iKon-M 937 Series

ANDOR™ TECHNOLOGY

low-light imaging

Features & benefits

Min operating temp of -100°C with TE cooling
Unparalleled TE cooling performance for negligible dark current, without the aggravation or safety concerns associated with LN_2.

$QE_{max.}$ 95% from back-illuminated sensor
Highest photon collection efficiency.

Frame Transfer Technology
100% duty cycle for maximum sensitivity at faster frame rate operation.

Ultra low noise readout
Intelligent low-noise electronics offer the most 'silent' system noise performance available.

Multi-Megahertz pixel readout
High frame rates achievable.

UltraVac™ - guaranteed hermetic vacuum seal process
Proven reliability and sustained lifetime performance.

Single window design
Maximum photon throughput.

13 x 13µm pixel size
Optimal balance of dynamic range and resolution

USB 2.0 connection
Simple USB 2.0 connection direct from back of camera – no controller box required!

Integrated shutter
C-mount shutter as standard. Close during readout to avoid vertical smear.

Cropped sensor mode
Specialised acquisition mode for continuous imaging with fast temporal resolution

Andor Solis software / SDK (Linux SDK available)
Friendly Windows user interface offers intuitive acquisition optimization, system integration, automation and advanced data manipulation facilities.

" Industry-Leading Ultra-Sensitive Imaging Technology "

Andor's iKon-M 937 series frame transfer cameras are designed to offer the ultimate in back-illuminated, low noise performance, applicable to both long exposure and fast frame rate imaging applications.

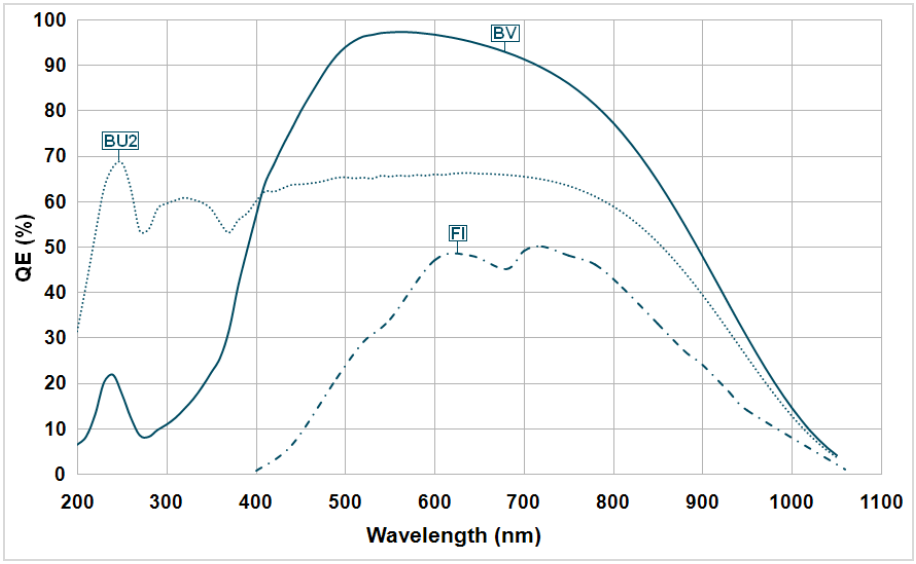
This high resolution 512 x 512 CCD camera boasts 95% QE_{max}, high dynamic range, 13µm pixels and exceptionally low readout noise. The iKon-M benefits from negligible darkcurrent with industry-leading thermoelectric cooling down to -100°C, enabling use of significantly longer exposure times than offered by any other camera on the market using this same sensor.

The iKon-M platform offers Multi-Megahertz readout for more rapid acquisition or fast focusing, along with direct USB 2.0 connectivity to PC.

Camera overview

Active Pixels♦1	512 x 512
Pixel Size (W x H; µm)	13 x 13
Image Area (mm)	6.6 x 6.6
Active Area Pixel Well Depth (e^-, typical)	100,000
Output Saturation (e^-, typical)♦2	200,000
Frame Rate (frames per sec)♦3	7.50
Read Noise (e^-, typical)	
@ 50 kHz	2.5
@ 2.5 MHz	10.3

Quantum efficiency♦4



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Technical specifications

System characteristics

Dummy Pixels	24, 24, 16, 528
Pixel Readout Rate (MHz)	2.5, 1, 0.05
Linearity (%, maximum)♦5	1
Vertical Clock Speed (µs)	11 to 44 (software selectable)
Software Selectable Sensitivity (e^- per A/D count, typical)	4,2,1
Digitization	16 bit (at all readout speeds)
Camera window type	Single quartz window, AR coated on both sides.

System readout noise♦6

Pixel Readout Rate	Readout Noise (e^-, typical)
0.05 MHZ	2.5
1 MHz	8.0
2.5 MHZ	10.3

Minimum sensor temperatures (typical)♦7

Air cooled (ambient air at 20ºC)	-80ºC
Re-circulator (XW-RECR) (ambient air @ 20ºC)	-95ºC
Water-cooled (@ 10 ºC, 0.75 l / min)	-100ºC

Dark current (back-illuminated)

@ -80°C (typical)	0.0005 e^-/pixel/sec
@ -100°C (typical)	0.00012 e^-/pixel/sec

Operating & storage conditions

Operating Temperature	0ºC to 30ºC ambient
Relative Humidity	< 70% (non-condensing)
Storage Temperature	-25ºC to 55ºC

Power requirements

- 5Vdc with 15 Watts
- 7.5Vdc with 30 Watts (PS-25 only)
- ±15Vdc with 3 Watts

Computer requirements

To handle data transfer rates of 2.5 MHz readout over extended kinetic series, a powerful computer is recommended, e.g.:

- 2.4GHz Pentium (or better) + 1Gbyte RAM
- 32 MB free hard disc to install software
- USB 2.0
- Windows 2000 or better

Need more information? Please contact us at:

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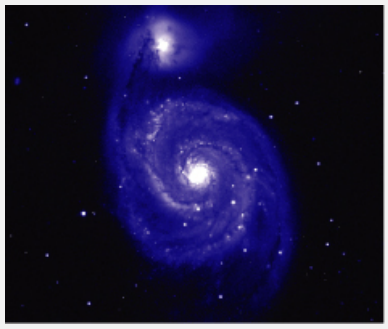
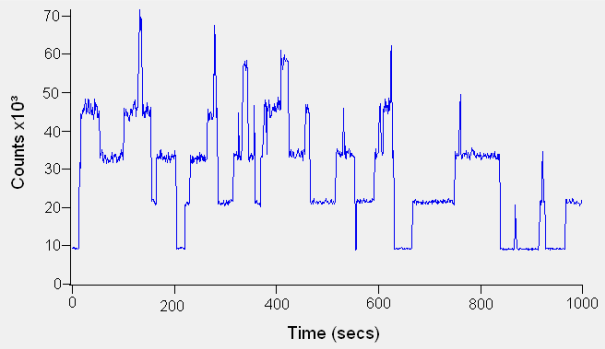
Applications

- Astronomy
- Biochip reading
- Bioluminescence/Chemiluminescence
- **B**ose-**E**instein **C**ondensation (**BEC**)
- Fluorescence microscopy
- High throughput screening
- Hyper-spectral imaging
- Laser Induced Fluorescence (**LIF**)
- Neutron Radiography
- Pressure sensitive paints
- Raman imaging
- Semiconductor analysis



Two interacting galaxies, M51 (Whirlpool Galaxy) and NGC 5195. ***Courtesy of Prof. Andrzej Pigulski, Wroclaw University, Poland.***



Fluorescence from a few-atom MOT v time, showing the discrete steps characteristic of single atoms entering and leaving the trap.

Ordering information & notes

To order the camera you require, please quote one of the following model numbers:

DU937N	**BU2**	Back illuminated device - AR coated for optimal performance in the 250 nm region
	BV	Back illuminated device - AR coated for optimal performance in the visible region
	FI	Standard front illuminated device

The DU937N is supplied with the following power supply:

PS-25	Switchable power supply for maximum air or water cooling, with 2x settings; **standard** or **deep cooling**.

The DU937N also requires one of the following software options:

Andor Solis (i)	A ready-to-run Windows 2000 or XP-based package with rich functionality for data acquisition and processing.
Andor SDK	A ready-to-run Windows 2000 or XP-based package with rich functionality for data acquisition and processing. Available for Windows 2000 or XP and Linux.

The following accessories are available for use with the DU937N:

XW-RECR	Re-circulator for enhanced cooling performance
XW-CHIL-150	Chiller/re-circulator for maximum cooling performance
XU-USB-EXT	USB Extender for transmission of data over long distances.
OA-CCFM	C-mount to Canon F-mount adapter
OA-CNAF	C-mount to Nikon F-mount adapter
OA-COFM	C-mount to Olympus F-mount adapter
OA-CTOT	C-mount to T-mount adapter
OA-ECAF	Auto ext. tubes (set of 3) for Canon AF
OA-ECMT	Auto ext. tubes (set of 3) for C-mount
OA-ENAF	Auto ext. tubes (set of 3) for Nikon AF

Specifications are subject to change without notice

♦1	Edge pixels may exhibit a partial response.
♦2	The output saturation that is actually accessible by the CCD system is dependent upon the sensitivity setting & binning mode selected.
♦3	Based on a horizontal pixel readout rate of 2.5 MHz and a vertical shift speed of 11µs.
♦4	Quantum efficiency of the CCD sensor as measured by the CCD Manufacturer (shown at room temperature)
♦5	Linearity is measured from a plot of counts vs. signal up to the saturation point of the system. Linearity is expressed as a percentage deviation from a straight line fit.
♦6	System Readout noise is for the entire system. It is a combination of CCD readout noise and A/D noise. Measurement is for Single Pixel readout with the CCD at a temperature of -50ºC and minimum exposure time under dark conditions. Noise values will change with pre-amplifier gain (PAG) selection. Values quoted are measured with highest available PAG setting.
♦7	Cooling is provided by the use of an external, mains driven, power supply. Minimum temperatures listed are typical values. Systems are specified in terms of minimum dark current achievable rather than absolute temperature.

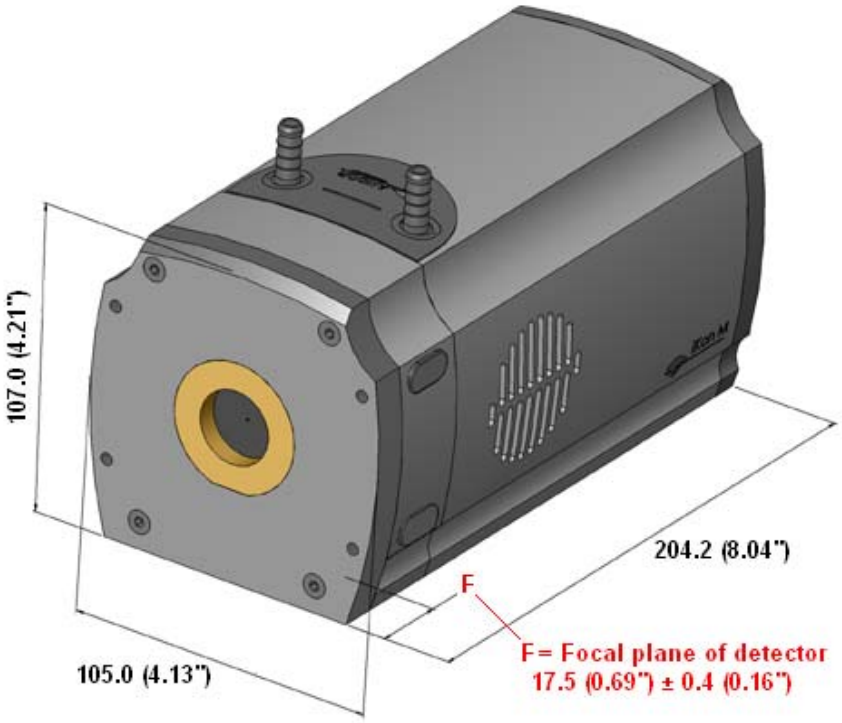
Note: The iKon-M has integrated shutter / shutter driver circuitry.

Rear view showing connections

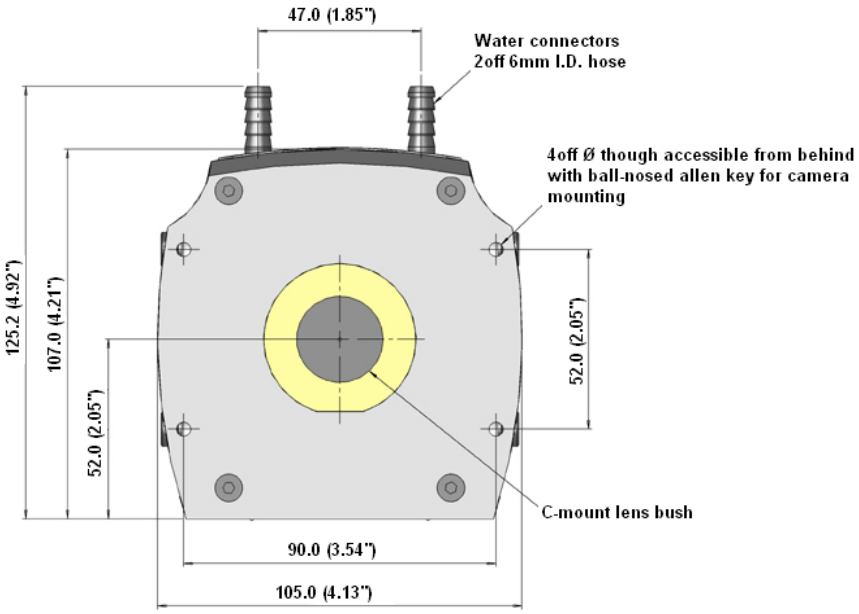
Dimensions

Weight: 2.6 Kg [5.7 lb]

Side / front view



Front face



Mounting hole locations