RETIGA E9 CMOS CAMERA

KEY FEATURES

- Optimal pixel size for lower magnification optics
- Large dynamic range with sub-electron noise and high full well capacity
- High quantum efficiency
- Programmable scan mode for light-sheet and digital slit confocal imaging
- Exposures up to 10 hours

TYPICAL APPLICATIONS

- Live cell imaging
- Light-sheet microscopy
- Spatialomics
- Luminescence
- Fluorescence microscopy
- Bioluminescence and chemiluminescence imaging

RELIABILITY

- Three-year warranty
- Extended warranty available

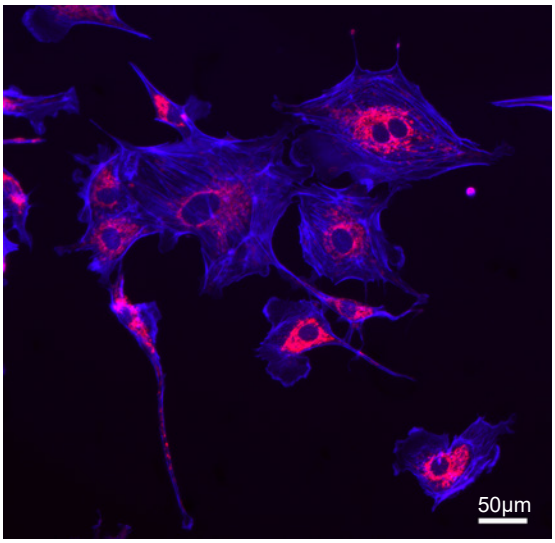
High Sensitivity, Low Dark Current, High Pixel Count sCMOS Camera

The Teledyne Retiga E9, a next-generation scientific CMOS camera, provides exceptional performance for demanding imaging applications. Whether it's light-sheet microscopy, high-content screening, or long-exposure imaging the Retiga E9 camera can meet your needs.

Featuring small pixels optimized for lower magnification, high numerical aperture optics, the Retiga E9 offers a maximum quantum efficiency above 90%, read noise less than one electron, and exposure times of up to 10 hours. This makes it an ideal solution for microscopists and instrumentation designers alike. With the Retiga E9 camera, you can capture fine features from your sample across larger fields of view, and measure almost every photon.

Programmable Scan Mode (PSM), a feature found on Photometrics scientific CMOS cameras, enables out-of-focus light rejection by syncing the rolling shutter of the camera with the position of the illumination for optimal contrast. PSM has been added to the Retiga E9 in both UP scan and DOWN scan directions.

Designed for OEM integration, the Retiga E9 camera has a small form factor, onboard triggering, and cross-platform support for Windows and Linux.



Cells labeled with Phalloidin (blue) and Mitotracker-Red (red) were imaged with a 20x 0.7NA lens. The field of view in the sample is approximately 800µm diagonal and the scale bar is 50µm long.

RETIGA E9 SPECIFICATIONS

SPECIFICATIONS	Camera Performance
Sensor	Sony IMX533 CMOS sensor
Active Array Size	3000 x 3000 (9 Megapixel)
Pixel Area	3.76 µm x 3.76 µm (14.1 μm^2)
Sensor Area	11.3 mm x 11.3 mm (16 mm diagonal)
Peak QE%	> 90% at 550 nm
Dark Current	2 x 10^{-5} e^-/p/sec
Readout Modes	Rolling shutter, Programmable Scan Mode (up, down)
Digital Binning	2 x 2, 3 x 3, 4 x 4, 8 x 8 and 16 x 16
Linearity	> 99%
Cooling Options	Air cooling to -25 °C at ambient temperatures < 30 °C
Digital Interfaces	USB 3.2 Gen 1(10 Gbps)
Lens Interfaces	C-mount
Mounting Points	1/4" - 20 TPI mount point on each side
Camera Weight	0.8 kg, 1.76 lbs
Camera I/O	Read out Trigger ready Exposure Out (all rows, line, any row, rolling shutter) Trigger in (first, edge, level)

CAMERA MODES

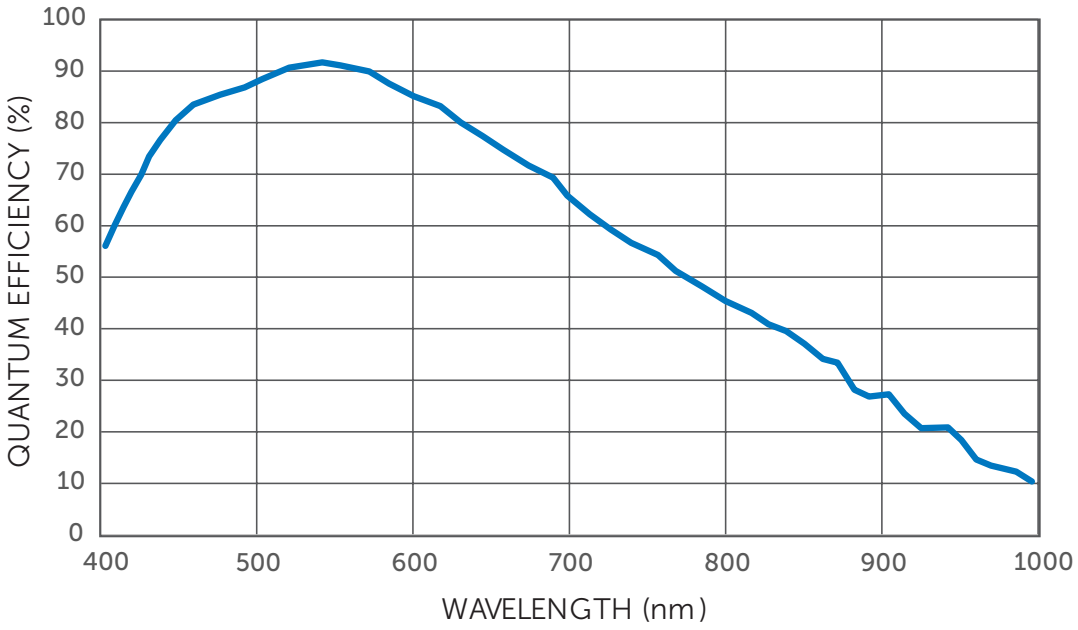
SPECIFICATIONS	Full Well	Balanced	Sensitivity
Full Well Capacity e^-	50 ke^-	16.5 ke^-	2000 e^-
Read Noise e^-	3.4 e^-	1.3 e-	0.8 e^-
Conversion gain e^-/gray	0.76	0.25	0.03
Dynamic Range	83.3 dB 14700	82.0 dB 12690	68.0 dB 2500

ROI SPEEDS

	Measured Frame Rates	
Region of interest in rows	**Startech card 3m C-C cable**	**USB 3.0 native port 0.9m A-C cable**
3000	26.9	25.3
1024	76.5	74.5
512	149.7	149.1
256	280.8	280.9
128	500.1	500.1
64	820.0	820.1
2	2158.9	2158.0

* The Retiga E9 is a rolling shutter camera so binning does not alter the frame rate.

RETIGA E9 QE CURVE

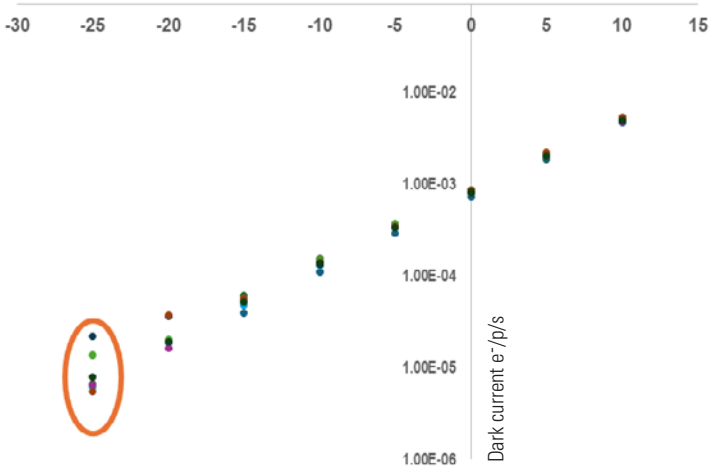


RESOLUTION (550 nm)

NA	0.1	0.2	0.3	0.4	0.6	0.8
Optical resolution (µm)	3.36	1.68	1.12	0.84	0.56	0.42
Ideal pixel size (µm)	1.46	0.73	0.49	0.36	0.24	0.18

Magnification sample	Pixel size in sample	Pixels per diffraction limited blur					
1	3.76	0.9	0.4	0.3	0.2	0.1	0.1
5	0.75	4.5	**2.2**	1.5	1.1	0.7	0.6
10	0.38	8.9	4.5	**3.0**	**2.2**	1.5	1.1
16	0.24	14.3	7.1	4.8	**3.6**	**2.4**	1.8
20	0.19	17.8	8.9	5.9	4.5	**3.0**	**2.2**

RETIGA E9 SENSOR TEMPERATURE



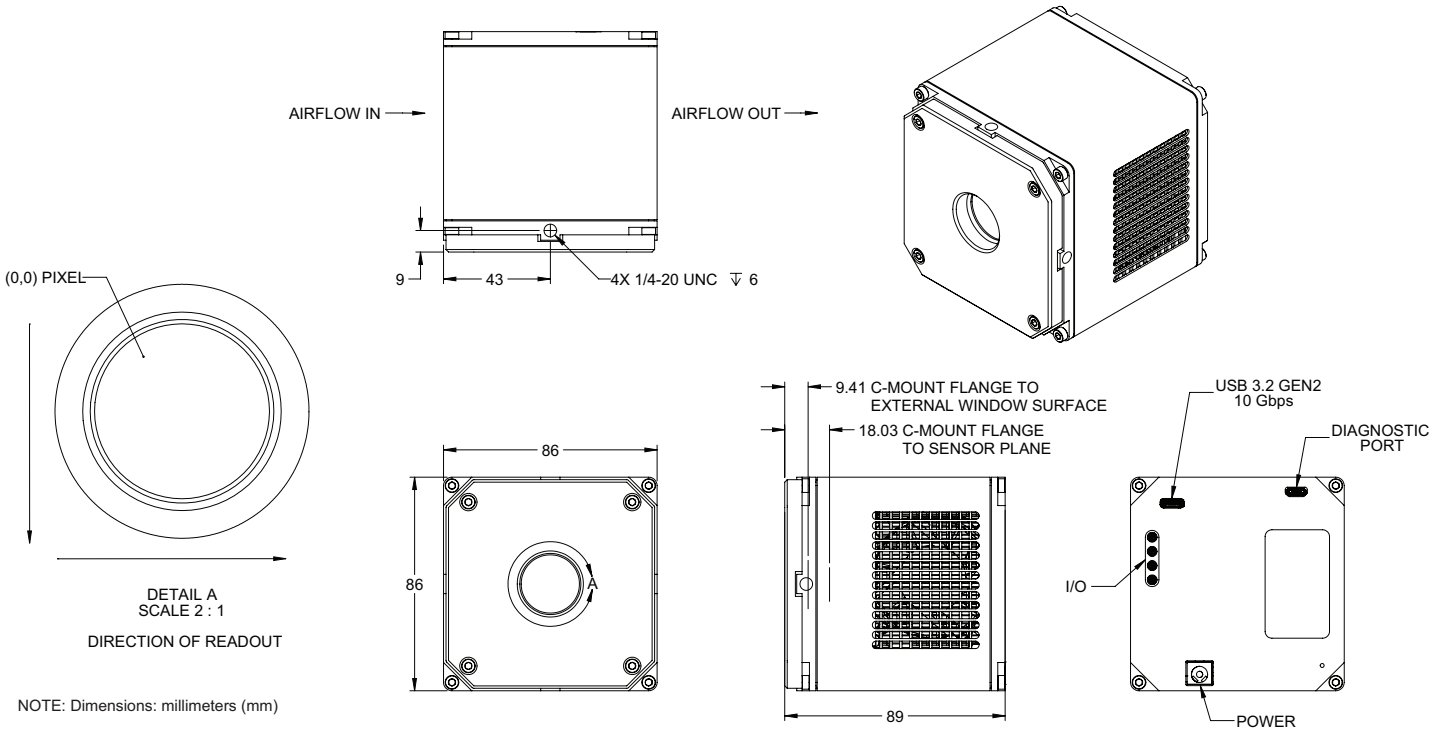
10^{-5} e⁻/p/s is on the order of an extra electron per pixel per day

Note on Dark Current Measurement

The Retiga E9 operates at a sensor temperature of -25 °C, where its dark current is exceptionally low–so low, in fact, that direct measurement requires hours-long dark exposures. To ensure efficient production testing, cameras are evaluated at 0 °C, where dark current can be measured in tens of minutes.

Using data collected across a range of sensor temperatures, (*as seen in the sensor temperature plot*) Teledyne accurately calculates the dark current at operating temperature, confirming the E9 camera's industry-leading thermal noise performance.

RETIGA E9 DIMENSIONAL OUTLINES (UNIT: MM)



RETIGA E9 ACCESSORIES

ACCESSORIES (INCLUDED)		
USB 3.2 Gen 2 10 Gbps interface card	Power supply (12V/5A DC)	PVCAM installation USB
USB A-C data cable, 0.9 m	PVCAM drivers/software	
USB C-C 3M data cable, 3 m	Quick installation guide	
Mini-BNC trigger cable	Performance and gain test data	

FOR MORE INFORMATION REACH OUT ONLINE:

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