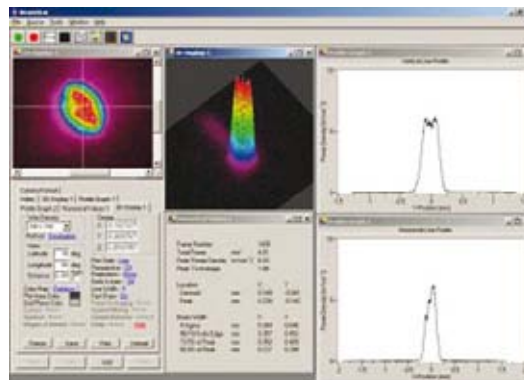


An integrated laser beam measurement/profiler system for pulsed and CW lasers. System contains an SP620 camera with variable attenuator for beam profiling. A thermopile power head for power measurement and a high speed photodiode for temporal pulse width measurement. Includes BeamGage Standard beam profiling software, and a USB power meter w/StarLab software. An optional USB digital oscilloscope is available for temporal measurement of pulsed lasers, order p/n SPE10008. Or a standard laboratory oscilloscope can be used.

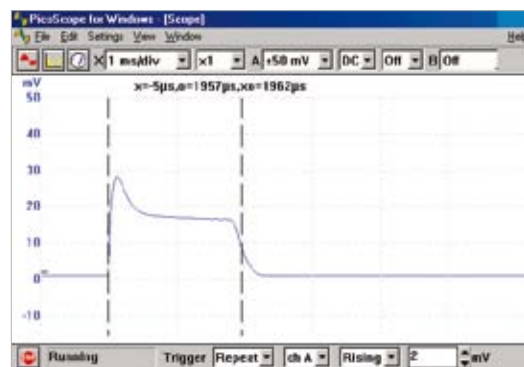
Diagnostic Capabilities: Spatial Beam Profile

The Beam Cube shows you the intensity profile of your beam in real time and allows you to adjust your laser resonator and beam delivery optical system for optimum beam quality on line. You can also measure the cross section at any point as shown. The illustration shows the intensity distribution of a pulsed Nd:YAG laser where the X and Y profiles are taken at the cursor lines which can be placed anywhere on the beam. This data can be saved, brought back and manipulated at any time so you can compare the present profile with a reference. The system has an exclusive optical design making it easy for you to adjust the intensity to get the optimum picture by just pushing and pulling the attenuating filter adjustment levers. The beam profile can also be shown in a three-dimensional form which can be rotated to different angles and elevations.



Temporal Pulse Shape

The temporal profile of laser pulses, important in obtaining consistent process results, can now be easily monitored. Shown to the right is the pulse shape of the same pulsed Nd:YAG laser with 2ms pulses. It is being measured with a PC oscilloscope available as an accessory. You can display the pulse shape alone or together with the beam profile on your PC. Plug the Beam Cube output into an oscilloscope to observe the temporal pulse shape of your laser beam.



Average Laser Power

With the Ophir USB Interface between the Beam Cube unit and your PC or laptop, you can measure the average power of your laser to an accuracy of $\pm 3\%$.

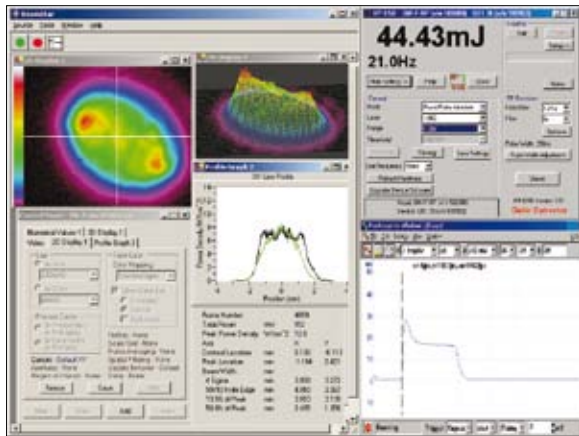
Energy per Pulse and Frequency

Energy sensor inside the Beam Cube is able to measure the energy per pulse and the frequency of the laser to high accuracy. With the USB Interface you can display this on your PC or laptop screen.

Statistics

The Beam Cube with USB Interface is able to record and store an unlimited number of points in your PC. The software provided has a number of ways of displaying the statistics of the data.

Schematic setup of a Beam Cube system

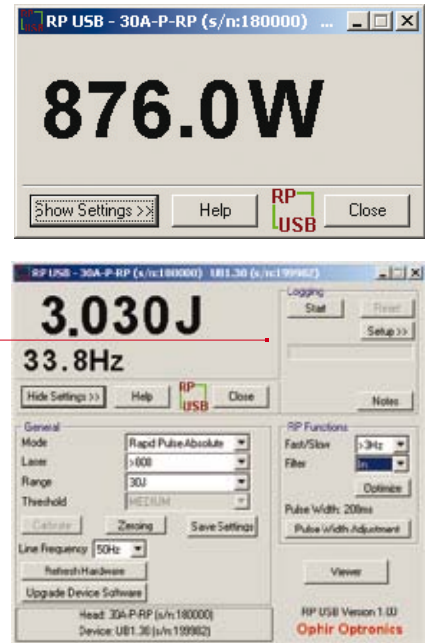


Laptop or desktop PC screen showing spatial beam profile, temporal profile, power, energy and frequency

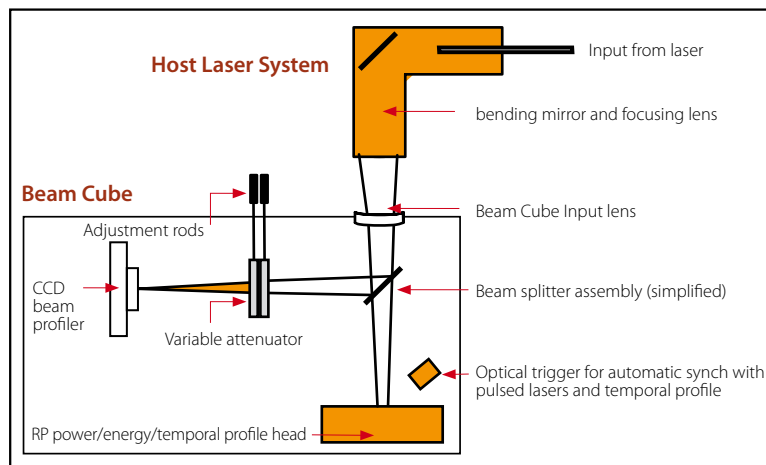
USB2 port

USB Interface

PC scope unit (optional)



Simplified Schematic of Beam Cube System



Specifications

General

Max and min average power	1W to 100W continuous and to 150W for up to 1 min
Maximum average power density ^{(a), (c)}	4kW/cm ² at entrance window
Max and min energy	20mJ ^(b) to 100Joules
Maximum energy density	max energy density
and repetition rate at	20J/cm ²
entrance window vs. pulse	5J/cm ²
width	1.5J/cm ²
Cooling System	Conduction cooled
Dimensions	22cm L x 16cm W x 14cm H
Spectral Range	400 - 1100nm (calibrated for 1064nm)

Beam profiler unit

Camera	SP620U 1600x1200 pixel camera with 4.4µm spacing
PC interface	USB2
Shutter speeds	Continuously variable 1/frame rate to 1/6,000, manual or automatic
Gain control	0dB to 27dB in ~700 steps (each step is ~0.035dB). Manual or automatic control
Frame rate at 640x480 pixel ROI	Std Beam Cube: 60Hz. Auto synch with laser Beam Cube 620: 20Hz. Auto synch with laser
Software features	Automatic gain and shutter control. Peak and Centroid position tracking. 2D and 3D contour map. Sophisticated noise and background control. Best fit to gaussian or top hat profile 3D display viewable from any angle or elevation. Store and recall screens in single or video fashion. 3 different measures of beam width, of peak, 4 sigma and 90/10 knife edge. Save numerical data files of profiles. Log data with time. Full on line instructions and help. Fully flexible screen format.

Minimum PC system requirements	GHz Pentium style processor, min 2GB RAM, Windows 7 (32/64) Laptop or Desktop.
Intensity adjustment	Continuously variable filters actuated from outside the unit.

System optical performance

Field of view	±6°
Maximum beam size	Ø22mm at entrance for converging beam, Ø7mm for collimated beams
Beam reduction or expansion	Expanded 2-3X. With no lens 1X
Resolution	~5µm
Power / energy / temporal profile unit	
Temporal pulse shape response time into oscilloscope	200µs resp. time. Maximum peak power 1000W.
Software functions with USB Interface connected to PC or laptop	average power, statistics
Data logging	Can send unlimited number of points in real time to PC via USB Interface at >1000 point/s. Windows software provided for data analysis.

Notes: (a) The power density limitation applies to any surface that the beam hits. For Beam Cube, since the object plane is outside the instrument, focal spots of much higher power density can be imaged as long as the power density limit on the optical surfaces is not exceeded.

Notes: (b) The Beam Cube will not resolve pulses of energy below 20mJ unless the pulse rate is high. If the energy deposited in 1/50th of a second exceeds 20mJ, then the unit will be able to show the pulses even though the individual energies are below 20mJ.

Notes: (c) If the beam power or energy density on the entrance window exceeds specifications, the window can be removed and not used, assuming that the power and energy density on the first beam splitter is below the damage threshold.

Ordering Information

Item	Description	Ophir P/N
Beam Cube 620	BeamCube system for beam profiling and power and energy. Optional PC oscilloscope for measuring pulse change for pulsed lasers. Comes with 100mm lens assembly. Uses SP620 beam profiling camera.	SP90323
-50mm lens assembly	Optional -50mm lens assembly for Beam Cube	SPZ08255
Optional PC oscilloscope	1MHz virtual oscilloscope for Beam Cube or BA500 to turn your PC into an oscilloscope displaying the temporal pulse shape. Uses PC or laptop USB port	SPE10008