

cellSens Dimension Software Guide

Version 1.3 rev 21 May 2014



for the iXon Ultra 897 & iXon 3897

Andor Technology 2014

andor.com



TABLE OF CONTENTS

INTF	RODU	ICTION
SEC	TION	1: INSTALLATION OF CELLSENS DIMENSION4
1.1	INSTA THE I	LLING CELLSENS DIMENSION TO RUN THE IXON ULTRA 897 AND XON ₃ 897 FOR THE FIRST TIME4
SEC ULTI	TION RA 89	2: USING CELLSENS DIMENSION WITH THE IXON 7 & IXON ₃ 897
2.1	RUNN TIME	IING THE IXON ULTRA 897 OR THE IXON ₃ 897 FOR THE FIRST IN CELLSENS DIMENSION7
2.2	SETTI	NG THE ACQUISITION PARAMETERS9
2.3	CONT	INUOUS LIVE VIEW AND SNAPSHOT13
2.4	SETTI	NG UP A KINETIC SERIES IN CELLSENS
	2.4.1	SETTING UP A TIMELAPSE IN CELLSENS DIMENSION
	2.4.2	Saving a Kinetic Series
	2.4.3	Saving a Kinetic series as a Multi-page tiff File
2.5	SETTI	NG A CUSTOM REGION OF INTEREST (ROI) IN CELLSENS
	DIME	NSION17
2.6	IXON	ULTRA 897 FRAME RATES IN CELLSENS DIMENSION
2.7	IXON	ULTRA 897 FEATURE MATRIX IN CELLSENS DIMENSION



INTRODUCTION

This document explains how to install and setup Olympus cellSens Dimension for use with the iXon Ultra 897 and iXon₃ 897.

IMPORTANT INFORMATION ABOUT USING CELLSENS DIMENSION

cellSens Dimension 1.9 is compatible with Windows 7 and 8, 32 and 64-bit operating systems.

iXon3 and iXon Ultra 897 cameras from Andor Technology require 'High End Camera Solution' from Olympus in order to work with cellSens Dimension software. Please contact your local Olympus representative for more information. This is a separate module to the cellSens Dimension license.

Trademarks and Patent Information

Andor[®], the Andor logo, iXon and Solis are trademarks of Andor Technology. Andor is an Oxford Instruments company. cellSens Dimension is a registered trademark of the Olympus Soft Imaging Solutions GmbH. All other marks are property of their owners.

Front page image courtesy of Prof. Jan Liphardt and Dr. Alan Lowe, University of California, Berkeley, USA.

REVISION HISTORY

Version	Released	Description
1.0	12 Nov 2013	Initial Release
1.1	22 Nov 2013	Added information regarding High End Camera Support requirement (Section 1.1) Added additional Driver installation information (Section 1.1)
1.2	12 May 2014	Added Software feature matrix (Section 2.7) Updated presentation (All Sections)
1.3	21 May 2014	Minor edit to text in table for consistency (Section 2.7)

INSTALLATION STEPS

SECTION 1: INSTALLATION OF CELLSENS DIMENSION

1.1 Installing cellSens Dimension to run the iXon Ultra 897 and the iXon $_3$ 897 for the first time

- 1. Install cellSens Dimension following the steps in the installer.
- 2. Ensure 'High End Camera Support for cellSens 1.9' is selected*

solution is an ad	ditional component that extends the functionality of your imaging software.	
vailable solutions		
Install	Product	
	CI Deconvolution for cellSens 1.9	
	Count & Measure Full for cellSens 1.9	
	CSU for cellSens Dimension 1.9	
	Database Client Edition for cellSens 1.9	
	Database Connect Edition for cellSens 1.9	
121	Database Core Edition for cellSens 1.9	
J	High End Camera Support for cellSens 1.9	
	LC20 for cellSens (OCA)	
	Multi Position for cellSens 1.9	
	NetCam for cellSens 1.9	
	Well Navigator for cellSens 1.9	
	too at a	

3. At the Image Source Selection, ensure the correct camera is selected e.g. **Andor iXon Ultra 897** as shown below.

cellSens Dimension 1.9 (build 11514) Setup	1
Image Source Selection Choose an image source for acquiring images	
Choose an entry from the left list. Then choose the device(s) you want to install from the right list. If your device is supported and not listed below, it will be installed automatically. Manufacturer/Image Source Device	Andor iYon
Olympus Soft Imaging Solutions Andor Hamamatsu Olympus Photometrics QImaging	Ultra 897
InstallShield	

* 'iXon3 and iXon Ultra 897 cameras from Andor Technology require 'High End Camera Solution' from Olympus in order to work with cellSens Dimension software. Please contact your local Olympus representative for more information' This is a separate module to the cellSens Dimension license.



or Andor iXon X3 DU 897 as shown here:

cellSens Dimension 1.9 (build 11514) Setup	X	
Image Source Selection Choose an image source for acquiring images	OLYMPUS	
Choose an entry from the left list. Then choose t list. If your device is supported and not listed below, Manufacturer/Image Source Olympus Soft Imaging Solutions Andor	he device(s) you want to install from the right it will be installed automatically. Device Andor Xon Ultra 897	Andor iXon X3
Hamamatsu Olympus Photometrics QImaging		DU897
InstallShield	< Back Next > Cancel	

- 4. Click 'Next'.
- 5. Follow the steps to complete the installation.
- After the cellSens installer has completed it places a HTML file on the Windows Desktop called 'Driver Information.html'. Open this file and follow the instructions to install the device drivers for the iXon₃ 897 and the iXon Ultra 897.
- 7. To install the driver for your Andor iXon camera, follow these steps:

For Andor iXon Ultra 897 camera:

- 1. Execute the file 'setup.exe'.
- 2. On the welcome page click 'Next'.
- 3. On the Select Destination Location page accept the default location and click 'Next'
- 4. On the **Select Components** page select '**Install 64-bit drivers onto your PC'.** Only select if you intend to use a 64-bit compiler and click '**Next**'.
- 5. On the Camera Types page accept the default 'iXon Ultra (USB)' and click 'Next'.
- 6. On the Ready to Install page click 'Install'
- 7. On the **Completing the Andor SDK 2.94.30007.0 Setup Wizard** page accept the default '**Yes, restart the computer now**' and click '**Finish**'.
- 8. Now connect your Andor iXon Ultra 897 camera to your computer and switch it on.
- 9. Windows will now install the driver for the camera (This will take a while).
- 10. Now the camera is ready for use.



For Andor iXon X3 DU897 camera:

- 1. Execute the file 'setup.exe'.
- 2. On the welcome page click 'Next'.
- 3. On the Select Destination Location page accept the default location and click 'Next'.
- 4. On the **Select Components** page select '**Install 64-bit drivers onto your PC**'. Only select if you intend to use a 64-bit compiler and click '**Next**'.
- 5. On the Camera Types page accept the default 'iXon (PCI)' and click 'Next'.
- 6. On the iXon Systems page accept the default 'All other systems' and click 'Next'.
- 7. On the Ready to Install page click 'Install'.
- 8. On the **Completing the Andor SDK 2.94.30007.0 Setup Wizard** page accept the default '**Yes, restart the computer now**' and click '**Finish**'.
- 9. The computer will now reboot.
- After the reboot go to the MS Windows Device Manager. (Please consult the MS Windows help on how to do this for your version of MS Windows). Select Other Devices PCI Data Acquisition and Signal Processing Controller.
- 11. Right-click 'PCI Data Acquisition and Signal Processing Controller' and select 'Update Driver Software'.
- 12. In the next dialog select 'Browse my computer for driver software'.
- 13. In the next dialog click 'Browse' and navigate to the directory 'Andor SOLIS\Drivers' in your program files directory.
- 14. Click 'Next'.
- 15. Confirm the next dialog by clicking 'Install'.

After successful installation there is a new section 'Andor' in the 'Device Manager'.



SECTION 2: USING CELLSENS DIMENSION WITH THE IXON ULTRA 897 & IXON3 897

- 1. Open the cellSens application, using Desktop Shortcut or from **Start>All Programs>cellSens Dimension>cellSens Dimension**.
- 2. Select 'High End Camera Support for cellSens 1.9'.

cellSens Dimension - Select Solutions					
You can select which of the following solutions you want to use in this working session.					
Solutions:					
High End Camera Support for cellSens 1.9					
Select <u>A</u> ll					
You can create a desktop shortcut for starting the program directly with the selected combination in future.					
Create Desktop Shortcut					
OK Cancel					

3. Click Create Desktop Shortcut, this ensures that the Andor cameras are always available.



USING CELLSENS DIMENSION WITH THE IXON ULTRA

4. Create a name and enter a comment for the Shortcut so you will always know what solution/camera will start with this shortcut.

Create Desktop Shortcut
Assign a name and comment that show which solutions will be started with this shortcut. The comment will appear when you hover over the shortcut.
You can change the name and comment later by right-clicking on the shortcut and selecting 'Properties'.
Name:
cellSens Dimension with Andor Camera Support
Comment:
A
· · · · · · · · · · · · · · · · · · ·
Create Desktop Shortcut Cancel

 On first run Quick Device Setup will automatically appear, select Andor iXon Ultra 897 or Andor iXon X3 DU897 as required:

	Quick Device Setup	8 ×
Andor iXon Ultra 897	Please select your camera and microscope Camera DP25 Not used Andor iXon Ultra 897 Andor iXon X3 DU897 DP25 DP71 DP72 DP80 SC100 SC30 CK	Cancel
	Quick Device Setup	8 X
Andor iXon X3 DU897	Please select your camera and microscope Camera Andor iXon Ultra 897 Andor iXon Ultra 897 Andor iXon X3 DU897 DP25 DP71 DP72 DP80 SC100 SC30	Cancel

6. Your iXon Ultra 897 or iXon $_3$ 897 is now ready to use in cellSens Dimension.



2.2 Setting the acquisition parameters

1. To access camera settings and set up acquisition parameters, open the **Acquire** tab on the main toolbar and click on **Devices > Device Settings**.



2. Choose 'Exposure' which will allow the maximum exposure to be set.

Configuration	Maximum exposure	time			
Default 🔹 🗟 abl 🗙 😂 📙	Manual:	0	5	s	Exposure
	<u>A</u> utomatic:	0	1	s	Settings
- 🔐 Information - 😭 Extra - 😭 Andor Ultra - 😍 Camera Adapter					
	Default				



For shorter exposures use the Exposure control in the Camera Control window.

cellSens Dimension	
File Edit View Acq	uire Image Process
🔁 • 🗃 • 🔚 🔒 🖌	ð 🕰 🛛 X 🖓 🕮 🎦
Camera Control	? 7 X
💷 쯝 🙀 🥵 🔛	🖬 💕 📙 💡
	6
Live	Snap
Movie recording	
Exposure: 38.08 ms	<u>^</u>
 Manual Automatic 	
38.08 ms 🗧 🕨 🔵	M (0)
Exposure time:	- ••

 To set the vertical shift speed and the vertical clock amplitude choose 'Andor Ultra'. This is also where extended EM gain control can be accessed. EM gain can also be controlled in the Camera Control window (shown below right).

vice Settings		cellSens Dimension
Configuration Default Camera Camera	EM Gain Range Allow extended EM gain range of 1000 Vertical dock control Vertical shifting speed: 0.5 µs Vertical glock amplitude: Normal	File Edit View Acquire Image Process
	Default	Exposure: 38.08 ms

CELLSENS DIMENSION WITH THE IXON ULTRA



4. To control the cooling temperature and the fan speed choose 'Extra' and adjust as required.



5. The readout rate can be set in the Camera Control window. In this example, '17 MHz EMCCD'.

	Pixelclock Pixeldock:	350
Selection of Readout rate	And 17 MHz EMCCD 0.08 MHz Conventional CCD 1 MHz Conventional CCD 1 MHz EMCCD 3 MHz Conventional CCD 5 MHz EMCCD 10 MHz EMCCD 17 MHz EMCCD Signal output: Total counts Spurious noise removal: Off Threshold multipler: 5 ÷ V Frame transfer Compared to the second	4 pixel 450 400

CellSens Dimension USING CELLSENS DIMENSION WITH THE IXON ULTRA



6. OptAcquire is a unique control interface, whereby a user can conveniently choose from a pre-determined list of set-up configurations, each designed to optimize the camera for different experimental acquisition types, thus removing complexity from the extremely adaptable control architecture of the iXon Ultra and iXon₃ 897. These preset modes can be accessed in the **Camera Control** window.

Andor iXon Ultra	
User defined Sensitivity and speed (EM amplifier) Dynamic range and speed (EM amplifier) Fastest frame rate (EM amplifier) Time lapse (EM amplifier) Time lapse and short exposures (EM amplifier) EMCCD highest dynamic range (EM amplifier) CCD lowest noise / slow readout (conventional amplifier) CCD highest dynamic range (conventional amplifier) CCD noise / readout balance (conventional amplifier) Photon counting Photon counting with long exposures (>10 sec) User defined Colored	Preset modes available for the selected camera model

Note: Camera preset modes for the iXon Ultra (11), iXon₃ 897 (9). Note also user defined option is available in addition to the preset modes.



2.3 Continuous Live View and Snapshot



For a continuous live view press the 'Live' icon in the **Camera Control** window or go to the **Acquire** tab and choose '**Live**'.



To acquire a snapshot press the '**Snap**' icon in the **Camera Control** window or go to the **Acquire** tab and choose '**Snap**'.

2.4 Setting up a Kinetic Series in cellSens

1. Configure acquisition settings using the Camera Control tab or go to the Acquire tab and choose 'Snap'.

Californi Domension		
For for law Schoe loss B	To No. 1920, Contraction Structure Contraction of Structure Contraction Structure Contra	d Massure / 52 Reporting Layout *
Carriera Control 7 # K	2 Star Free, *	Experiment Manager 7 # #
		BDHCBHR .
12 10	CellSens Dimension	* 0 0
Live Snep	Table & Candidate	New Dev. Dev
Expenses 6.000 ms		
@ Neval	Table Use the Table Subar Subars	
All a chart of		
formate true	Security of the devices the controlled in the Device List dialog law. Your unleases has to know which comparently, your microscope is assigned with. Only these companently can be configured and	
0 80	adjunguantly controlled by the otherway. You enter the defails of components that are available, in the 'Acquire' Descendent. 'I defail bes.	
Gent () 2	Constructions of the second of the second se	
EH gam	And a set of the components in the set of the component is the set of the component in	
	Constanting of the second seco	
\sim	Use this command to before characterism methods for your microscope, using commands to sufface to ive resonance that the second se	
HDR -		
Actives HCR	Your software provides a visited by being you go through the individual collection processor. Use the Acquire	
Assess (
	Caterar. This delay how offers several options that charges the behavior of your software, if you uncheck the option Show at each starture, the start page will not appear at the start of the software.	
forallow draw		
Resolution: 512 x 512 *		
512 × 512 *		
512×512 *		
Note +		
Pineklock •		
17 Mrs BHCOD *		
Andor illion Ultra * Acquire Mode: •		Br. Br. Br. Br.
😂 🍓 Gallery		
Ready		
	cellSens Dimension	
	File File Mount Accurate Table M	
	File Edit View Acquire Tools M	
	Camera Control ? 7 ×	
	Live Snap	
	Movie recording	

2. Select 'Movie recording' which is located under the 'Live' button.



3. Once you select 'Movie recording', the 'Snap' button updates to 'Movie'.



4. Click 'Movie' to begin the acquisition.

Note: The Movie button 💟 updates to 🔲 to show that an acquisition sequence is being recorded.

2.4.1 Setting up a Timelapse in cellSens Dimension

Use the '**Process Manager**' on the right hand side of the main cellSens window to define the number of frames you wish to acquire and to set an interval between frames. In addition, you can set a delay at the start of an acquisition. This is important, if for example, photoactivation of a sample is required before acquisition.

When all experimental parameters have been set press the 'Start' button to begin acquisition

Press the 'Start' button to begin acquisition	Process Manager 7 4 Live Image: Complexity of the second s
	 Automatic Processes Manual Processes Manual Processes Manual Processes Manual Processes Interval: 00000:00:30.020 • Interval: 00:00:00.079 • Cycles: 381 • Start delay: 00:00:00 • Start delay: 00:00:00 • As fast as possible Duration: 0:00:30



2.4.2 Saving a Kinetic Series

cellSens Dimension automatically saves the image acquisition files in avi format directly to disk in the **My Pictures** folder. The default save options can be modified in **Acquisition settings > Saving > Movie** if required.

Acquisition Settings	Amera Control	? + × Image: A state of the sta
Acquisition Settings	secon danging	8 ×
 → Acquisition → General → Online Deblur → Automatic EFI → Manual MIA → HDR → Document Name → Snapshot → Movie → Process/Experiment → Camera 	Automatic save Destination: Eile type: Close after save Directory Path: Create Subdirectory Preview:	File system AVI Video File (*.avi)
< <u> </u>	<u>D</u> efault	Apply to All OK Cancel
		Adjust the

Adjust the save settings as required



2.4.3 Saving a Kinetic series as a Multi-page tiff File

The kinetic series can also be saved as a multi-page tiff file after acquisition if required. To do this follow the steps below:

1. Select 'File' > 'Save as'.



2. Choose the location to save your image files to and choose .tiff as the file type.

Save Image As	1.0	1000	-	-		×
	oraries			√ 4 ₇	Search Pictures	م
Organize - Ne	w folder					2
🍌 Temp	Pictures library Includes: 2 locations				Arrange by:	Folder 🔻
📜 Libraries	_temp Sample Pictu	res				
Documents						
Videos						
File <u>n</u> ame: Save as <u>t</u> ype:	Acquisition Tagged Image File Format (*.tif)					•
Compress	ion: None					
Hide Folders				Options	Save	Cancel

3. Click 'Save'.



2.5 SETTING A CUSTOM REGION OF INTEREST (ROI) IN CELLSENS DIMENSION

To define a custom ROI follow the instructions below:

- 1. Start live mode to see the full field of view.
- 2. To define the ROI go to the '**Resolution**' part of the camera control window. Click on the '**Toggle sub-array**' button.

	Resolution: 512 x 512	•
	Live/Movie:	
	512 x 512 👻	
	Snap/Process:	
T L T . 1	512 x 512 👻	
sub-array	Apply to Live	

3. The dimensions of the ROI can be adjusted in the live window.

2.6 IXON ULTRA 897 FRAME RATES IN CELLSENS DIMENSION

The frame rates for the iXon Ultra 897 in cellSens dimension software are shown in the following figure. Please note that the Cropped mode feature is not available in cellSens Dimension.



Figure 1: Comparison of the Frame Rates of the iXon Ultra 897 for different ROI sizes



2.7 IXON ULTRA 897 FEATURE MATRIX IN CELLSENS DIMENSION

	iXon Ultra 897
Trigger Modes	
Internal	\checkmark
External	\checkmark
External Exposure	\checkmark
Software Trigger	\checkmark
Fast External	×
External Start	×
Acquisition Modes	
Single image	\checkmark
Continuous - camera acquires until aborted	\checkmark
Kinetic Series - Frame number and Rate Control	\checkmark
Accumulate mode - specify number and rate to accumulate images	×
Fast Kinetics - Increase frame rate for user defined rows (requires masked area)	×
Readout Modes	
Imaging - Full Image Readout from Sensor	\checkmark
Overlap - also called Frame Transfer (Selected modes only)	\checkmark
Full Vertical Binning (FVB)	×
Multi Track - User defined depth of vertically binned rows at user defined spacings	×
Crop mode (Corner tethered and Optically Centered)	×
ROI - Arbitrary size region anywhere on sensor	\checkmark
Camera Binning - User Defined*	×
Readout Parameters	
Exposure Time	\checkmark
EM Pixel Readout Rate - 17MHz, 10Mhz, 5Mhz, 1MHz	\checkmark
Conventional Pixel Readout Rate - 3MHz, 1MHz, 0.08MHz	\checkmark
Pre Amp Gain - 1,2 and 4	\checkmark
Vertical Shift Speed (3.3µS, 1.7µS, 0.9µS, 0.5µS and 0.3µS)	\checkmark
Vertical Clock Amplitude (Normal, +1,+2, +3, and +4)	\checkmark
Electron Multiplying Mode - Real gains from x2 to 300, - Real gains (x1000 in extended mode)	\checkmark
Optaquire	
Enable Specific Mode	\checkmark
Add/Delete user defined mode	×
iCam	
Change Exposure Time during acquisition - (Limitations apply, see manual)	×
Change EM gain and control	×
Metadata	
Timestamp Clock (current timestamp reading on camera) +/- 10ns and time of subsequent frames	×

USING CELLSENS DIMENSION WITH THE IXON ULTRA



	iXon Ultra 897
For USB cameras FIFO fill level recorder in Meta data	×
Image Processing	
Spurious Noise Filter (Median, Level above, Interquartile Range) -on camera correction	\checkmark
Data Averaging Filter	\checkmark
Shutter Control**	
Open/Closed/Auto (open on power up)	×
Fan Control	
High, Low, Off	\checkmark
Operating System Support	
Windows 7 & 8, 32-bit & 64-bit	\checkmark
Recommended Application Features	
Image Flip - Horizontal and Vertical (conventional and EM registers readout raw data in a different order by default)	\checkmark
Image Rotation - 90 degrees clockwise, 90 degrees anticlockwise	×
Image Streaming to disk at all sustained frame rates	×
Supported File formats should contain all acquisition information in header	×

* Fixed Binning Options 1, 2, 4, 8 & 16 available

**Shutter is opened upon initialization of camera, closed upon de-initialization