ORCA-Fusion

CAMERA SPECS

LOW NOISE AND EXCEPTIONAL READ NOISE UNIFORMITY

HIGH RESOLUTION
2304 x 2304
5.3 Megapixels

HIGH SPEED
100 fps
At 2304 x 2048 ROI

DYNAMIC RANGE
21 400:1

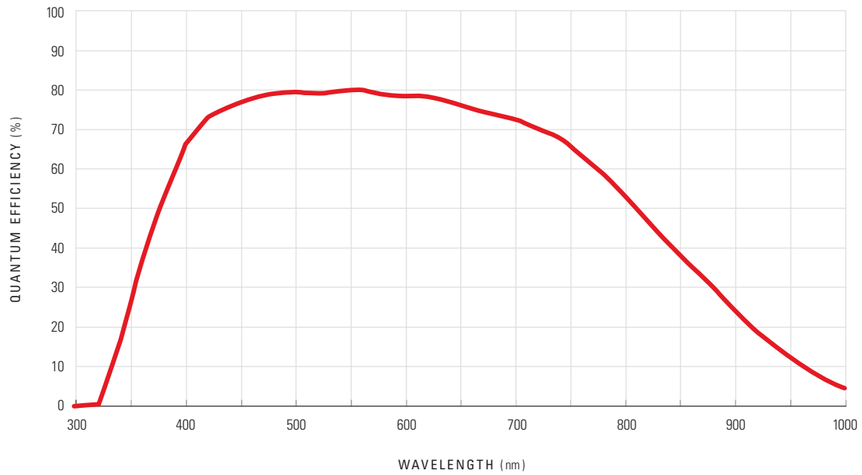
PIXEL SIZE
6.5 µm x 6.5 µm

READ NOISE
0.7 electrons, rms
Ultra Quiet Scan

PRNU
0.06% rms
@ 7500 electrons

DSNU
0.3 electrons rms

PEAK QE
80%



HAMAMATSUCAMERAS.COM

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ORCA-Fusion

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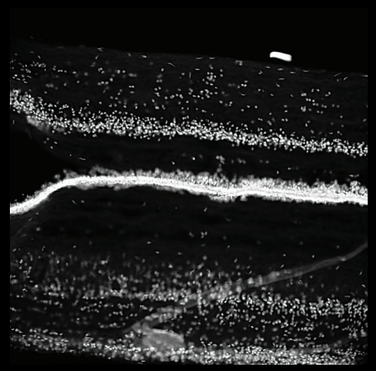
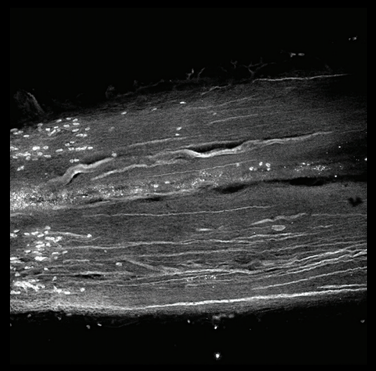
The ORCA-Fusion, built from the sensor up, balances the complex nuances of camera features to provide beautiful images and robust data at all lights levels, but especially in tough low-light conditions. The exceptionally low and highly uniform read noise of



A

B



C

the ORCA-Fusion means that when the sample emits even just a handful of photons, either by default or by experimental design, they are not lost in the noise, but detected and reliably quantified. After all, when you want to hear a whisper it's best to be in a quiet place.

ORCA-Fusion SPECIFICATIONS

Camera
ORCA-Fusion

Product Number
C14440-20UP

Pixel Size
6.5 µm x 6.5 µm

Effective number of pixels
2304 x 2304

Effective Area
14.976 mm x 14.976 mm

FUSION IMAGES

A. *Image of a regenerated lamprey spinal cord labeled with DAPI, which reveals the distribution of cells throughout the spinal cord. The brightest signal in the center of the spinal cord is the central canal. Credits: E. Guadarrama and J. Morgan (Marine Biological Laboratory).*

B. *Plant tissue culture induced to make xylem. Fluorescent bands are cell wall thickenings needed to reinforce the cell wall for water transport. Credits: Sample prepared by T. Baskin, UMass Amherst and provided by R. Oldenbourg, Marine Biological Laboratory.*

C. *Image of a regenerated lamprey spinal cord labeled with a neurofilament antibody, which reveals numerous regenerating axons. Credits: E. Guadarrama and J. Morgan (Marine Biological Laboratory).*

Readout noise (electrons, rms) [*1]	
Fast scan	1.4
Standard scan	1.0
Ultra quiet scan	0.7
Quantum efficiency [*1]	
@ 400 nm	65 %
@ 550 nm	80 %
@ 700 nm	70 %
@ 800 nm	50 %
Full well capacity [*1]	15,000 electrons
Dynamic range [*1]	21 400:1 [*2]
Conversion factor [*1]	0.24 electrons / count
Cooling Temperature	
With forced-air	-5 ˚C (Ambient temperature: +25 ˚C) [*3]
Water cooled	-5 ˚C (Water temperature: +25 ˚C) [*3]
Dark current (electrons/pixel/second) [*1]	
@ -5 ˚C	0.5
@ -15 ˚C	0.2
Dark offset	100 counts
Dark signal non-uniformity (DSNU)	0.3 electrons rms
Photo response non-uniformity (PRNU)	
@7500 electrons	0.06 % rms
Linearity error [*1] **(EMVA 1288 standard)**	0.5 %
Readout modes	Full resolution, digital binning (2 x 2, 4 x 4), sub-array, lightsheet
Readout times at full resolution [*4]	
Fast scan	11.22 ms (89 fps with CoaXPress or 31.6 fps with USB 3.0)
Standard scan	42.99 ms (23.2 fps with CoaXPress or USB 3.0)
Ultra quiet scan	184.4 ms (5.4 fps with CoaXPress or USB 3.0)
Lightsheet readout (fast scan)	
Row interval time	4.868 µs to 963.8 µs [*4]
Readout time at full resolution	11.22 ms to 2.221 s [*4]
Readout modes	Full resolution, sub-array
Readout directions	Top to bottom readout / Bottom to top readout
Exposure times	
Fast scan	17 µs to 10 s (4.87 µs step)
Standard scan	65 µs to 10 s (18.65 µs step)
Ultra quiet scan	280 µs to 10 s (80.00 µs step)
Trigger modes	Edge, Level, Sync readout, Start, Global reset edge, Global reset level, programmable
Trigger delay function	Yes
Trigger output	Global exposure timing, trigger ready, low, high
Input trigger connector	SMA x1
Output trigger connectors	SMA x 3
Master pulse mode	Free running / start trigger / burst
Digital output	16 bit [*5] / 12 bit / 8 bit
Interface	CoaXPress (6.25 Gbpsx2 lane) and USB 3.0 Super Speed [*6]
Lens mount	C-mount (Standard) / F-mount (Part Number TBD)
Software	HCImage, LabVIEW, MATLAB, µManager

[*1] Typical value [*2] Calculated from the ratio of the full well capacity and the readout noise [*3] Dark current depends on cooling temperature
[*4] Valid to 4 digits and rounded up to 5th digit [*5] With standard scan, A/D = 14 bits + 2 bits for linearity correction [*6] USB 3.1 Gen 1 compatible