PRESENTATION

OVERVIEW OF THE DIFFERENT MODELS

Gentec-EO has a large choice of beam diagnostic tools. from CCD cameras to scanning systems and even position sensing detectors, we have all you need to characterize your beam.

See page 176

BEAMAGE

- ½ in & ⅔ in CCD Cameras
- 1.4 MPixels
- UV to IR Wavelengths
- Sensor Size up to 8.8 x 6.6 mm
- USB Powered and Controlled

½ in and ⅔ in CCD CAMERAS

See page 178

BEAMAGE FOCUS

- ½ in & ⅔ in CCD Cameras with Fiber Tapers
- For Large Beams up to 20 x 15 mm
- 1.4 MPixels
- UV to IR Wavelengths
- USB Powered and Controlled

½ in and ⅔ in CCD CAMERAS WITH FIBER TAPERS FOR LARGE BEAMS

See page 180

BEAM'R2

- Scanning Slit Beam Profiler
- XY Slit Planes
- Si and InGaAs Sensors
- Dual-Sensor Systems available for the widest wavelength range possible
- Sensor Size up to 4 x 4 mm

XY SCANNING SLITS

See page 180

BEAMMAP2

- Scanning Slit Beam Profiler
- XYZθϕ Slit Planes
- Real Time M2, Divergence and Collimation
- Si and InGaAs Sensors
- Dual-Sensor Systems available for the widest wavelength range possible
- Sensor Size up to 4 x 4 mm

XYZϕθ SCANNING SLITS
REAL TIME M2, DIVERGENCE AND COLLIMATION

COMPARISON TABLE

See page 182

BEAMSCOPE-P8

- Scanning Probe Beam Profiler
- Pinholes, Single Slits or XY Slits Available
- Real Time Measurement of : XY Profile, Angular Divergence, Ellipticity, Centroid Position, Gaussian Fit and more
- 2D or 3D Plots
- For Large Beams up to 40 x 23 mm (with M2 Stage)

SCANNING PROBE PROFILERS

COMPARISON TABLE

MODEL	PROFILE	M2	SCAN	KNIFE EDGE	CCD	PULSED LASERS	RESOLUTION	MAX IMAGE SIZE	SEE PAGE
Beamage	X-Y	Option			✓	< 20 kHz	1 µm	8.8 x 6.6 mm	176
Beamage Focus	X-Y				✓	< 20 kHz	1.6 µm	20 x 15 mm	178
Beam'R2	X-Y		✓			> 100 kHz	0.1 µm	4 x 4 mm	180
BeamMap2	X-Y-Z-θ-ϕ	Real Time	✓	✓		> 100 kHz	0.1 µm	4 x 4 mm	180
BeamScope-P8	X-Y	Option	✓			> 10 kHz	0.1 µm	40 x 23 mm	182

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BEAMAGE

½ in and ⅔ in CCD Cameras

KEY FEATURES

1 Plug and Play
Direct USB2.0 connection

2 For CW or Pulsed Lasers
Suitable for both CW and pulsed lasers, with single pulse capture up to 20 kHz

3 User-Friendly Software
- Background capture and subtraction
- XY profiles and centroids
- Gaussian and top hat fits
- Beam wander tool

4 Auto Trigger
Automatically synchronizes to pulsed lasers

5 M2 Capabilities
With optional M2 stage and lenses

AVAILABLE MODELS

Beamage-CCD12
(½ in CCD Camera)

Beamage-CCD23
(⅔ in CCD Camera)

AVAILABLE SENSORS

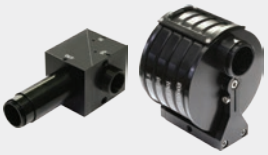
4 Sensor choices for each size:

Standard Si	350 - 1150 nm
-1310	1290 - 1350 nm
-IR	1480 - 1680 nm
With UG11 Filter	260 - 380 nm

ACCESSORIES

Stand with Delrin Post
(Model Number: 200428)

M2 Stage (M2DU)



CUB, CUB-UV & EAM-2
Beam Splitters and Attenuators

Stackable ND Filters
(0.5, 1.0, 2.0, 3.0 & 4.0)

UV Converters &
IR Adaptors

Pelican Carrying Case

SEE ALSO

ACCESSORIES FOR BEAM DIAGNOSTICS 184
LIST OF ALL ACCESSORIES 186

BEAMAGE

SPECIFICATIONS

MODELS	BEAMAGE-CCD12	BEAMAGE-CCD23
SENSOR TECHNOLOGY	CCD	CCD
EFFECTIVE APERTURE	6.3 x 4.8 mm	8.8 x 6.6 mm
MEASUREMENT CAPABILITY		
Pixel Count	1.4 MPixels	1.4 MPixels
H x V	1360 x 1024	1360 x 1024
Pixel Dimension	4.65 x 4.65 µm	6.45 x 6.45 µm
Minimum Measurable Beam	~47 µm	~65 µm
Shutter Type	Synchronous	Synchronous
Maximum Full Frame Rate	~10 Hz	~10 Hz
Single Pulse Capture	20 kHz	20 kHz
Signal to RMS Noise	1000:1	1000:1
Electronic Shutter Dynamic Range	43 dB	43 dB
ADC	14 bit	14 bit
WAVELENGTH RANGES		
Standard	350 - 1150 nm	350 - 1150 nm
-1310 (residual silicon response) [a]	1290 - 1350 nm	1290 - 1350 nm
-IR (with Phosphor coating) [b]	1480 - 1680 nm	1480 - 1680 nm
With UG11 Filter (for UV) [c]	260 - 380 nm	260 - 380 nm
DAMAGE THRESHOLDS [d]		
Maximum Average Power [e]	1 W	1 W
Saturation Level (1064 nm)		
Continuous Laser	10 W/cm²	10 W/cm²
Pulsed Laser	300 µJ/cm²	300 µJ/cm²
PHYSICAL CHARACTERISTICS		
Sensor Size	6.3 x 4.8 mm	8.8 x 6.6 mm
Dimensions (not including filter)	61H x 81.1W x 22.9D mm	61H x 81.1W x 22.9D mm
Weight (head only)	230 g	230 g
ORDERING INFORMATION		
Full Product Name	BEAMAGE-CCD12	BEAMAGE-CCD23
Product Number (Stand not included)	201027	201028

a. With 1290 nm long-pass filter instead of ND4.
b. A standard Si chip camera can also be fitted with a cam-IR adaptor for NIR detection.
c. A standard Si chip camera can also be fitted with a UV converter for profiles down to 190 nm.
d. With ND4 filter.

Specifications are subject to change without notice

BEAMAGE FOCUS

½ in and ⅔ in CCD Cameras with Fiber Tapers for Large Beams

KEY FEATURES

1 Large Area Fiber Tapers
2 sizes for large beams:
- Focus I: 11 x 14 mm
- Focus II: 20 x 15 mm

2 Plug and Play
Direct USB2.0 connection

3 For CW or Pulsed Lasers
Suitable for both CW and pulsed lasers, with single pulse capture up to 20 kHz

4 User-Friendly Software
- Background capture and subtraction
- XY profiles and centroids
- Gaussian and top hat fits
- Beam wander tool

5 Auto Trigger
Automatically synchronizes to pulsed lasers

AVAILABLE MODELS

Beamage-Focus I-CCD12
(14.4 x 10.8 mm Taper)

Beamage-Focus II-CCD23
(20 x 15 mm Taper)

AVAILABLE SENSORS

3 Sensor choices for each size:

Standard Si	350 - 1150 nm
-1310	1290 - 1350 nm
-IR	1480 - 1680 nm

ACCESSORIES

Stand with Delrin Post
(Model Number: 200428)

Stackable ND Filters (Focus I)
(0.5, 1.0, 2.0, 3.0 & 4.0)

Stackable NDL Filters (Focus II)
(0.5, 1.0, 2.0, 3.0 & 4.0)

CUB, CUB-UV & EAM-2
Beam Splitters and Attenuators

Pelican Carrying Case

SEE ALSO

ACCESSORIES FOR BEAM DIAGNOSTICS 184
LIST OF ALL ACCESSORIES 186

BEAMAGE FOCUS

SPECIFICATIONS

MODELS	BEAMAGE FOCUS I	BEAMAGE FOCUS II
SENSOR TECHNOLOGY	CCD	CCD
EFFECTIVE APERTURE	14.4 x 10.8 mm	20 x 15 mm
MEASUREMENT CAPABILITY		
Pixel Count	1.4 MPixels	1.4 MPixels
H x V	1360 x 1024	1360 x 1024
Pixel Dimension	10.5 x 10.5 µm	14.5 x 14.5 µm
Minimum Measurable Beam	~105 µm	~145 µm
Pixel Multiplying Factor (PMF)	2.25	2.27
Shutter Type	Synchronous	Synchronous
Maximum Full Frame Rate	~10 Hz	~10 Hz
Single Pulse Capture	20 kHz	20 kHz
Signal to RMS Noise	1000:1	1000:1
Electronic Shutter Dynamic Range	43 dB	43 dB
ADC	14 bit	14 bit
WAVELENGTH RANGES		
Standard	350 - 1150 nm	350 - 1150 nm
-1310 (residual silicon response) [a]	1290 - 1350 nm	1290 - 1350 nm
With UG11 Filter (for UV) [b]	260 - 380 nm	260 - 380 nm
DAMAGE THRESHOLDS [c]		
Maximum Average Power	1 W	1 W
Saturation Level (1064 nm)		
Continuous Laser	10 W/cm²	10 W/cm²
Pulsed Laser	300 µJ/cm²	300 µJ/cm²
PHYSICAL CHARACTERISTICS		
Effective Aperture	14.4 x 10.8 mm	20 x 15 mm
Sensor Size	6.3 x 4.8 mm (CCD12)	8.8 x 6.6 mm (CCD23)
Dimensions	61H x 81.1W x 48.6D mm	61H x 81.1W x 57.3D mm
Weight (head only)	310 g	310 g
ORDERING INFORMATION		
Full Product Name	BEAMAGE FOCUS I	BEAMAGE FOCUS II
Product Number (Stand not included)	201112	201074

a. With 1290 nm long-pass filter instead of ND4.
a. A standard Si chip camera can also be fitted with a UV converter for profiles down to 190 nm.
b. With ND4 filter.

Specifications are subject to change without notice

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BEAMR2-BEAMMAP2

Scanning Slits Beam Profilers

KEY FEATURES

1 Plug and Play
Direct USB2.0 connection

2 Beam'R2
Each single plane XY beam profiling head contains a 2.5 µm slit pair for high dynamic range slit mode & a 25 µm slit pair for 0.1 µm resolution Knife-Edge mode

3 BeamMap2
Adds multiple Z-plane scanning to allow the measurement of:
- Real-time XYZ profiles, Focus position
- Real-time M2, Divergence, Collimation

4 Dual Sensors
Each model is available with dual sensors, for the largest wavelength range possible:
- DD-2.0: Si + InGaAs
- DD-2.4: Si + Extended InGaAs

5 True2D Slits
0.4 µm thick metallic multilayer films on a sapphire substrate avoid the tunnel effect of air slits

AVAILABLE MODELS


Beam'R2
Single Sensor


BeamMap2
Dual Sensors


Beam'R2-DD
Single Sensor


BeamMap2-DD
Dual Sensors

AVAILABLE SENSORS

Single Sensor:

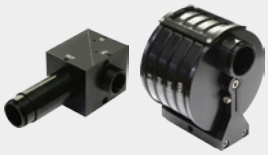
Si	190 - 1000 nm
InGaAs	650 - 1800 nm

Dual Sensors:

Si + InGaAs	190 - 1800 nm
Si + Ext. InGaAs	190 - 2500 nm

ACCESSORIES


Stand with Delrin Post
(Model Number: 200428)


CUB, CUB-UV & EAM-2
Beam Splitters and Attenuators


Pelican Carrying Case

SEE ALSO

ACCESSORIES FOR BEAM DIAGNOSTICS	184
LIST OF ALL ACCESSORIES	186

BEAMR2-BEAMMAP2

SPECIFICATIONS

MODELS	BEAM'R2	BEAMMAP2
SLIT-SCAN PLANES	XY	XYZθΦ
MEASUREMENT CAPABILITY		
Dimensions of Capture Region		
Si	4 mm	
InGaAs	3 mm	
Dual: Si + InGaAs	Si: 4 mm + InGaAs: 3 mm	
Dual: Si + Extended InGaAs	Si: 4 mm + Extended InGaAs: 2 mm	
Laser Types	CW or Pulsed	
Waist Diameters ($2\omega_0$)	0.5 - 1500 µm	
Waist Diameter Resolution	0.2 % of beam diameter	
Best Resolution	0.1 µm	
Precisions		
Beam Divergence	N/A	± 1 mrad over a ± 100 mrad range
Beam Pointing	N/A	± 1 mrad over a ± 100 mrad range
Beam M^2	N/A	± < 5 %, M^2 =1.0 to > 20
Waist Centroid Position	± 2 µm rms	
Auto Gain Range	40 dB (10 000:1)	
Update Rate	5 Hz	
WAVELENGTH RANGES		
Si	190 - 1000 nm	
InGaAs	650 - 1800 nm	
Extended InGaAs	0.8 - 2.5 µm	
DAMAGE THRESHOLDS		
Maximum Average Power	1 W	
Maximum Irradiance	0.5 mW/µm²	
PHYSICAL CHARACTERISTICS		
Dimensions	61.0H x 67.3W x 68.2D mm	
Weight (head only)	450 g	
Cable	3 m, USB 2.0, A to mini-B5	
ORDERING INFORMATION		
Full Product Names		
Si	BR2-Si	BMS2-4XY250*-Si
InGaAs	BR2-IGA	BMS2-4XY250*-IGA
Dual: Si + InGaAs	BR2-DD-2.0	BMS2-4XY250*-DD-2.0
Dual: Si + Extended InGaAs	BR2-DD-2.4	BMS2-4XY250*-DD-2.4

* Default unit has 250 µm plane spacing. 50, 100, 500, 750 & 5000 µm plane spacings available

Specifications are subject to change without notice

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BEAMSCOPE-P8

Scanning Probe Beam Profiler

KEY FEATURES

1 Plug and Play
Direct USB2.0 connection

2 Real-Time Measurements
- X-Y profile
- Angular divergence
- Ellipticity, Centroid and Gaussian fit
- Relative power

3 Wide Range of Beam Diameters
- Can profile beams as small as 3 mm in diameter to 40 x 23 mm (with the 2D-stage

4 Wide Wavelength Range
From 190 nm to 4 µm

5 High Resolution
Down to 0.5 mm (or 0.5 %)

AVAILABLE MODELS


BS-PA
(Pinhole Aperture)


BS-SS
(Single Slits)


BS-XY
(XY Slits)

AVAILABLE SENSORS

3 Sensor choices for each model:

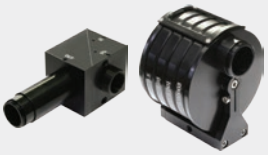
Standard Si	190 - 1150 nm
Ge	800 - 1800 nm
InAs	1.5 - 3.5 µm

ACCESSORIES


Stand with Delrin Post
(Model Number: 200428)

M2-Stage

M2 Stage (M2DU)


CUB, CUB-UV & EAM-2
Beam Splitters and Attenuators


Pelican Carrying Case

SEE ALSO

ACCESSORIES FOR BEAM DIAGNOSTICS 184
LIST OF ALL ACCESSORIES 186

BEAMSCOPE-P8

SPECIFICATIONS

MODELS	BEAMSCOPE-P8
APERTURE TYPES	Pinholes, Single Slit, X-Y Slits

MEASUREMENT CAPABILITY	
Measured Profile Parameters	Gaussian beam diameter, Gaussian fit, Second moment beam diameter, Knife-edge beam diameter, Centroid position (relative & absolute) Beam wander display
Displayed Profiles	X only, Y only, X & Y 2-D plot, 3-D plot
Laser Types	CW or Pulsed (> 10 kHz)
Waist Diameters	2 µm - 15 mm
Measurement Resolution	<0.1 µm, or 0.1 % of beam diameter
Optical Dynamic Range	42.5 dB optical (23 000:1)
Update Rate	>1 Hz typical, 2 Hz maximum
WAVELENGTH RANGES	
Si	190 - 1150 nm
Ge	800 - 1800 nm
InAs	1.5 - 3.5 µm
DAMAGE THRESHOLDS	
Maximum Average Power	1 W
Maximum Irradiance	
> 500 nm	0.5 mW/µm²
< 500 nm	0.25 mW/µm²
PHYSICAL CHARACTERISTICS	
Scanned Areas	
Pinholes (PA Series)	Line Scan – Pinhole diameter x 23 mm
Single Slits (SS Series)	Rectangle – Si: 7 x 23 mm, Ge: 5 x 23 mm, InAs: 3 x 23 mm
X-Y Slits (XY Series)	Trapezoid – Si: 5 x 15/5 mm, Ge: 3 x 15/5, InAs: 2 x 15/5 mm
2D-Stage (M2DU)	Rectangle – 40 x 23 mm
Dimensions	51H x 115W x 62D mm
Weight (head only)	540 g

ORDERING INFORMATION

Full Product Name	PA	SS	XY
Si	BS8-PAxx	BS8-SSyy	BS8-XYyy
Ge	BS8G-PAxx	BS8G-SSyy	BS8G-XYyy
InAs	BS8IA-PAxx	BS8IA-SSyy	BS8IA-XYyy

xx: For pinhole apertures, replace xx by 5, 10, 25, 50 or 100 (mm)
yy: For single and dual slits, replace yy by 2.5, 5, 10, 25, 50 or 100 (mm)

Specifications are subject to change without notice

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ACCESSORIES FOR BD

M2DU - M2 STAGE FOR BEAMAGE

DESCRIPTION

The USB 2.0 interfaced M2DU accessory converts any Beamage-CCDXX series beam profiling camera into a compact ISO 11146 compliant M2 measurement system. The M2DU system comprises a lens fixed to the front of a moving stage on which the Beamage camera moves up to 44 mm. An 85 mm focal length, 400 to 900 nm, achromat refocuses an input beam to a waist within the stage travel range. (Alternative lens focal lengths and coatings will be recommended/supplied for some applications.) Sampling in accordance with the ISO 11146 standard measures the hyperbolic region about the waist. A least squares hyperbolic fit to the second moment diameter data allows calculation of the M2 value and related parameters.

SPECIFICATIONS

Beam Diameters: See Graph

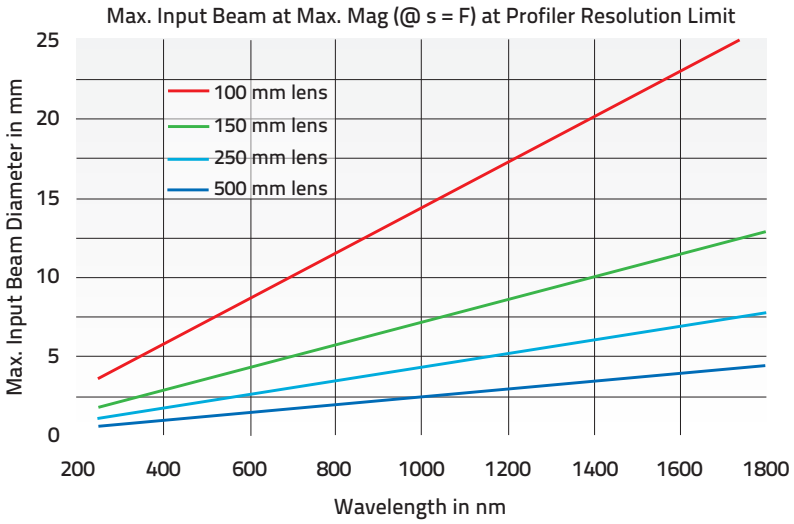
Wavelengths:

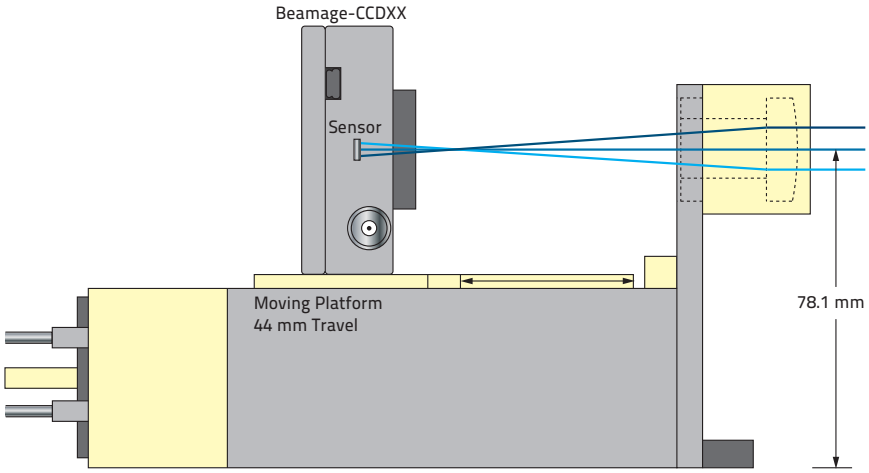
UV:	190 - 1100 nm
VIS:	400 - 800 nm
NIR:	650 - 1050 nm
TEL:	1050 - 1620 nm

M2 Repeatability: ±2 %

Focal Lengths:

100 nm	(25 mm Ø)
150 nm	(25 mm Ø)
250 nm	(25 mm Ø)
500 nm	(50 mm Ø)





OPERATION

Operation includes an Auto scan range mode which simplifies scanning a range in accordance with the ISO standard, and is described fully in the Application Note which accompanies the stage. An initial 20-point scan with an Average of 2 images at each positioned is performed over the total range of the stage. The software then establishes the optimal scan range for M2 measurement in accordance with the Standard. Averaging is set to 5 images per position and 60 equispaced positions in z about the beamwaist. A typical full scan takes 5 minutes, but coarser scans may be performed faster.

ACCESSORIES FOR BD

EAM2 - VARIABLE ATTENUATOR

DESCRIPTION

EAM-2 is a simple-to-use variable attenuator. It consists of a bank of four filter wheels, each with three different filters ranging from 100% transmission down to 0.003 %. This filter bank offers almost continuous attenuation from 0 to more than 93 dB (Optical Density > 9).

The EAM-2 has three M6 mounting holes and can also connect directly to the C-mount port of a camera. EAM-2 uses Schott NG absorbing filter glass (NG). The filters are laser grade polished to 10-5 scratch-dig and λ/10 finish. All filters are mounted at a 4° angle to suppress back-reflection interference fringes

SPECIFICATIONS

Maximum Attenuation:	93 dB (OD9)
Minimum Attenuation:	0dB
Maximum Power Density:	1 W/cm²
Maximum Energy Density:	100 mJ/cm²
Wavelength Range:	350 - 2200 nm
Clear Aperture:	18 mm Ø
Angle:	4°
Mounting:	3 x M6, C-Mount

		Wheel # 1		2		3		4	
		dB	%	dB	%	dB	%	dB	%
Filter #	1	0	100	0	100	0	100	0	100
	2	0.5	90	5	30	20	1	35	0.03
	3	1	80	10	10	25	0.3	40	0.01
	4	3	50	15	3	30	0.1	45	0.0003

CUB & CUB-UV - BEAM SPLITTER CUBES

DESCRIPTION

The CUB beam splitter cube takes a fixed ratio beam sample. It uses the front surface reflection from an uncoated laser mirror to achieve a reflection of 3% to 10% of the main laser beam for further analysis.

The surface is polished to 10-5 scratch-dig and 1/10 wave finish, wedged at 10 arcmin to avoid interference fringes and can take power densities up to 2 MW/cm². Like the EAM attenuator it has C-Mount ports and can be connected to the EAM and your camera with the ETCM connecting tubes. It can post mount from an M6 threaded post.

SPECIFICATIONS

Attenuation:	3% to 10% (Polarization dependent)
Spectral Range:	
CUB:	350 - 2200 nm
CUB-UV:	190 - 2200 nm
Clear Aperture:	19 mm
Damage Threshold:	50 J/cm²

Part #	Description
CUB	Beam Splitter
CUB-UV	UV Beam Splitter
ETCM-2	Tube Set with 2 Tubes (2 x 50 mm tubes + 4 adaptor rings)
ETCM-3	Tube Set with 3 Tubes (3 x 50 mm tubes + 4 adaptor rings)