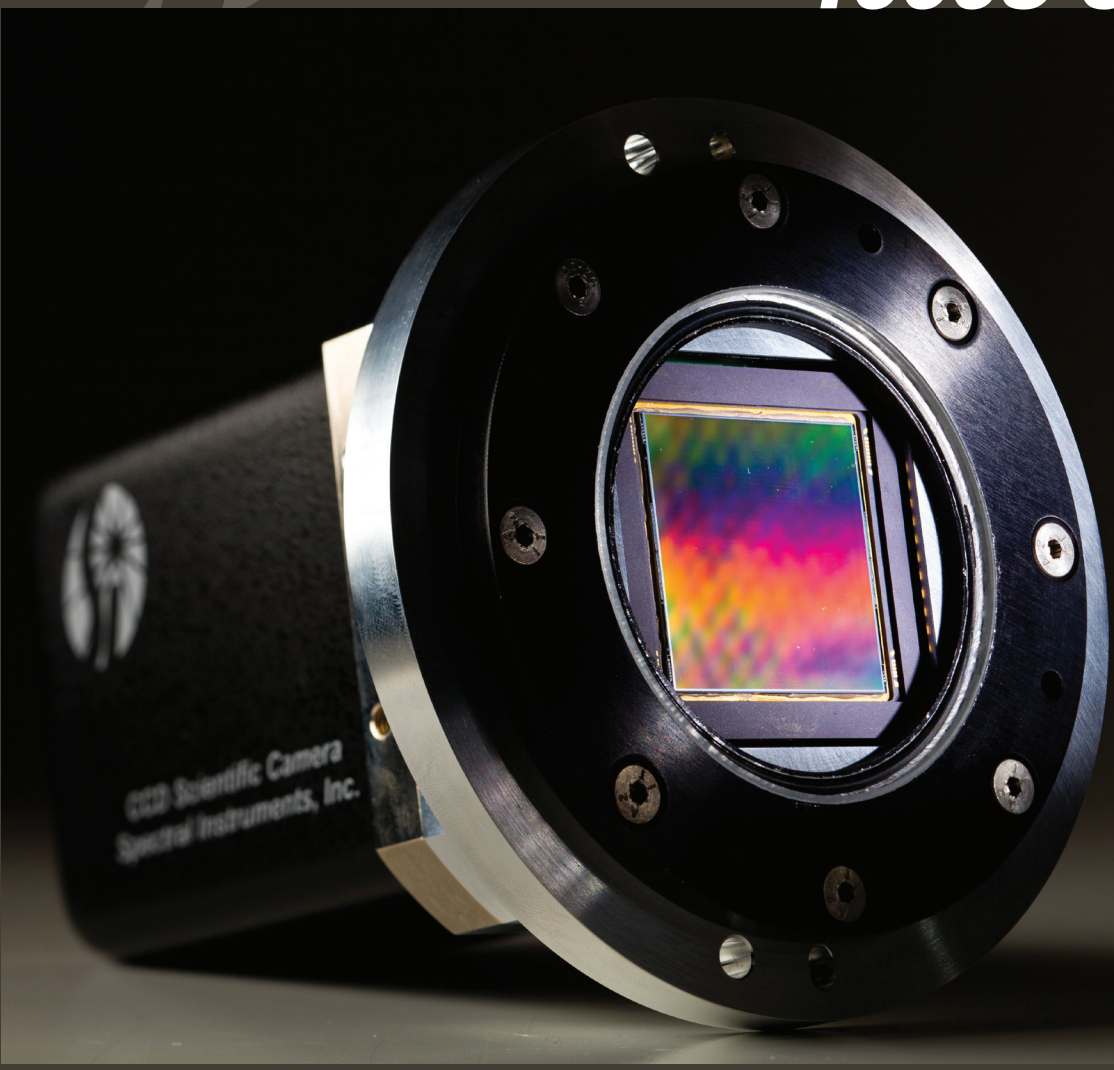
1000S CCD Camera



SI's 1000S camera is designed for uncompromising camera performance in a TEC camera unit. Cooling to -35°C in the versatile 1000S camera body is available with some CCDs. Large CCDs (4k x 4k) with fiber optic tapers and faceplates can be installed as well, still with cooling to -20°C. The most frequently purchased models of the 1000S camera have fiber optics bonded to the CCD. However, windowed models are available with backside and frontside CCDs.

Features

- **Available CCD operating temperatures of -20 to -35°C,** depends on the variety of CCDs, and fiber optics this camera can accommodate. Water and air cooled models are available.
- **Designed for spatially constrained applications;** camera volume optimized for space.
- **Multiple read speeds available;** from low noise speeds of 100kHz up to four MHz pixel rates.
- **High dynamic range;** low noise performance with 16-bit digitization and high full well provide large dynamic range imaging.
- **Sealed camera head;** 1000S camera CCD chamber is permanantly sealed for years of maintenance free service.
- **Many sensors available;** large sized 4k x 4k, down to 1k x 1k full frame and frame transfer devices available; front or backside illuminated. 1000S is now being outfitted as a radiation hardened CMOS camera.
- **Binning and region of interest imaging;** high performance with binning, and ROI imaging for small area high speed available.
- **Power supply options;** both our standard 'desktop' power supply and a DC-DC option (see next page) are available for the 1000S camera line.
- **Fiber optic communication;** standard communication to computer by fiber optic cable to proprietary PCI or PCIe card.
- **Software included with every camera** is our SI Image software suite for camera control, data manipulation and archiving. Native file format is FITS. C++ and LabView SDK available upon request.

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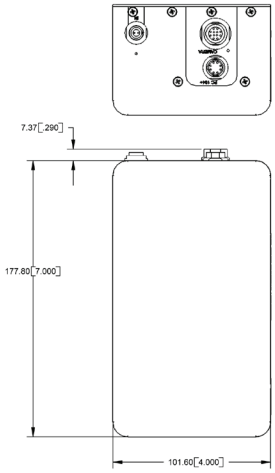
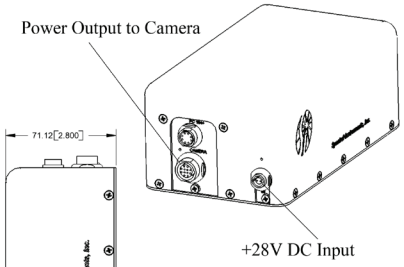




Brick Power Supply
Approximate consumption of 100W continuous 24VDC input

Camera Details

Water cooling required	1 lpm @ 20°C
Window details	Many AR coatings available with custom order. Typical Broadband specs: <1% Reflectivity per surface, 450-800nm
Read speeds	Software selectable, customizable
Trigger options	SMA or optical trigger inputs
Camera weight	About 5lbs, depending on options
Power supply options	Standard 'desktop' power supply and DC-DC 'brick' available

Typical Camera performance 42-40 CCD

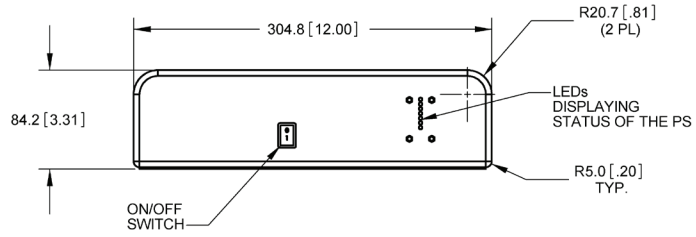
Read noise @ 100kHz	3.9e-
Read noise @ 200kHz	4.1e-
Read noise @ 400kHz	5.6e-
Read noise @ 800hHz	9.1e-
Dark current -35°C	0.05e-/pixel/s
Full well	100ke-
Linearity	<1%, 200e- to 100ke-
CCD size	13.3 x 13.3mm
CCD pixel size	13.5µm
CCD pixel dimension	2048 x 2048
Backside AR coatings available	Midband, Broadband, none and Enhanced UV

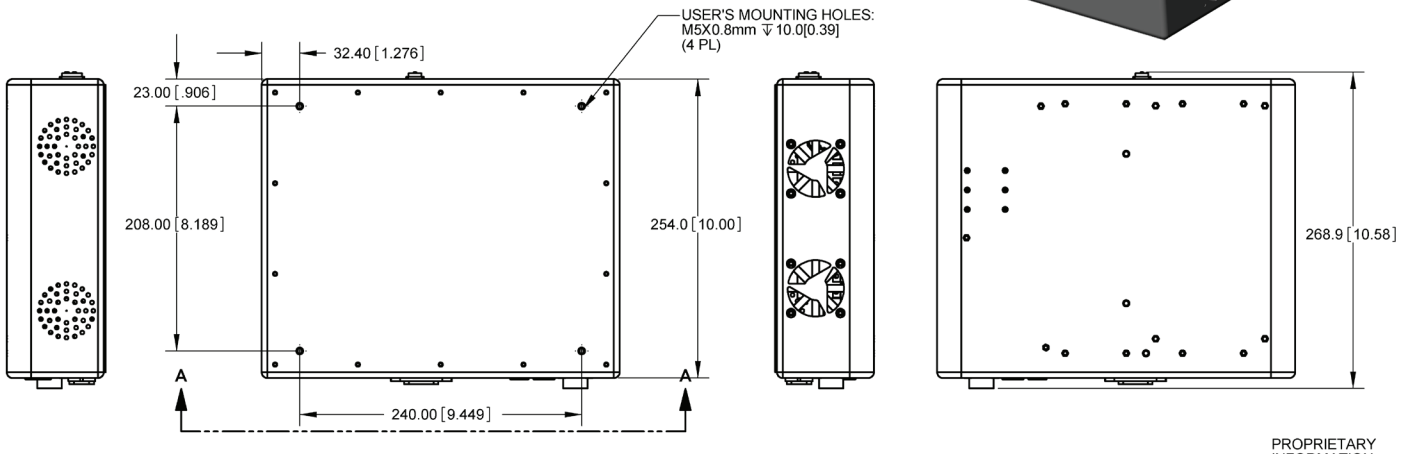
Grade 1 CCD Cosmetics (42-40)

Column Defects	3
Dark pixels	150
Bright pixels	150
Traps	20

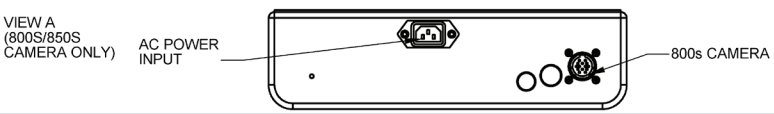
CCD cosmetics subject to change
Contact SI if other requirements must be met
See www.e2v.com for the latest specifications

All camera specifications are subject to change. Contact SI for details on configuring a camera specific to your application.





PROPRIETARY INFORMATION



Desktop Power Supply
Approximate consumption of 100W continuous
120-220V 50/60Hz input

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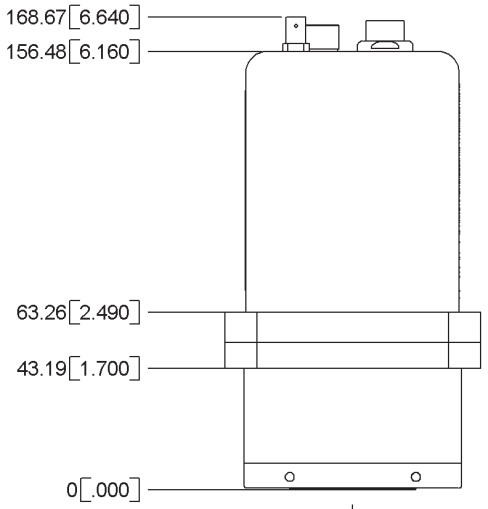
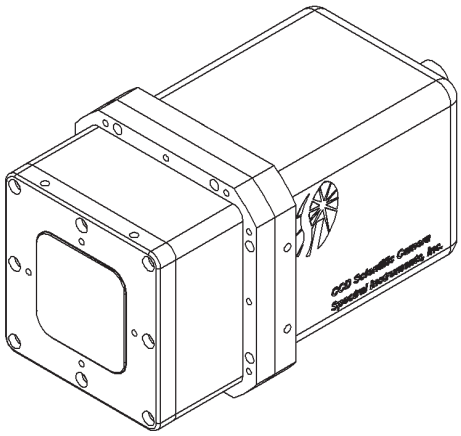
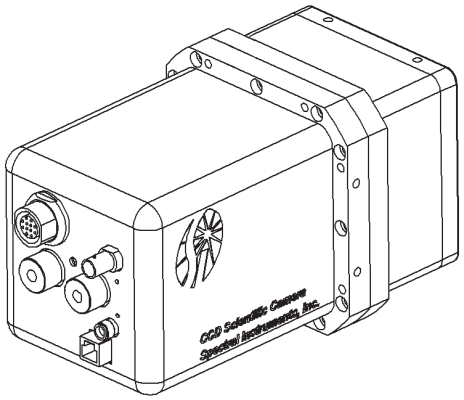
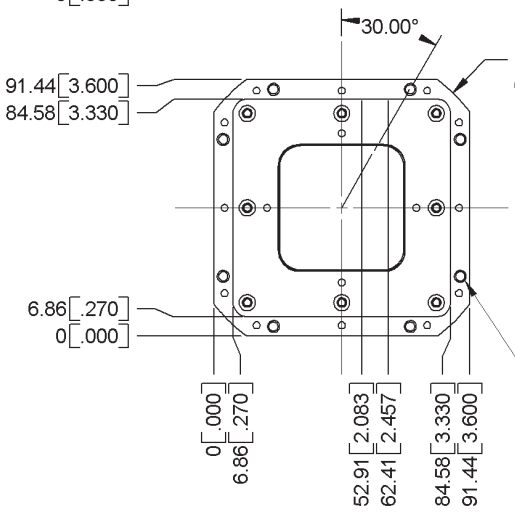
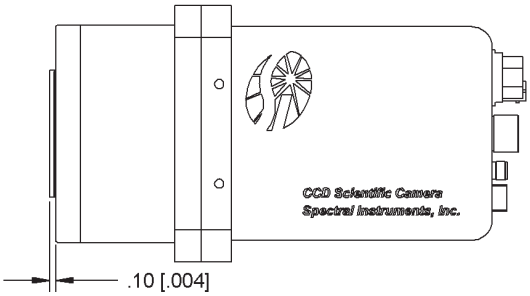
1000S CCD Camera

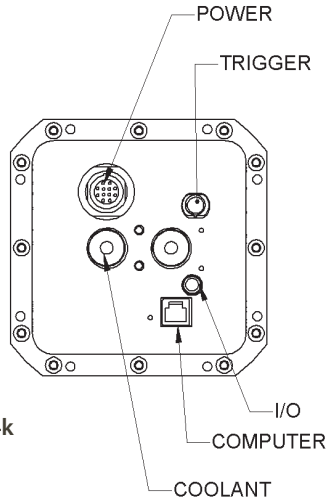




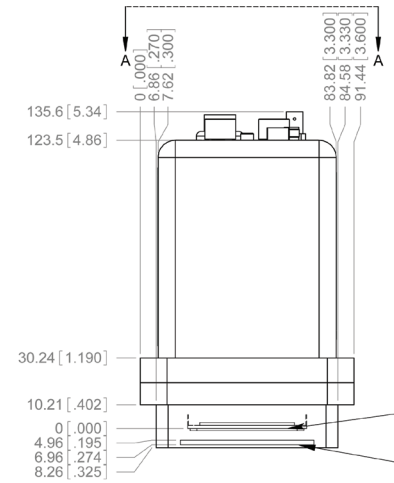


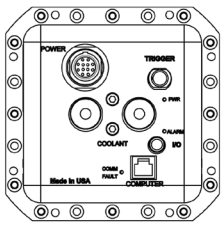




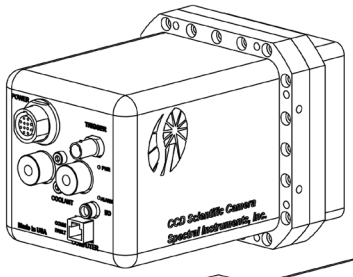


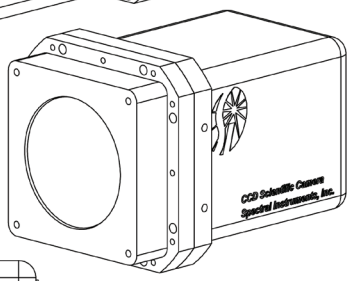
1000S with a Kodak 4k x 4k CCD and a 1:1 fiber optic faceplate

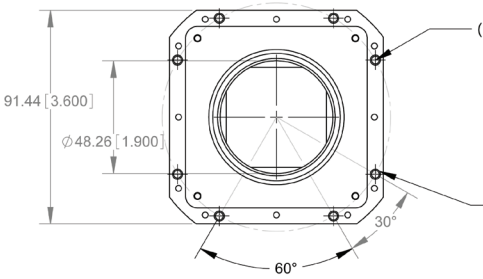


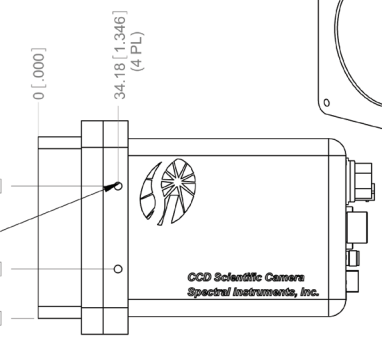


VIEW A
SCALE 1 : 1.5









1000S with a 2k x 2k e2v CCD and a window input

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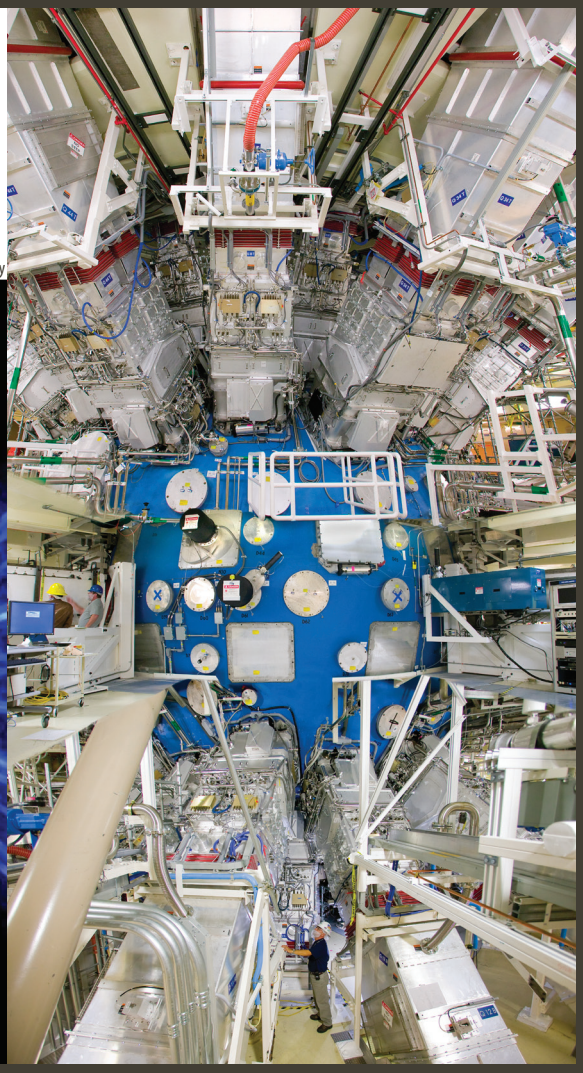
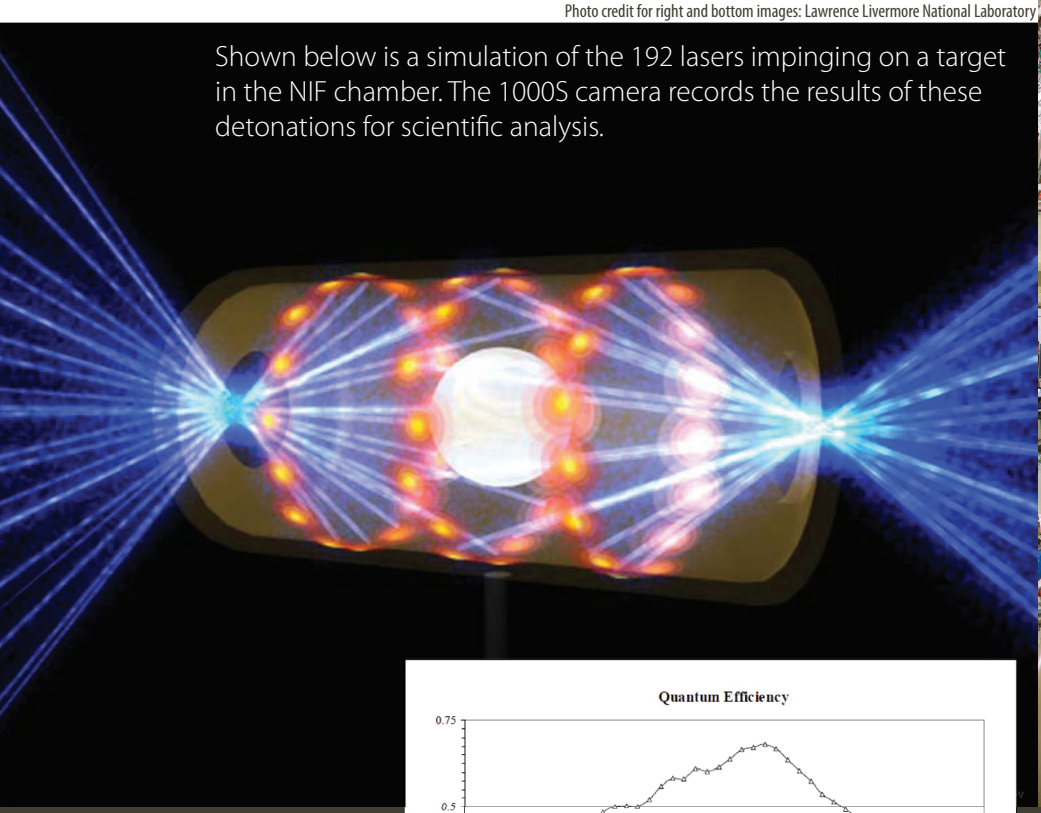
The 1000 Series camera provides a compact high-performance detector platform originally designed to replace film in the streak camera systems used in high speed experiments such as those performed at NIF. The small form-factor was specifically designed to fit conveniently into the diagnostic tubes used to monitor the results from the NIF detonations, as well as monitoring the optics involved in producing and focusing the 192 lasers beams which impinge on the target. The versatile 1000S platform is now being re-engineered to accept CMOS sensors. A CMOS detector and specially selected electronic components provide a robust camera that can survive the high-flux prompt radiation burst. The CMOS detector is 3K x 4K 5.5 micron pixels operating at a 30 Hz frame rate. That the camera survive the 14MeV 1020 neutron/cm /sec flux is a necessity and this camera is designed to do just that.

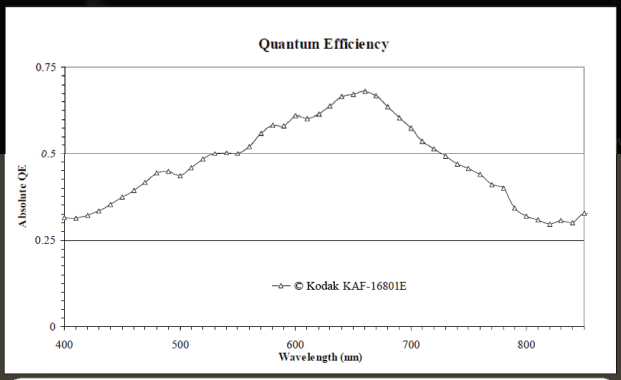
Shown to the right is the target chamber for the National Ignition Facility (NIF) located at the Lawrence Livermore National Laboratory. Scientists are studying the physics behind Inertial Confinement Fusion to gain a better understanding of hydrogen fusion as a future renewable energy source.

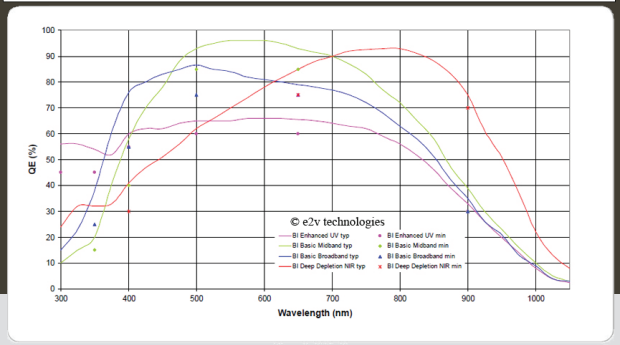
Photo credit for right and bottom images: Lawrence Livermore National Laboratory



Shown below is a simulation of the 192 lasers impinging on a target in the NIF chamber. The 1000S camera records the results of these detonations for scientific analysis.







Typical Camera performance Kodak KAF 16801E

Read noise @ 690kHz	6.2e-
Read noise @ 1MHz	7.5e-
Dark current –20°C	0.05e-/pixel/s
Full well	100ke-
Linearity	<1%, 200e- to 100ke-
CCD size	36.9 x 36.9mm
CCD pixel size	9µm
CCD pixel dimension	4096 x 4096

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