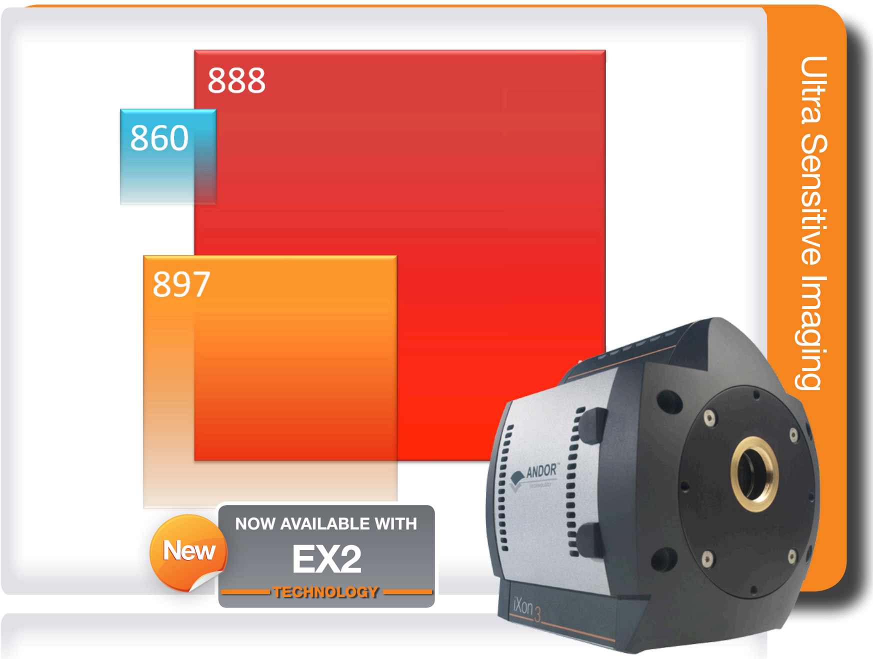
ANDOR

iXon3 888

13.3 x 13.3 mm/1024 x 1024 sensor,
Large Field of View Imaging EMCCD

Features and Benefits

- **13.3 x 13.3 mm sensor**
  Largest Field of View EMCCD
- **EX2 Technology**
  Extended QE response
- **TE cooling to -95°C**
  Critical for elimination of dark current detection limit
- **Fringe Suppression**
  Reduced etaloning in NIR
- **OptAcquire**
  Optimize the highly flexible iXon3 for different application requirements at the click of a button
- **Count Convert**
  Quantitatively capture and view data in electrons or incident photons. Real-time or post-processing
- **RealGain™**
  Absolute EMCCD gain selectable directly from a linear and quantitative scale
- **EMCAL™**
  Patented user-initiated self-recalibration of EM Gain
- **Spurious Noise Filters**
  Intelligent algorithms to filter clock induced charge events from the background. Real time or post-processing
- **Cropped Sensor Mode**
  Specialised acquisition mode for continuous imaging with fastest possible temporal resolution
- **iCam**
  The market-leading exposure time fast-switching software
- **UltraVac™ [*1]**
  Critical for sustained vacuum integrity and to maintain unequalled cooling and QE performance, year after year
- **Selectable amplifier outputs – EMCCD and conventional**
  '2 in 1' flexibility. EMCCD for ultra-sensitivity at speed, conventional CCD for longer acquisitions
- **Enhanced Photon Counting Modes**
  Intuitive single photon counting modes to overcome multiplicative noise, Real time or post-processing



Large Field of View - Megapixel Back-Illuminated EMCCD

Andor's iXon3 888 is megapixel back-illuminated EMCCD, combining large field of view, single photon detection capability and > 90% QE. The 1024 x 1024 frame transfer format offers unequalled thermoelectric cooling down to -95°C and industry-lowest clock induced charge noise. EMCCD and conventional CCD readout modes provide heightened application flexibility. New EX2 technology offers extended Quantum Efficiency performance.

The iXon3 888 benefits from an advanced set of user–requested features, including OptAcquire, Count Convert, Spurious Noise Filters, Cropped Sensor Mode, Signal Averaging and enhanced Photon Counting capability. Patented EMCAL™ and RealGain™ provide sustained quantitative EM gain calibration.

Specifications Summary [*2]

Active pixels	**1024 x 1024**
Pixel size (W x H)	**13 x 13 µm**
Active area pixel well depth	**80,000 e^-**
Gain register pixel well depth	**730,000 e^-**
Maximum readout rate	**10 MHz**
Frame rate	**8.7 - 4,205 fps**
Read noise	**< 1e^- with EM gain**
Maximum cooling	**-95°C**

System Specifications [2]

Model number	888
Sensor options	**#BV**: Back Illuminated, standard AR coated **BVF**: Back Illuminated, standard AR coated with fringe suppression **UVB**: Back Illuminated, standard AR with additional lumogen coating **#EX:** Back illuminated, dual AR coated **EXF:** Back illuminated, dual AR coated with fringe suppression
Active pixels	1024 x 1024
Pixel size	13 x 13 µm
Image area	13.3 x 13.3 mm with 100% fill factor
Minimum temperature, air cooled, ambient 20°C Recirculator liquid cooling, coolant @ 22°C, >0.75l/min Chiller liquid cooling, coolant @ 10°C, >0.75l/min	-80°C -90°C -95°C
Digitization	True 14 bit @ 10, 5, 3 & 1 MHz readout rate (optional 16-bit available @ 1 MHz)
Triggering	Internal, External, External Start, External Exposure, Software Trigger
System window type	**#BV and BVF sensors:** UV-grade fused silica, 'Broadband VIS-NIR', wedged **UVB sensor:** UV-grade fused silica, 'Broadband VUV-NIR', unwedged **#EX, EXF sensors:** UV-grade fused silica, 'Broadband VUV-NIR', wedged
Blemish specification	Grade 1 sensor (CCD201-20), as defined by the sensor manufacturer (see www.e2v.com for further details)

Advanced Performance Specifications [2]

Dark current and background events [3, 4] Dark current (e-/pixel/sec) @ -85°C Spurious background (events/pix) @ 1000x gain / -85°C	 0.0005 0.004	
Active area pixel well depth	80,000 e-	
Gain register pixel well depth [5]	730,000 e-	
Pixel readout rates	Electron Multiplying Amplifier 10, 5, 3, 1 MHz	Conventional Amplifier 3 & 1 MHz
Read noise (e-) [6]	**Without Electron Multiplication**	**With Electron Multiplication**
10 MHz through EMCCD amplifier	47	< 1
5 MHz through EMCCD amplifier	35	< 1
3 MHz through EMCCD amplifier	27	< 1
1 MHz through EMCCD amplifier	18	< 1
1 MHz through conventional amplifier	6	-
Linear absolute Electron Multiplier gain	1 - 1000 times via RealGain™ (calibration stable at all cooling temperatures)	
Linearity [7]	Better than 99%	
Vertical clock speed	0.9 to 6.5 µs (variable)	

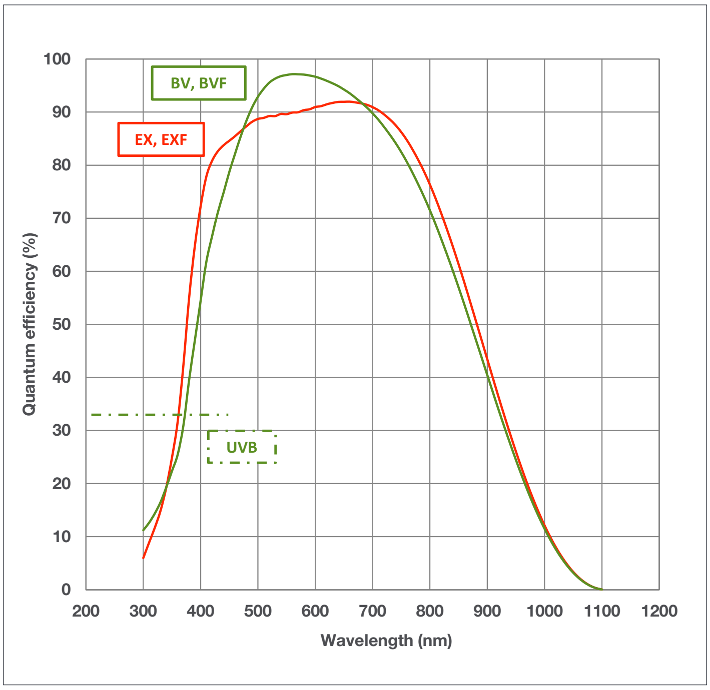
Frame Rates (Standard Mode) [8]

	Array size						
Binning	**1024 x 1024**	**512 x 512**	**256 x 256**	**128 x 128**	**1024 x 100**	**1024 x 32**	**1024 x 1**
1 x 1	8.7	17	34	64	83	202	622
2 x 2	17	33	64	117	148	313	-
4 x 4	33	63	115	197	240	426	-
8 x 8	61	111	191	297	345	507	-

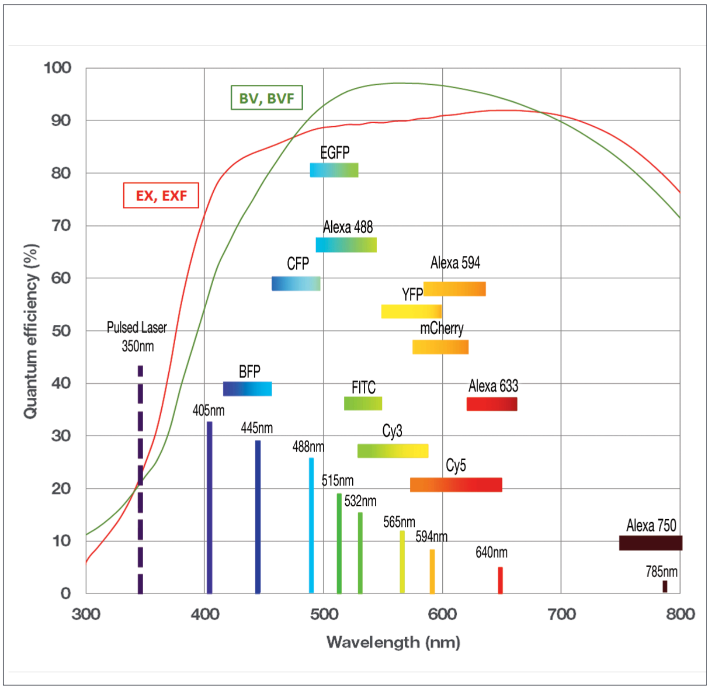
Frame Rates (Cropped Mode) [8]

	Array size					
Binning	**512 x 512**	**256 x 256**	**128 x 128**	**1024 x 100**	**1024 x 32**	**1024 x 1**
1 x 1	17	66	242	92	269	4205
2 x 2	34	127	443	179	511	-
4 x 4	64	233	757	338	926	-
8 x 8	117	400	1173	609	1560	-

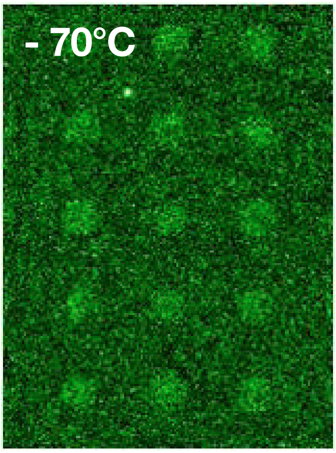
Quantum Efficiency Curves [9]

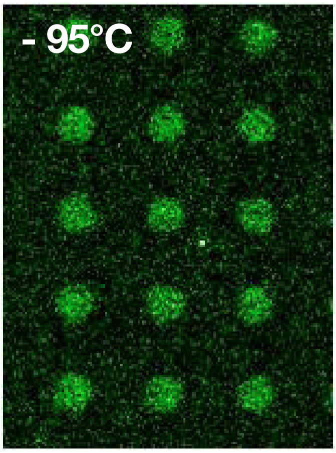


QE vs. Fluorophores Curve



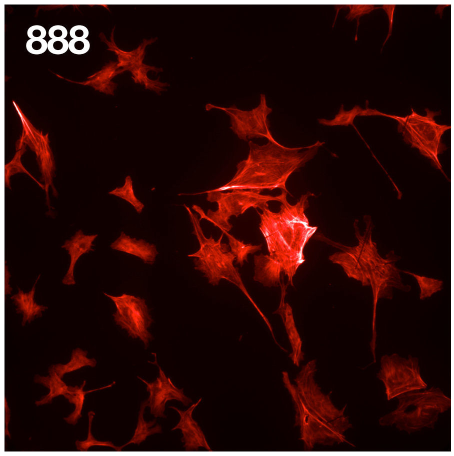
Deep Cooling

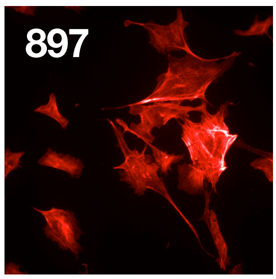




Images of extremely dim LED signal (signal intensity typical of weak luminescence experiments) acquired with iXon3 888 at cooling temperatures -70°C and -95°C (water cooling to achieve latter), 120 sec exposure times, sub-region show. The need to push to such deeper cooling temperatures can be readily observed under such extreme low light conditions

Field of View Comparison





Field of View Comparison between iXon3 models. The 888 model has a x2.6 greater sensitive area than the 897 model.

Creating The Optimum Product for You

How to customise the iXon3 888:

Step 1.

Simply select from the 2 digitisation options that best suit your needs from the selection opposite.

Step 2.

The iXon3 888 comes with 5 options for sensor types. Please select the sensor which best suits your needs.

Step 3.

Please indicate alternative window option if required.

Step 4.

Please indicate which software and controller card you require.

Step 5.

For compatibility, please indicate which accessories are required.

DU-888 [D] - C00 - [EXF]

example shown

Step 1.

Choose digitisation option

D: 10, 5, 3 & 1 MHz readout @ 14 bit
E: 10, 5, & 3 MHz readout @ 14 bit and 1 MHz @ 16 bit

Step 2.

Choose sensor finish option

#BV: Back-illuminated, standard AR coated
BVF: Back-illuminated, standard AR coated with fringe suppression
UVB: Back Illuminated, standard AR with additional lumogen coating
#EX: Back-illuminated, EX2 dual AR coated
EXF: Back-illuminated, EX2 dual AR coated with fringe suppression

Step 3.

Select alternative camera window (optional)

The standard window has been selected to satisfy most applications. However, other options are available. The alternative camera window code must be specified at time of ordering.

To view and select other window options please refer to the '**Camera Windows Supplementary Specification Sheet**' which gives the transmission characteristics, product codes and procedure for entering the order. Further detailed information on the windows can be found in the Technical note – '**Camera Windows: Optimizing for Different Spectral Regions**'.

Step 4.

The iXon3 888 requires at least one of the following controller card and software options:

CCI-23 PCI Controller card.
CCI-24 PCIe Controller card.

Solis Imaging A 32-bit application compatible with 32 and 64-bit Windows (XP, Vista, 7 and 8) offering rich functionality for data acquisition and processing. AndorBasic provides macro language control of data acquisition, processing, display and export.

Andor SDK A software development kit that allows you to control the Andor range of cameras from your own application. Available as 32 and 64-bit libraries for Windows (XP, Vista, 7 and 8), compatible with C/C++, C#, Delphi, VB6, VB.NET, LabVIEW and Matlab. Linux SDK compatible with C/C++.

Andor iQ A comprehensive multi-dimensional imaging software package. Offers tight synchronization of EMCCD with a comprehensive range of microscopy hardware, along with comprehensive rendering and analysis functionality. Modular architecture for best price/performance package on the market.

Third party software compatibility

Drivers are available so that the iXon3 range can be operated through a large variety of third party imaging packages. See Andor web site for detail: andor.com/software/

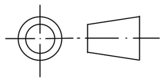
Step 5.

The following accessories are available:

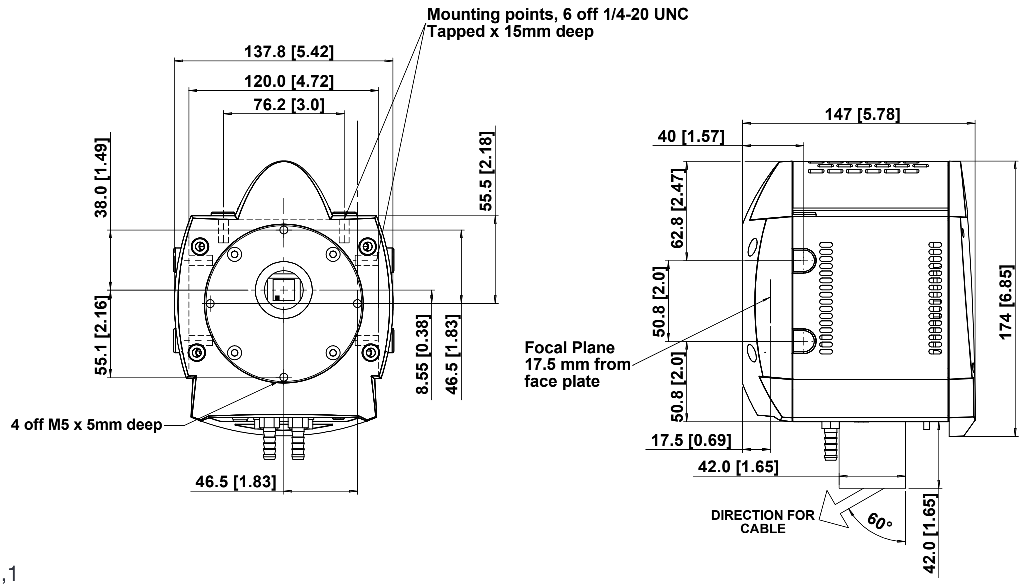
OPTOMASK Optomask microscopy accessory, used to mask unwanted sensor area during Cropped Sensor mode acquisition.
XW-RECR Re-circulator for enhanced cooling performance
ACC-XW-CHIL-160 Oasis 160 Ultra compact chiller unit
OA-CNAF C-mount to Nikon F-mount adapter
OA-COFM C-mount to Olympus adapter
OA-CTOT C-mount to T-mount adapter

Product Drawings

Dimensions in mm [inches]

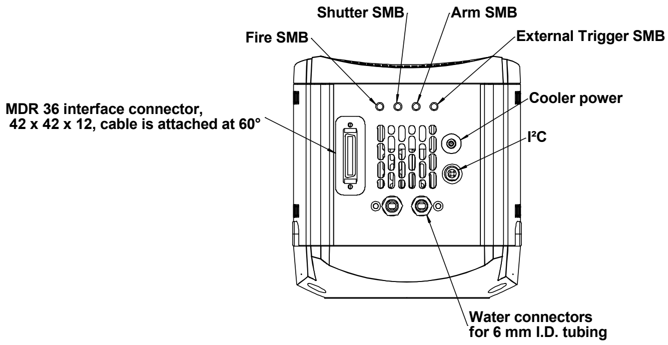


Third-angle projection



■ = position of pixel 1,1

Weight: 3.4 kg [7 lb 8 oz]



Connector panel

Connecting to the iXon3

Camera Control

Connector type: PCI or PCIe

TTL / Logic

Connector type: SMB, provided with SMB - BNC cable

Fire (Output), Shutter (Output), Arm (Output), External Trigger (Input)

I²C connector

Compatible with Fischer SC102A053-130, pinouts as follow:

1 = I²C Clock, 2 = I²C Data, 3 = Ground , 4 = +5 Vdc

Minimum cable clearance required at rear of camera

90 mm

Typical Applications

- Single Molecule Detection
- Tomography
- In Vivo Luminescence
- TIRF Microscopy
- Spinning Disk Confocal Microscopy
- FRET
- Microspectroscopy / Hyperspectral Imaging
- Astronomy
- Single Photon Counting

Order Today

Need more information? At Andor we are committed to finding the correct solution for you. With a dedicated team of technical advisors, we are able to offer you one-to-one guidance and technical support on all Andor products. For a full listing of our local sales offices, please see: andor.com/contact

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Items shipped with your camera:

1x PCI or PCIe controller card + SATA adapter
1x Controller card splitter/fly-lead (if required)
1x 3m iXon3 detector cable
2x 2m SMB to BNC connection cables
1x Power supply with mains cable
1x Quick launch guide
1x CD containing Andor user manuals
1x Individual system performance booklet
1x Disposable ESD wrist strap

Footnotes: Specifications are subject to change without notice

1. Assembled in a state-of-the-art cleanroom facility, Andor's UltraVac™ vacuum process combines a permanent hermetic vacuum seal (no o-rings), with a stringent protocol to minimize outgassing, including use of proprietary materials.
2. Figures are typical unless otherwise stated.
3. The dark current measurement is averaged over the sensor area excluding any regions of blemishes.
4. Using Electron Multiplication (EM) the iXon3 is capable of detecting single photons, therefore the true camera detection limit is set by the number of 'dark' background events. These background events consist of both residual thermally generated electrons and Clock Induced Charge (CIC) electrons (also referred to as Spurious Charge), each appearing as random single spikes that are well above the read noise floor. A thresholding scheme is employed to count these single electron events and is quoted as a probability of an event per pixel. Acquisition conditions are full resolution and max frame rate (10 MHz readout; frame-transfer mode; 1.7 µs vertical clock speed; x 1000 EM gain; 10 ms exposure; -85°C).
5. The EM register on CCD201 sensors has a linear response up to 400,000 electrons max. and a full well depth of ~730,000 electrons maximum.
6. Readout noise is for the entire system. It is a combination of sensor readout noise and A/D noise. Measurement is for Single Pixel readout with the sensor at a temperature of -75°C and minimum exposure time under dark conditions. Under Electron Multiplying conditions, the effective system readout noise is reduced to sub 1e^- levels.
7. Linearity is measured from a plot of counts vs exposure time under constant photon flux up to the saturation point of the system.
8. All measurements are made with 0.9 µs vertical clock speed. It also assumes internal trigger mode of operation.
9. Quantum efficiency of the sensor at 20°C, as supplied by the sensor manufacturer.

Recommended Computer Requirements:

- 3.0 GHz single core or 2.6 GHz multi core processor
- 2 GB RAM
- 100 MB free hard disc to install software (at least 1 GB recommended for data spooling)
- PCI 2.2 or PCIe slot
- 10,000 rpm SATA hard drive preferred for extended kinetic series
- Windows (XP, Vista, 7 and 8) or Linux

Operating & Storage Conditions

- Operating Temperature: 0°C to 30°C ambient
- Relative Humidity: < 70% (non-condensing)
- Storage Temperature: -25°C to 50°C

Power Requirements

- 110 - 240 VAC, 50 - 60 Hz

LiXon3888SS 0114 R1