480-1610 nm
Shutter type:	Rolling	Rolling	Rolling	Rolling
Max Frame rate:	> 10 Hz	> 10 Hz	> 10 Hz	> 10 Hz
Max. 'every pulse' PRR:	=	Not suitable for pulse capture	=	=
Single pulse capture PRR:	=	Not suitable for pulse capture	=	=
Signal to RMS Noise:	1,000:1 (30/60 dB)	1,000:1 (30/60* dB)	1,000:1 (30/60* dB)	1,000:1 (30/60* dB)
Electronic Shutter	162 µs to 1s	162 µs to 1s	162 µs to 1s	162 µs to 1s
Dynamic Range:	38 dB	38 dB	38 dB	38 dB
ADC:	10 bit	10 bit	10 bit	10 bit
Interface:	USB 2.0	USB 2.0	USB 2.0	USB 2.0

* Effective size due to phosphor

1.800 in
1.525 in
0.900 in
0.275 in
1.800 in
1.525 in
0.900 in
0.275 in

LED

HOLES 'B'
#8-32
DEPTH 0.25 in
3 PLACES

HOLES 'A'
#4-40 UNC-2B
DEPTH 0.2 in
8 PLACES

C-MOUNT
1.0''-32 UNC-2B

ACTIVE SENOR AREA
BladeCam-HR 6.6 mm X 5.3 mm
BladeCan-XHR 6.5 mm X 4.9 mm

0.450 in
0.250 in
0.125 in
0.090 in

USB 2.0 PORT

SENSOR PLANE
~4.8 mm
(from sensor to case face)

Founded in 1988, DataRay is the worldwide leader in beam profiling and analysis, delivering innovative, high-quality, affordable, and reliable instrumentation to the photonics industry. Product lines include beam profiling cameras (163 nm to 16 µm, model-dependent), and scanning slit beam profilers (190 nm to 3.9 µm, model-dependent).

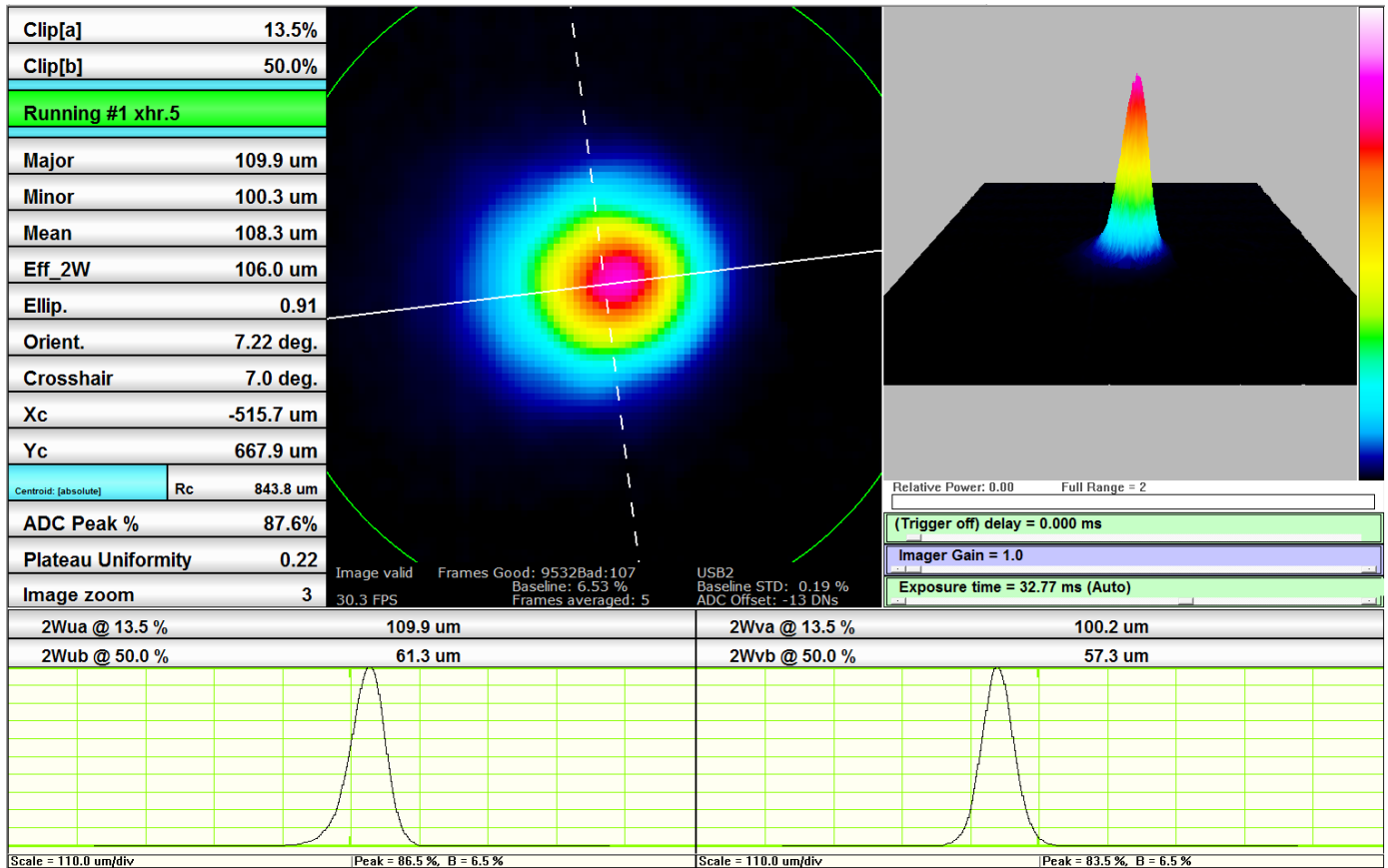# S-BC-XHR-1310: High Resolution beam profiling to 1350 nm.

Clip[a]	13.5%
Clip[b]	50.0%
Running #1 xhr.5	
Major	109.9 um
Minor	100.3 um
Mean	108.3 um
Eff_2W	106.0 um
Ellip.	0.91
Orient.	7.22 deg.
Crosshair	7.0 deg.
Xc	-515.7 um
Yc	667.9 um
Centroid: [absolute] Rc	843.8 um
ADC Peak %	87.6%
Plateau Uniformity	0.22
Image zoom	3

Relative Power: 0.00   Full Range = 2

(Trigger off) delay = 0.000 ms

Imager Gain = 1.0

Exposure time = 32.77 ms (Auto)

Image valid   Frames Good: 9532 Bad:107   USB2
30.3 FPS   Baseline: 6.53 %   Baseline STD: 0.19 %
                 Frames averaged: 5   ADC Offset: -13 DNs

2Wua @ 13.5 %	109.9 um	2Wva @ 13.5 %	100.2 um
2Wub @ 50.0 %	61.3 um	2Wvb @ 50.0 %	57.3 um

Scale = 110.0 um/div   Peak = 86.5 %, B = 6.5 %   Scale = 110.0 um/div   Peak = 83.5 %, B = 6.5 %

Image of a 1310 nm beam, 100 µm diameter, 1.5 mW. [43 ms Shutter, no ND filter]

WinCam D/1310 Sensitivity Limits (85% of ADC)

Max Beam Power = 100 mW

Exposure τ in ms

Beam Power in mW

For example, to give an 85% saturation level on the ADC:

At 1310 nm, a 100 micron diameter 2 mW beam will require a shutter exposure time τ of ~ 30 ms.

At λ < 1310 nm, τ will be lower.
At λ > 1310 nm, τ will be greater.

Beam 13.5 % Diameter in microns
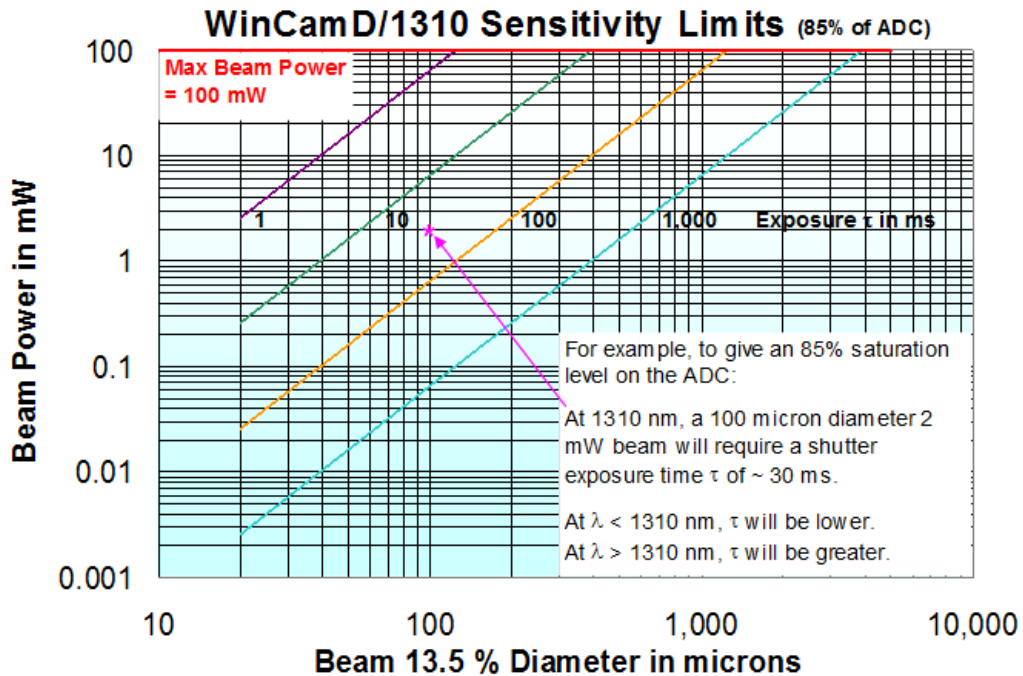
S-BC-HR-TEL: Economical Telecom beam profiling, 1480 to 1610 nm

Clip[a]	13.5%
Clip[b]	50.0%
1550nm_1.8mW_1000um diam.w	
Major	1116.3 um
Minor	1088.5 um
Mean	1111.6 um
Eff_2W	1040.9 um
Ellip.	0.98
Orient.	0.01 deg.
Crosshair	0.0 deg.
Xc	-233.6 um
Yc	-2086.8 um
Centroid: [absolute] Rc	2099.9 um
ADC Peak %	82.5%
Plateau Uniformity	0.12
Image zoom	1

Image valid   Frames Good: 0Bad:0   USB2
Hypercal engaged.   Baseline: 5.59 %   Baseline STD: 0.65 %
9.3 FPS   Frames averaged: 5   ADC Offset: -407 DNs

Relative Power: 0.00   Full Range = 2

2Wua @ 13.5 %	1116.3 um	2Wva @ 13.5 %	1088.5 um
2Wub @ 50.0 %	724.5 um	2Wvb @ 50.0 %	682.7 um

Scale = 400.0 um/div |Peak = 70.4 %, B = 5.6 %
Scale = 400.0 um/div |Peak = 71.9 %, B = 5.6 %

S-BC-HR-TEL for Telecom C & L bands

- 1480 to 1610 nm, IR to visible conversion phosphor on Silicon CMOS
- ≈25 μm FWHM point spread function due to phosphor
- ~20 μW to 100 mW, for 1 mm diam. @1550 nm. (With 0.02% transmission (1550 nm) ND filter e.g. 10 ms exposure on 1 mW, 1 mm diameter beam at 1550 nm.
- Gamma (γ) correction is included in the software.
- Same Ultra-compact case 45 x 45 x 16.5 mm
- USB 2.0
- Comes with 3 ND filters and a LP 1290 blocking filter for best noise reduction performance
- Port powered
- Full featured DataRay software