

# W-VIEW GEMINI

## Simultaneous dual wavelength imaging by a single camera

The W-VIEW GEMINI is an image splitting optics which provides one pair of dual wavelength images separated by a dichroic mirror onto a single camera. Simultaneous image acquisition of dual wavelength images allows you high speed ratio metric imaging and other multiple fluorescence applications.



### Wide field of view

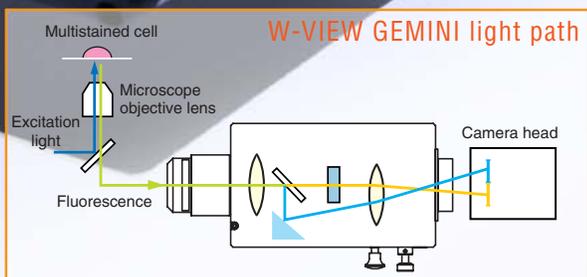
Exquisitely matched to Gen II sCMOS cameras

### High transmittance

Exceptional performance from 400 nm to 800 nm

### Chromatic aberration correction mechanism

### Compatible with a wide range of third party filters

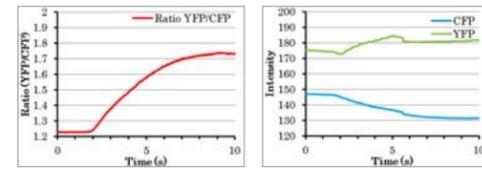
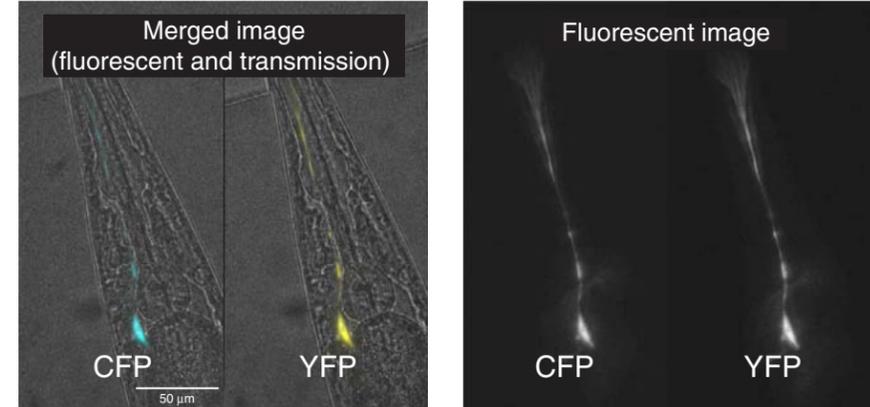


# Applications

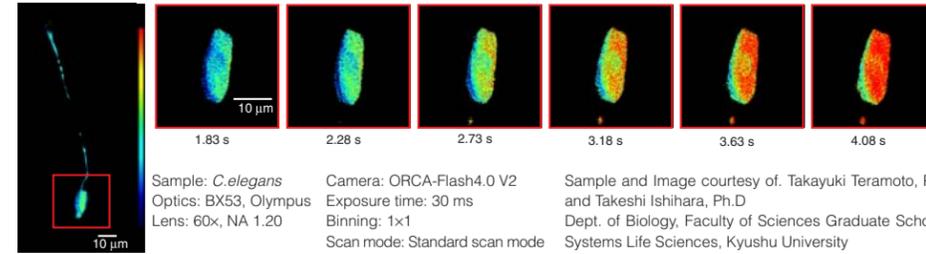


## Wide field of view and high speed Ca<sup>2+</sup> imaging of YC3.60 expressing ASER neuron in *C. elegans*

The combination of W-VIEW GEMINI and ORCA-Flash4.0 V2 Gen II sCMOS camera realizes wide field of view dual wavelength imaging. The combination enables FRET measurement of entire single neuron (cell body and dendrite) of *C. elegans* even under measuring conditions with high NA and magnification objective lens.



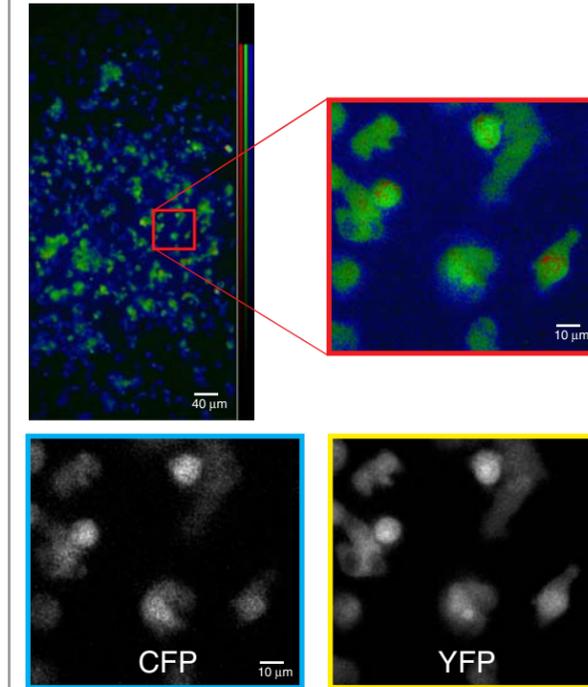
Ca<sup>2+</sup> response of ASER neuron to lower NaCl stimulation (50 mM → 25 mM) was observed at 33.3 frames/s.



Sample: *C. elegans*  
Optics: BX53, Olympus  
Lens: 60x, NA 1.20  
Camera: ORCA-Flash4.0 V2  
Exposure time: 30 ms  
Binning: 1x1  
Scan mode: Standard scan mode  
Sample and Image courtesy of Takayuki Teramoto, Ph.D. and Takeshi Ishihara, Ph.D.  
Dept. of Biology, Faculty of Sciences Graduate School of Systems Life Sciences, Kyushu University

## Wide field of view Ca<sup>2+</sup> imaging of YCnano15 expressing Cellular Slime Mold

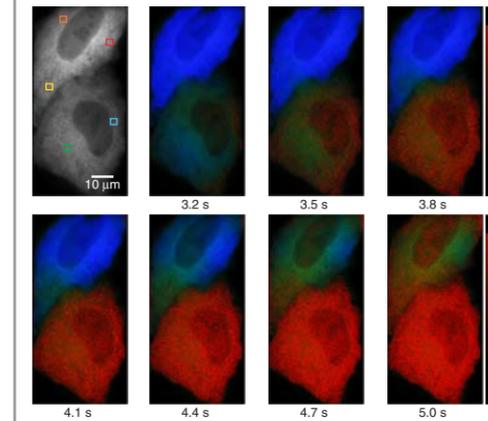
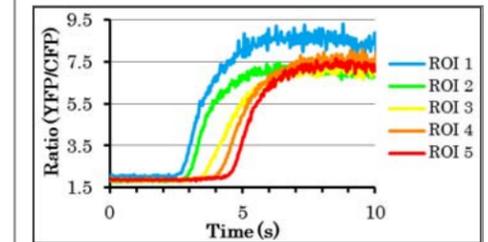
Ca<sup>2+</sup> dynamics of Cellular Slime Mold was observed at high resolution and wide field of view by the combination of W-VIEW GEMINI and ORCA-Flash4.0 V2 Gen II sCMOS camera.



Sample: Cellular Slime Mold  
Optics: TE2000E, Nikon  
Lens: 20x, NA 0.75  
Camera: ORCA-Flash4.0 V2  
Exposure time: 500 ms  
Binning: 2x2  
Scan mode: Slow Scan  
Sample and Image courtesy of Yoshiyuki Arai, Ph.D. and Takeharu Nagai, Ph.D.  
Department of Biomolecular Science and Engineering  
The Institute of Scientific and Industrial Research, Osaka University

## Fast Ca<sup>2+</sup> imaging of YC3.60 expressing HeLa cell

Ca<sup>2+</sup> dynamics of HeLa cell by histamine stimulation was observed at 33.3 frames/s by the combination of W-VIEW GEMINI and Imagem X2 EM-CCD camera.

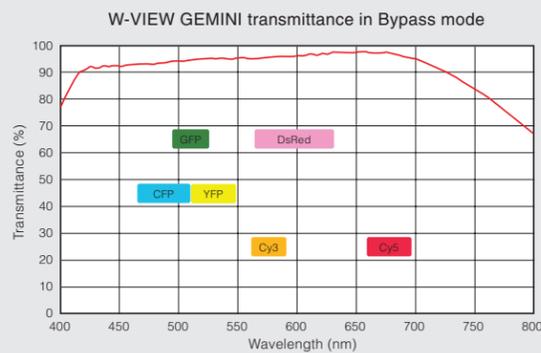


Sample: HeLa cells  
Optics: TE2000E, Nikon  
Lens: 100x, NA 1.49  
Camera: Imagem X2  
Exposure time: 30 ms  
Binning: 1x1  
Pixel clock rate: 22 MHz  
EM Gain: 1200x  
Sample and Image courtesy of Masahiro Nakano, Ph.D. and Takeharu Nagai, Ph.D.  
Department of Biomolecular Science and Engineering  
The Institute of Scientific and Industrial Research, Osaka University

## Flexibly matched to your experiment

### ● Signal from your sample can be hard to get - don't waste it.

The W-VIEW GEMINI provides excellent transmittance across a broad range of wavelengths. Exceptional performance from 400 nm to 800 nm is enabled by our proprietary lens system. When used with "imaging grade" filters, the system is optimized for low light imaging.



### ● Use all the pixels you've purchased

The W-VIEW GEMINI is designed to take advantage of the wide field of view provided by Gen II sCMOS cameras. Up to 13 mm x 6.4 mm F.O.V. and resolution of up to approximately 2000 pixels x 1000 pixels for each image.

### ● Choose your own filters

Because it is compatible with commercially available filters, the W-VIEW GEMINI allows for great wavelength flexibility. Choose the dichroic, bandpass and neutral density filters that work for your experimental question.

### ● Always ready, but never in the way.

Our "Bypass mode" (patent pending) means that by simply removing the dichroic mirrors, the camera sees the image as though it was connected directly to the microscope. You can switch between standard imaging and dual wavelength imaging without having to reconfigure the camera or remove the W-VIEW GEMINI.

### ● Chromatic aberration correction mechanism

The W-VIEW GEMINI has a correction lens unit in the long wavelength path and it can improve the magnification difference of two wavelength images caused by chromatic aberration. The following images show an example of the magnification difference caused by chromatic aberration is improved by the correction lens unit.



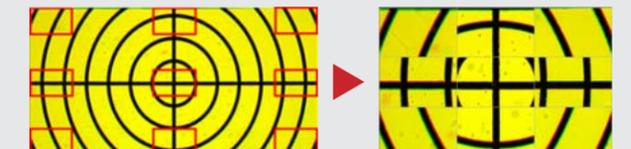
Without a correction lens unit      With a correction lens unit

### ● Symmetrically balanced design

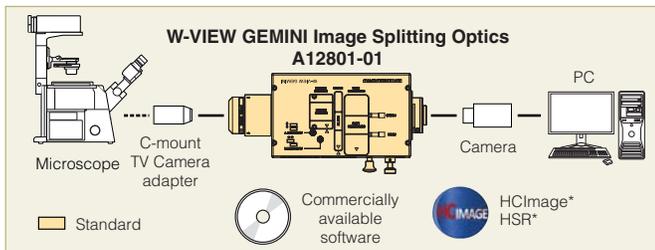
Designed for stability on both inverted and upright microscopes, the W-VIEW GEMINI's C-mount connectors are placed along a linear axis. And with its compact form factor, it integrates smoothly on a wide range of research microscopes.

### ● Fast and straight forward alignment

The W-VIEW GEMINI is designed to be easily adjusted when used with any camera. And, when using a Hamamatsu camera, the included "W-VIEW Adjustment" software makes the process even faster by simultaneously displaying and magnifying nine strategic points on the concentric chart (also included). This visual feedback lets the user dial in alignment quickly and accurately.



# Configuration example



\* HClmage/HSR software provides standard image measurement functions.

# Specifications

Product name	W-VIEW GEMINI image splitting optics
Product number	A12801-01
Structure	C-mount to C-mount linear structure
Input mount	C-mount (female)
Output mount	C-mount (male)
Relay lens magnification	1.0
Field of view*1	13 mm × 6.4 mm (W-VIEW mode) 13 mm × 13 mm (Bypass mode)
Mode	W-VIEW mode / Bypass mode*2
Transmittance wavelength range*3	400 nm to 800 nm
Transmittance (Typ.)*4	97 %
Dichroic mirror*5 *6	Compatible with 25.2 × 35.6
Bandpass filter*5 *6	Compatible with φ25.4 filter
ND filter*5 *6	Compatible with φ25.4 filter
Chromatic aberration correction mechanism	Correction lens unit *7 *8 *9
Ambient operating temperature	0 to 40 °C
Ambient storage temperature	-10 to 50 °C
Ambient operating and storage humidity	70 % max. (With no condensation)

- \*1 Vignetting may occur when used with a relay lens or variable magnification lens.  
Please check with your Hamamatsu representative to confirm this point before purchase.  
\*2 Mode in which dichroic mirror, etc. are removed from the light path and the image from the microscope is projected to the camera without alteration.  
\*3 All are values in the bypass mode.  
\*4 Value at peak wavelength in the bypass mode.  
\*5 Because dichroic mirror, band-pass filter and ND filter are not included with the W-VIEW GEMINI, they must be purchased separately. Use an "imaging grade" dichroic mirror and bandpass filters. See "Dichroic mirror and Bandpass filter specifications".  
A set which includes one Dichroic holder (empty) and one Filter holder (empty) is included with the W-VIEW GEMINI. Additional sets can be purchased by ordering part number A12802-01.  
\*6 For the usable size, see "Size of dichroic mirror and filters".  
\*7 This is to improve the magnification difference caused by chromatic aberration. The position difference of two wavelength images caused by the distortion aberration is not improved.  
\*8 Since the FOCUS knob is designed to improve the axial chromatic aberration caused by this optics, its effect is very limited.  
\*9 Dual focal plane imaging is not possible.

## Accessories included are:

Mask unit (6.4 mm), Mask unit (3.9 mm), Correction lens unit  
Dichroic holder (empty), Filter holder (empty),  
Mask unit cover, Correction lens cover, Dichroic cover, Filter cover  
C-mount cap (male), C-mount cap (female),  
Hex driver (2.5 mm), Hex driver (1.5 mm),  
Concentric chart, Filter jig, Format adjustment jig,  
Accessory storage case, Instruction manual

\*While one set of appropriate filter holders is included with the W-VIEW GEMINI, the actual filters are not. Please purchase them separately from a third party vendor.

## OPTIONS

Model name	Product name
A12802-01	Holder set for image splitting optics*1
A12964-01	Height adjustable stand*2

\*1 A12802-01 includes a Dichroic holder (empty) and a Filter holder (empty).

\*2 A12964-01 is the height adjustable stand inserted between the floor and W-VIEW GEMINI bottom.

Adjustable height range:

Vertical installation: 10 mm to 36 mm Horizontal installation: 32 mm to 59 mm

## Dichroic mirror and Bandpass filter specifications

To utilize the performance of the W-VIEW GEMINI's finely corrected optical system, we recommend using only dichroic mirror and bandpass filters of the highest quality. Appropriate dichroic mirror and bandpass filters can be purchased from companies like Semrock. Be sure to ask for their "imaging grade" filters.

## Recommended examples of Semrock filters

CFP/YFP FRET Imaging	
Bandpass Emitter 1	FF01-483/32-25
Bandpass Emitter 2	FF01-542/27-25
Dichroic mirror	FF509-FDi01-25x36

GFP/DsRED Dual Band Imaging	
Bandpass Emitter 1	FF01-512/25-25
Bandpass Emitter 2	FF01-630/92-25
Dichroic mirror	FF560-FDi01-25x36

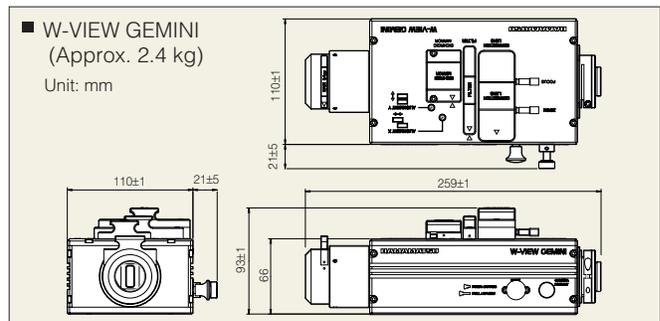
Cy3/Cy5 FRET Imaging	
Bandpass Emitter 1	FF01-593/40-25
Bandpass Emitter 2	FF01-676/29-25
Dichroic mirror	FF640-FDi01-25x36

## Size of dichroic mirror and filters

	Size (mm) / Tolerances (mm)	Thickness (mm)
Dichroic mirror	25.2 × 35.6 ±0.1	2.0(Max.)
Bandpass filter	φ25.4 +0/-0.6	6.0(Max.)*
ND filter		

\*The value is total thickness of a bandpass filter and ND filter.

# Dimensional outlines



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