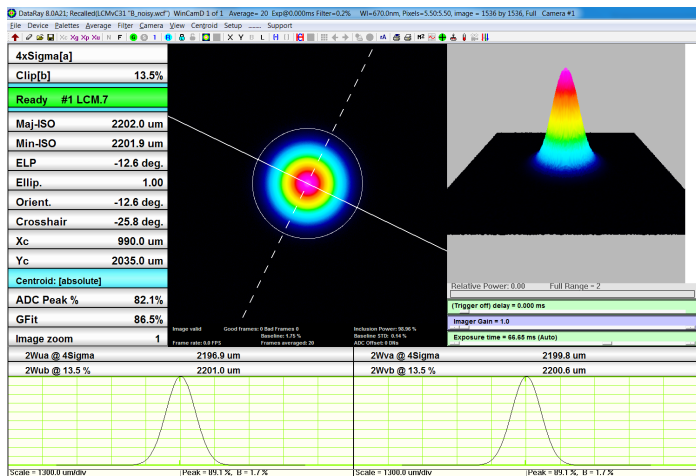


# WinCamD-LCM4

## 1" CMOS Beam Profiling Camera, SuperSpeed USB 3.0, 190 – 1605\* nm

\* model-dependent

With an 11.3 x 11.3 mm active area, 4.2 Mpixels, 5.5 x 5.5  $\mu\text{m}$  pixels, optical and electronic triggering of a global shutter, and an update rate to 60+ Hz, the WinCamD-LCM4 series is ideally suited to both CW and pulsed laser beam profiling. The new high resolution CMOS detector means no comet tailing, and the shutter and trigger options simplify pulse capture.



The WinCamD-LCM4 is paired with DataRay's full-featured software which has no license fees, unlimited installations, and free software updates. It is perfect for applications including: CW and pulsed laser profiling; field servicing of laser systems; optical assembly; instrument alignment; beam wander and logging; R&D; OEM integration; quality control; and  $M^2$  measurement with available M2DU stages.



Shown actual size  
1.8 x 1.8 x 0.8"

### System Features

- 355 to 1150 nm (CMOS), to 190 & to 1605 nm with options
- 4.2 MPixel, 2048 x 2048 pixels, 11.3 x 11.3 mm active area
- 5.5  $\mu\text{m}$  pixels
- 60 fps @ 512 x 512, 30 fps @ 1024 x 1024, 12 fps @ 2048 x 2048
- Port-powered USB 3.0; 3 m cable, no power brick
- HyperCal™** – Dynamic Noise and Baseline Correction software (Pat. Pending)
- New **MagND™** stackable magnetic ND filters or C-mount filters
- 2,500:1 Signal to RMS Noise
- Global shutter with optical and TTL trigger
- Electronic auto-shutter, 85  $\mu\text{s}$  to 2 sec (44 dB)
- 12-bit ADC
- Isolated pulse triggering
- Parallel capture on multiple cameras
- Field-replaceable image sensors
- Relative power level display
- Window-free sensors standard for no fringing
- ISO 11146  $M^2$  option – beam propagation analysis, divergence, focus
- 50 mm and 200 mm stage lengths for a wide range of Raleigh ranges

### Applications

- CW & pulsed laser profiling
- Field servicing of lasers and laser-based systems
- Optical assembly & instrument alignment
- Beam wander & logging
- $M^2$  Measurements

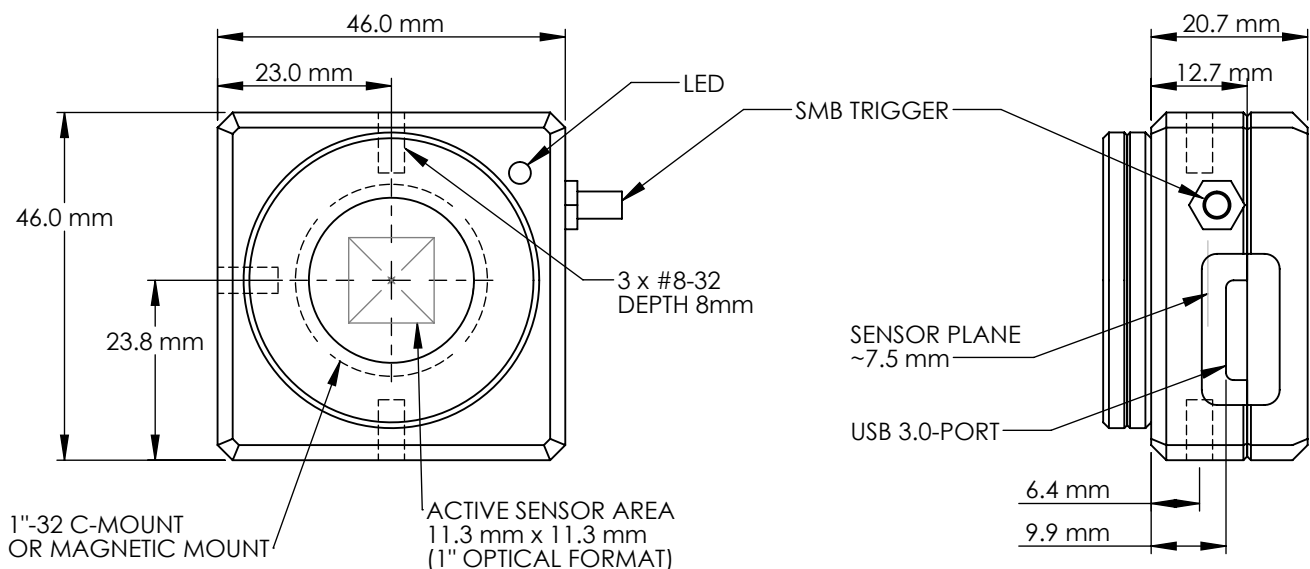
## Additional Software Features

- 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

## WinCamD-LCM4 Series Model Specifications:

Specification	Detail	Notes
Wavelength range:	<b>S-WCD-LCM4-UV:</b> 190-1150 nm <b>S-WCD-LCM4:</b> 355-1150 nm <b>S-WCD-LCM4-1310:</b> 355-1350 nm <b>S-WCD-LCM4-TEL:</b> 1480-1605 nm	Incl. MagND-UV filters (ND 1, 2, 4) Incl. MagND filters: ND 1, 2, 4 Incl. MagND filters (ND 1, 2, 4), 1290 nm long pass filter Incl. MagND filters (ND 1, 2, 4), 1290 nm long pass filter
Image area (mm):	11.3 x 11.3	
Sensor:	1" CMOS	
Resolution:	2048 x 2048	
Pixel count:	4.2 MPixel	
Pixel dimensions (µm):	5.5 x 5.5	S-WCD-LCM4-TEL: effective pixel size is 25 µm
Min. beam (10 pixels):	55 µm	S-WCD-LCM4-TEL: 250 µm
Shutter type:	Global	
Frame rate @ 2048 x 2048:	≥ 12 Hz	
Frame rate @ 1024 x 1024:	≥ 30 Hz	
Frame rate @ 512 x 512:	≥ 60 Hz	
Max. 'every pulse' PRR:	≥ 12.5 Hz	
Single pulse capture max PRR:	USB 3.0: 12.6 kHz USB 2.0: 6.3 kHz	
Signal to RMS Noise:	2,500:1, 34/68 dB opt/ elec.	
Electronic Shutter:	25,000: 1, 85 µs to 2s USB 3.0 12,500:1 158 µs to 2s USB 2.0	
ADC:	12-bit	
Interface:	USB 3.0	

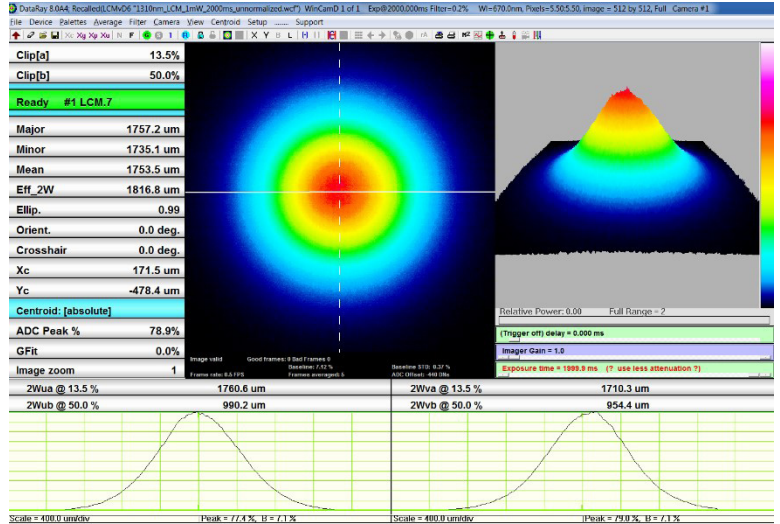
## Outline & Mounting (shown actual size)



# WCD-LCM4-1310: High Resolution Beam Profiling to 1350 nm

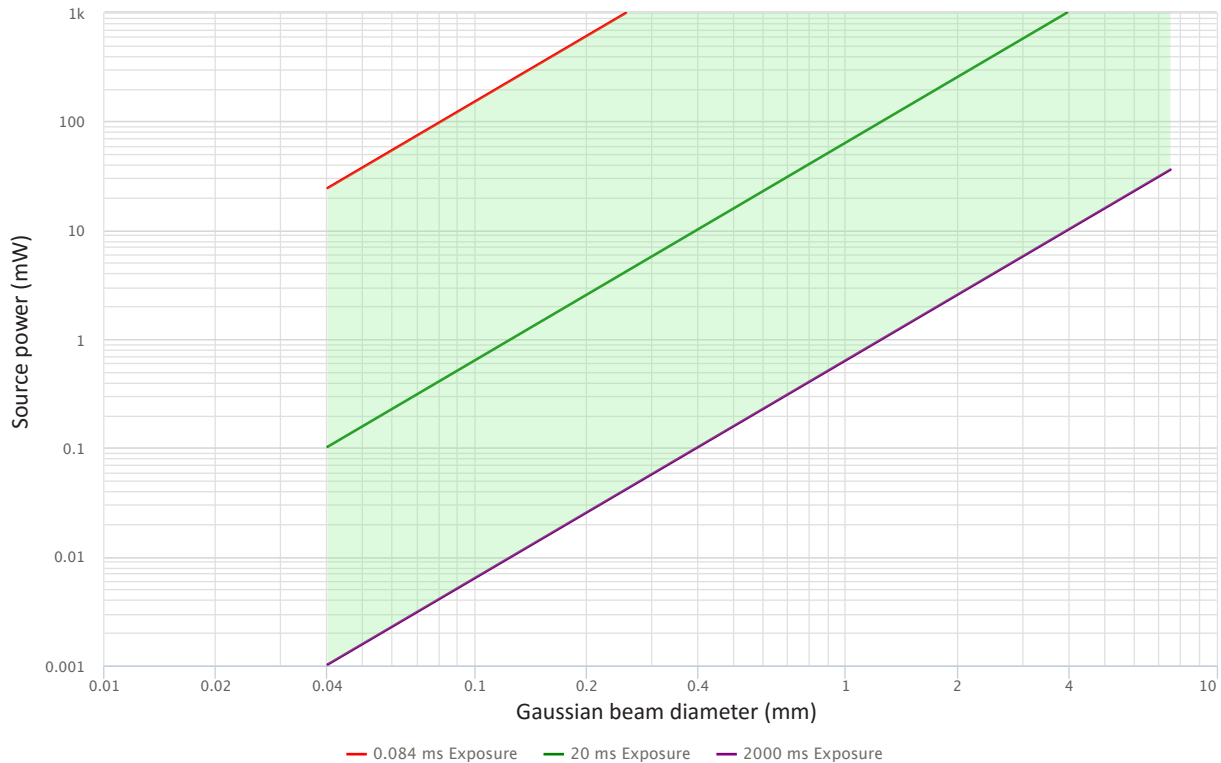
The WinCamD-LCM4-1310 uses proprietary software and electronics in conjunction with sensors that exhibit residual sensitivity at 1310 nm. This is a tailing silicon response, and has been observed out to at least 1350 nm. The effective Quantum Efficiency (QE) in this tailing response is around 0.01%; i.e., a factor of around  $\sim 10^4$  down on the visible response.

Despite the low QE, WCD-LCM4-1310 cameras can be very attractive for 1310 nm region use if the source irradiance is adequate (see chart). The small 5.5 micron square pixels give much higher resolution than standard NIR cameras. The WinCamD shutter exposure of up to 2 sec. is 25 to 30 times greater than that of standard cameras, partially compensating the low 1310 nm sensitivity. The system comes with 3 ND filters, a 1290 nm long pass filter, and housing to limit the field of view and reduce ambient illumination background.



## WinCamD-LCM4-1310: Operating Range at 1310 nm (No ND)

At 1340 nm the required power is around 10x greater. Do not exceed 1 W total.

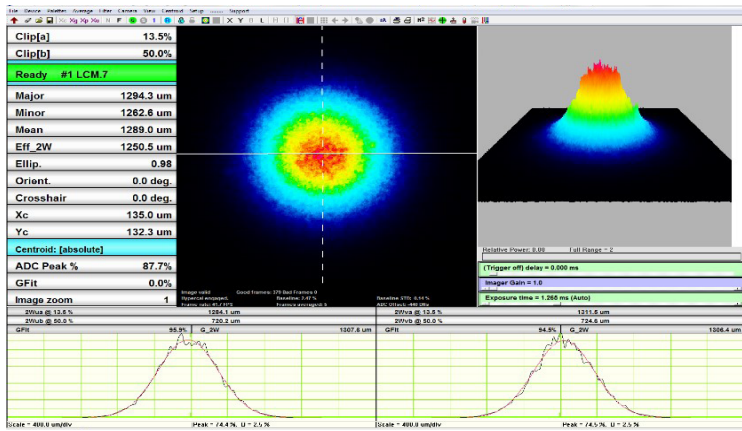


## S-WCD-LCM4-TEL: Economical Telecom Beam Profiling, 1480 to 1605 nm

The WinCamD-LCM4-TEL utilizes a specialized phosphor coating on the detector, converting IR to visible light to produce an economical solution to profiling beams in the Telecom C & L bands. Model WinCamD-LCM4-TEL is a good alternative to expensive InGaAs cameras for the TEL wavelengths 1480-1605 nm. Due to the granular nature of the phosphor coating, the minimum beam size for good accuracy is ~250  $\mu\text{m}$ . The large 1" (11.3 mm x 11.3 mm) sensor is ideal for alignment and large beam measurements.

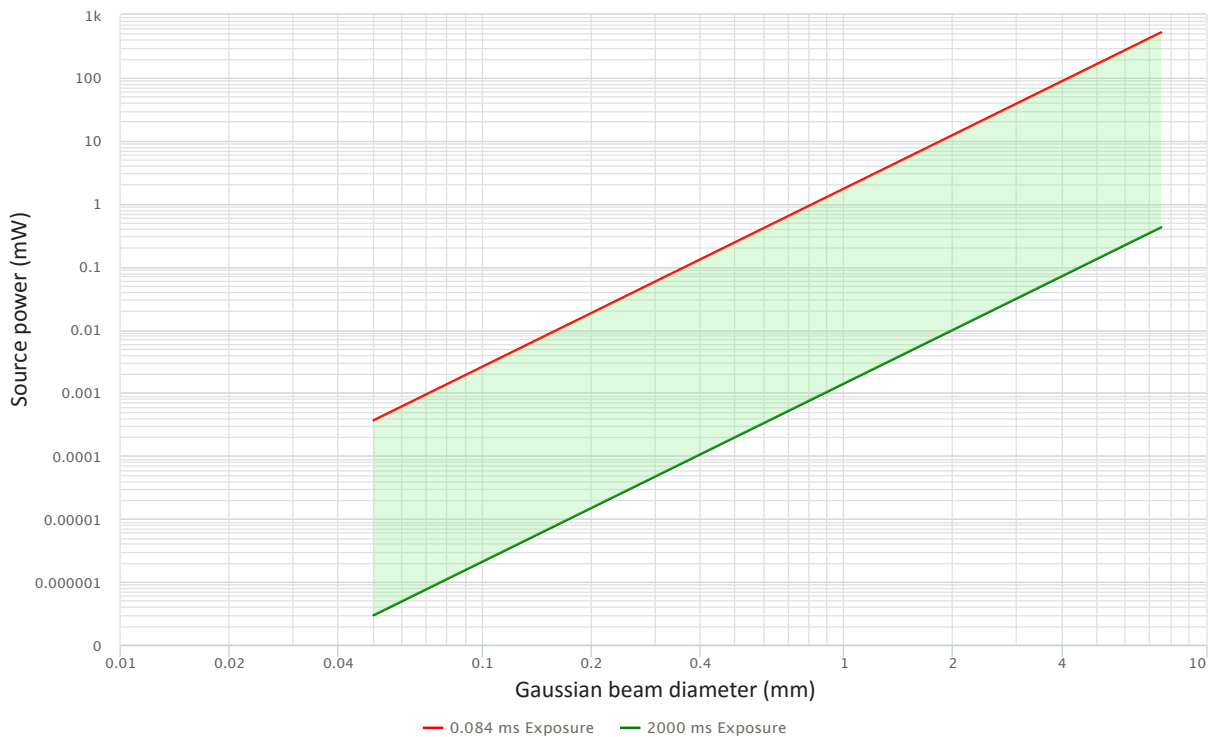
### System Features

- 1480 to 1605 nm, IR to visible conversion phosphor on Silicon CMOS sensor
- $\approx 25 \mu\text{m}$  FWHM point spread function due to phosphor
- Sensitivity down to  $\sim 20 \mu\text{W}$  for 1 mm diam. @ 1550 nm
- Gamma ( $\gamma$ ) correction is included in the software
- Comes with 3 ND filters and a 1290 nm long pass filter
- Full-featured DataRay software



1550 nm beam at 1.268 ms exposure

WinCamD-LCM4-TEL: 1550 nm, 1 mW beam at 1.3 ms exposure



### Ordering Information

Application	Model	Details
UV (190-1150 nm)	S-WCD-LCM4-UV	Complete system with 3 UV-grade MagND filters (1, 2, 4), USB 3.0 cable, manual and software
Visible (355-1150 nm)	S-WCD-LCM4	Complete system with 3 MagND filters (1, 2, 4), USB 3.0 cable, manual and software
1350 nm (355-1350 nm)	S-WCD-LCM4-1310	Complete system with 3 MagND filters (1, 2, 4), 1290 nm long pass filter and 50 mm tube, USB 3.0 cable, manual and software
Telecom (1480-1605 nm)	S-WCD-LCM4-TEL	Complete system with 3 MagND filters (1, 2, 4), 1290 nm long pass filter, USB 3.0 cable, manual and software

### Ordering Information for M-Squared Measurements

Item	Model	Description
Translation stage (50 mm travel)	M2DU-50	Medium travel stage for average Raleigh range lasers
Translation stage (200 mm travel)	M2DU-200	Long travel stage for wide Raleigh range lasers
UV Lens	LNZ-UV-__*	Lens and mounting adapters for use with M2DU series stages 190-1100 nm
VIS Lens	LNZ-VIS-__*	Lens and mounting adapters for use with M2DU series stages 380-800 nm
NIR Lens	LNZ-NIR-__*	Lens and mounting adapters for use with M2DU series stages 650-1050 nm
TEL Lens	LNZ-TEL-__*	Lens and mounting adapters for use with M2DU series stages 1050-1350 nm

\* Contact DataRay for system modelling and lens recommendations for your beam.

Typical focal lengths: 50, 100, 150, 200, 250, 500, 750, 1000 mm

Apertures: 25 and 50 mm  $\phi$

### Accessories for LCM series cameras

Accessory	Models	Application
UV converters	BSF-series C,G,P,R apertures to 48 mm $\phi$	UV spectrum profiles and M <sup>2</sup> from 190- 400 nm
Right angle prism	RA-08, 12, 23, 47	High power beams with UV converter
Extended range to 1350 nm	1310-UPG	Extend cameras to 1310 nm, 1290 LP filter and tube
IR converter	CamIR-WCD	Beams 1- 15 mm $\phi$ , 1480 to 1605 nm
Microscope objectives	MO	Reimage small beams, call for recommendation
Beam reducers	BR	Measure large beams, call for recommendation
Variable attenuator	EAM-2	Beams to 1 W/cm <sup>2</sup> , 350-2500 nm, 20 mm CA