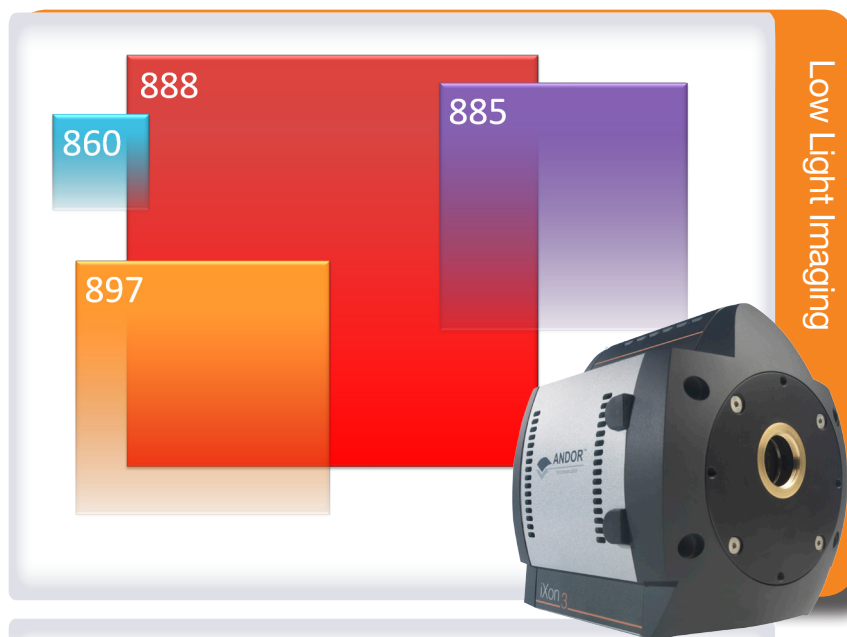


Features and Benefits

- **13.3 x 13.3 mm sensor**
Largest Field of View EMCCD
- **TE cooling to -95°C**
Critical for elimination of dark current detection limit
- **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
- **Minimal Clock-Induced Charge**
Unique pixel clocking parameters, yielding minimized spurious noise floor
- **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
- **Real Time Signal Averaging**
Recursive and frame averaging functions for improved SNR



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.

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

Active pixels	1024 x 1024
Pixel size (W x H)	13 x 13 μm
Active area pixel well depth	90,000 e ⁻
Gain register pixel well depth	730,000 e ⁻
Maximum readout rate	10 MHz
Frame rate	8.7 - 4205 fps
Read noise	< 1e ⁻ with EM gain
Maximum cooling	-95°C

System Specifications ^{*2}

Model number	888
Sensor options	BV: Back Illuminated CCD, Vis optimized UVB: Back Illuminated CCD with UV coating BB: Back illuminated, blue optimised AR coating
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	-80°C
Coolant recirculator	-90°C
Coolant chiller, coolant @ 10°C, 0.75l/min	-95°C
Digitization	True 14 bit @ 10, 5, 3 & 1 MHz readout rate (16 bit available @ 1 MHz)
Triggering	Internal, External, External Start, External Exposure, Software Trigger
System window type	Single window with double-sided AR coating (standard for BV model)
Blemish specification	Grade 1 sensor (CCD201-20), as defined by the sensor manufacturer e2V For further details see http://www.e2v.com/?go=d&doc=D0545A5B-24E8-7360-B635011B4BB24026

Advanced Performance Specifications ^{*2}

Dark current and background events ^{*3,4}		
Dark current (e⁻/pixel/sec) @ -85°C	0.001	
Spurious background (events/pix) @ 1000x gain / -85°C	0.01	
Gain register pixel well depth ^{*5}	730,000 e ⁻	
Pixel readout rates	Electron Multiplying Amplifier	Conventional Amplifier
	10, 5, 3, 1 MHz	3 & 1 MHz
Read noise (e⁻) ^{*6}	Typical	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)	

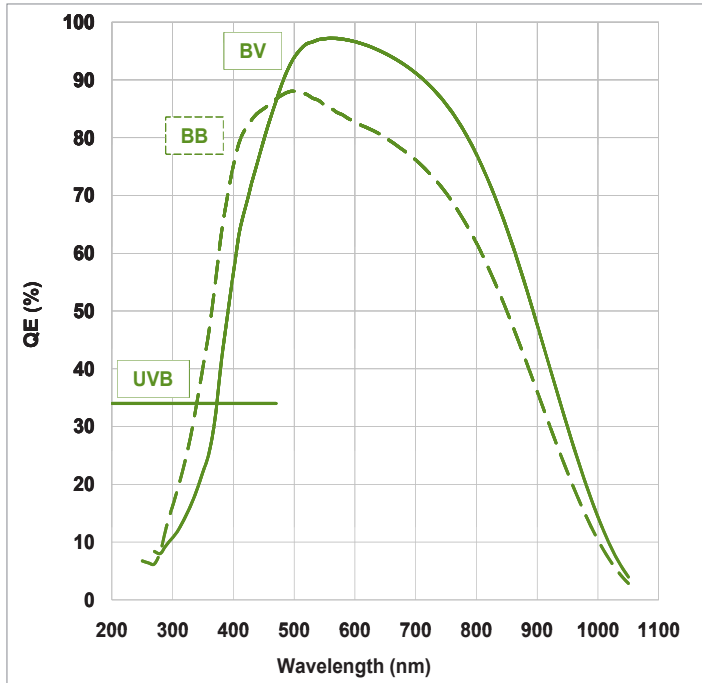
Frame Rates (Standard Mode) ^{*8}

Binning	Array size						
	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	-

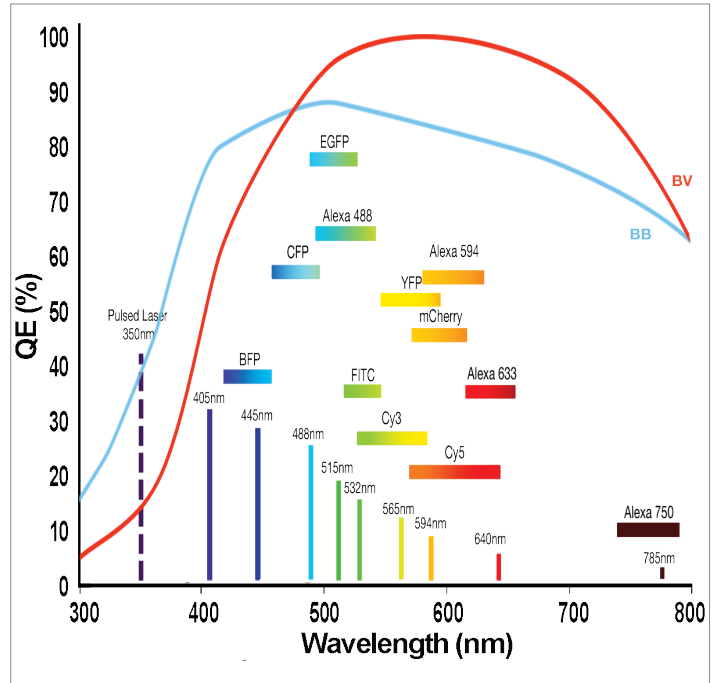
Frame Rates (Cropped Mode) ^{*8}

Binning	Array size					
	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	-

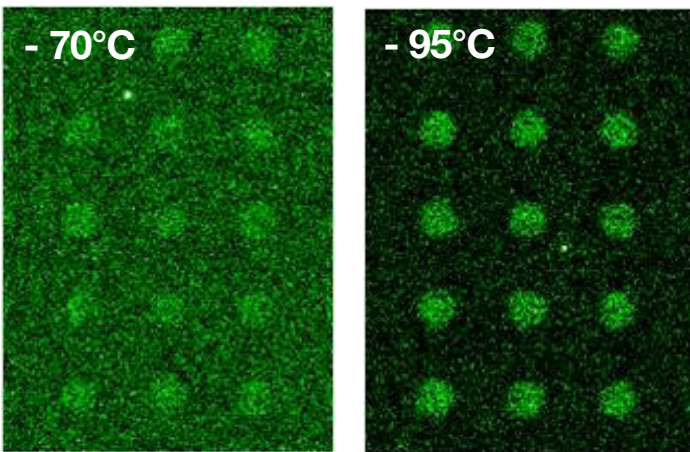
Quantum Efficiency Curves ⁹⁹



QE v Fluorophores Curve

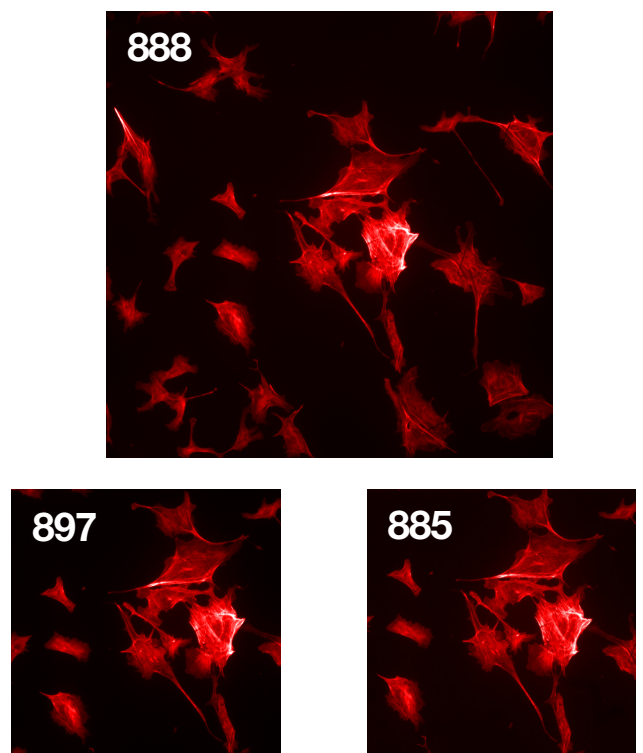


Deep Cooling



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 897 and 885 models.

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.

Verify lens mount suitability.

Step 3.

The iXon₃ 888 (BB sensor only) comes with 2 alternative options for window coatings. Please select the coating which best suits your needs.

Step 4.

The iXon₃ 888 comes with 3 options for sensor types. Please select the sensor which best suits your needs.

Step 5.

Please indicate which software and controller card you require.

Step 6.

For compatibility, please indicate which accessories are required.

DU-888 **D** - **C** - 0 0 - # **BV**
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 lens mount option

C: C-mount
Other mounts available - please call us for further information

Step 3.

Choose window option

0: Default window (non-BB sensors)
B: Blue optimized AR coated window (BB sensors only - see step 4)
Q: Quartz uncoated window (BB sensors only - see step 4)

Step 4.

Choose sensor finish option

#BV: Back illuminated, mid-band AR coated sensor
UVB: Back illuminated, UV coated sensor
#BB: Back illuminated, blue optimized AR coated sensor

Step 5.

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 for Imaging A 32-bit application compatible with 32 and 64-bit Windows (XP, Vista and 7) 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 and 7) and Linux. Compatible with C/C++, C#, Delphi, VB6, VB.NET, LabVIEW and Matlab.

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: <http://www.andor.com/software/>

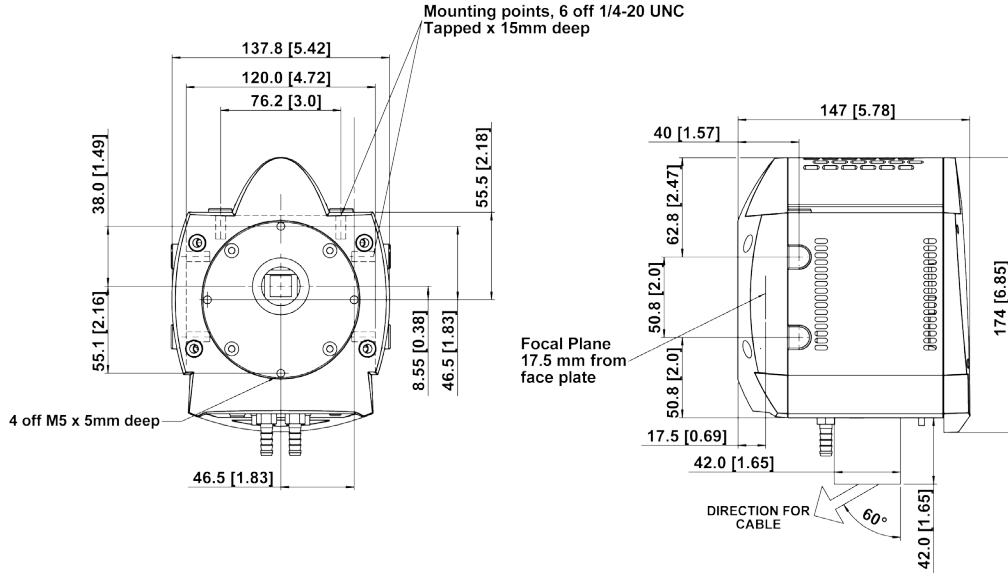
Step 6.

The following accessories are available:

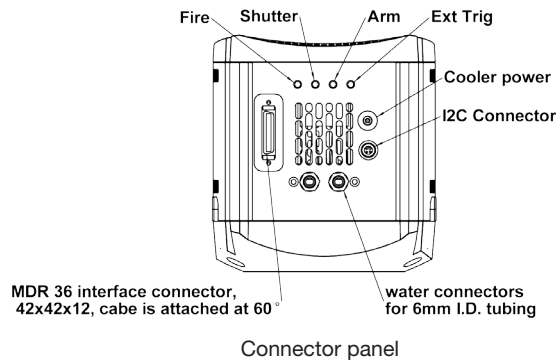
OPTOMASK Optomask microscopy accessory, used to mask unwanted sensor area during Cropped Sensor mode acquisition.
XW-RECR Re-circulator for enhanced cooling performance
ACC-XW-CHIL-160 Oasis 160 Ultra compact chiller unit
OA-CNAF C-mount to Nikon F-mount adapter
OA-COFM C-mount to Olympus adapter
OA-CTOT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

Product Drawings

Dimensions in mm [inches]



Weight: 3.4 kg [7 lb 8 oz]



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



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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 - 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 measured 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 and 7) 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 0511 R1