New Digital Sight Series
Providing a more user-friendly imaging experience

Nikon’s new image acquisition and measurement application for microscope cameras enables simple camera control of the DS-Fi3 high-definition, high-sensitivity general purpose color camera and DS-Ri2 high-definition color camera via a tablet PC.

Three camera options covering two computing platforms

<table>
<thead>
<tr>
<th>Microscope Camera</th>
<th>Frame rate</th>
<th>Max recordable pixels</th>
<th>Mount</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS-Fi3</td>
<td>15 fps (2880 × 2048), 30 fps (1440 × 1024)</td>
<td>2880 × 2048</td>
<td>C-mount</td>
</tr>
<tr>
<td>DS-Ri2</td>
<td>6 fps (4908 × 3264), 45 fps (1636 × 1088)</td>
<td>4908 × 3264</td>
<td>F-mount</td>
</tr>
<tr>
<td>DS-Qi2</td>
<td>6 fps (4908 × 3264), 45 fps (1636 × 1088)</td>
<td>4908 × 3264</td>
<td>F-mount</td>
</tr>
</tbody>
</table>

Imaging software

Using a tablet PC

Using a desktop PC
Superior color reproduction

Nikon is well-known for outstanding and lifelike color reproduction, and developing superior algorithms for creating results that look like the actual samples. These algorithms are used in all of the color cameras in the digital sight lineup.

High-speed live display

Fast USB3.0 data transfer means fast, smooth live updating of images for finding samples or focusing, even at full resolution.

High sensitivity, low noise

Quantum efficiency and read noise have been greatly improved, providing better capability for acquisition of fluorescent images with better signal-to-noise ratios than before.

High-resolution images

A CMOS high density 5.9 megapixel sensor produces high resolution images. USB3.0 date transfer allows fast focusing at high resolution, and easy capture images in all types of observation methods such as brightfield, differential interference contrast, and phase contrast.

Microscope Camera

DS-Fi3

5.9 megapixel Color High-resolution

Liquid crystal panel
(Objective: TU Plan Fluor 10X)

Tubular adenoma, HE staining (Objective: CFI Plan Apochromat Lambda 4X)
Photos courtesy of Dr. Yasunori Ohta, Department of Pathology, IMSUT Hospital, Institute of Medical Science, The University of Tokyo

Tubular adenoma, HE staining (Objective: CFI Plan Apochromat Lambda 4X)

Breast cancer, FISH method (Objective: CFI Plan Apochromat Lambda 100X Oil)
Photos courtesy of Hironao Kusakari, Diagnostic Pathology, St. Marianna University Hospital

Breast cancer, FISH method (Objective: CFI Plan Apochromat Lambda 100X Oil)

The mounting board
(Objective: TU Plan Fluor 5X)

The mounting board
(Objective: TU Plan Fluor 5X)

Liquid crystal panel
(Objective: TU Plan Fluor 10X)

DS-Fi3 / Quantum efficiency

Quantum efficiency (%)

Wavelength (nm)

DS-Fi3 / Quantum efficiency

5.9 megapixel Color

Tubular adenoma, HE staining (Objective: CFI Plan Apochromat Lambda 4X)
Photos courtesy of Dr. Yasunori Ohta, Department of Pathology, IMSUT Hospital, Institute of Medical Science, The University of Tokyo

Breast cancer, FISH method (Objective: CFI Plan Apochromat Lambda 100X Oil)
Photos courtesy of Hironao Kusakari, Diagnostic Pathology, St. Marianna University Hospital

Bone marrow (Objective: CFI Plan Achromat NCG 40X)
Photos courtesy of Clinical Laboratory Department, Yokohama City University Hospital

High-resolution images

A CMOS high density 5.9 megapixel sensor produces high resolution images. USB3.0 date transfer allows fast focusing at high resolution, and easy capture images in all types of observation methods such as brightfield, differential interference contrast, and phase contrast.

High-speed live display

Fast USB3.0 data transfer means fast, smooth live updating of images for finding samples or focusing, even at full resolution.

Superior color reproduction

Nikon is well-known for outstanding and lifelike color reproduction, and developing superior algorithms for creating results that look like the actual samples. These algorithms are used in all of the color cameras in the digital sight lineup.

DS-Fi3 interfaces with PC computers via a USB3.0 interface directly to the camera head, and uses NIS-Elements series software for image acquisition.
Two Large Sensor high resolution 16.25-megapixel CMOS image sensors for microscopy

Two Nikon FX-format CMOS image sensor cameras join the Digital Sight series of microscope digital cameras: the DS-Ri2 color digital camera and the DS-Qi2 monochrome digital camera. High pixel density and large field of view coupled with USB3.0 high speed data transfer offer fast frame rates and high resolution images with these CMOS image sensors.

Large Format CMOS image sensors

Nikon manufactures CMOS image sensors and imaging technologies for professional DSLR cameras, and now has optimized our sensors for microscopy.

DS-Ri2

16.25 megapixel (not interpolated) and accurate color rendition are features that make the DS-Ri2 an excellent choice for recreating color images as they are seen by the eye.

DS-Qi2

High pixel density, high sensitivity and low noise are key features of the DS-Qi2 monochrome camera.

Pig kidney epithelial cells expressing GFP-EB3 tubulin

Sample courtesy of Michael Davidson, National High Magnetic Field Laboratory, Florida State University

Malleable cast iron (Objective: TU Plan Fluor 20x)

The tissues of the liver, HE staining (Objective: CFI Plan Apochromat Lambda 10x)

Photo courtesy of Kazuhiro Murooka, Photography Division, Tokyo Women’s Medical University
Photography with the natural colors seen through the microscope

Nikon is a leader in development of algorithms for reproducing color just as the eyes see it. The DS models’ image processing engine is based on extensive data accumulated over many years of developing microscope color digital cameras, resulting in perfect reproduction of the colors your eyes see in the microscope.

High-resolution images

16.25-megapixel CMOS image sensors for astonishing image quality

The DS series enables one-shot instantaneous capture and fast storage of images with resolution as high as 4908 x 3264 pixels, without pixel shifting or pixel stepping. This pixel density is ideally suited for photomicrography of ultra-fine structures or patterns in biological or industrial samples, at low or high magnifications.

High-speed live display

High-speed display, even of supra-HDTV-class live images

The DS-Ri2 can display 4908×3264 pixel (full-pixel) images at 6 fps, or 1636×1088 pixel (3×3 pixel averaging) images at 45 fps. This fast live frame rate makes fine focusing easy to perform.

High sensitivity, low noise

Fluorescent color image capture with high signal-to-noise ratio

Sensitivity settings that span the range from ISO200 to ISO12800 allow the capture of vivid fluorescent color images.
Capture Low light fluorescence and Large Fields of View

Monochrome Microscope Camera
DS-Qi2

16.25 megapixel
Monochrome
Cooled

High sensitivity
Detects even faint fluorescent signals
7.3μm pixels, high quantum efficiency, and very low read noise allow the DS-Qi2 to read in even faint fluorescent signals.

Excellent linearity
Reliable quantitative analysis made possible
With a linearity error of ±1%, the DS-Qi2 is a superb tool for measuring intensities in fluorescence samples, including time-based intensity measurement and ratiometric measurement.

High frame rate
Fast focusing, even with fluorescent images
With a high-sensitivity CMOS image sensor and USB 3.0-based data transfer, the DS-Qi2 enables high-speed live imaging and image capture at up to 45 fps (1636×1088 pixels).

Low noise
Acquires dim fluorescent signals with ultra-low noise
Both 2.2 electrons read noise coupled with a large full-well capacity and 0.6 electrons dark current allow the acquisition of 14bit fluorescence images with very little noise.

Fluorescent time-lapse imaging through integration with NIS-Elements software
With a large field of view and pixel density, and low noise, the DS-Qi2 is ideal for time-resolved imaging applications.
Intervention with the comprehensive imaging software series

Nikon uses the NIS-Elements series as control software. NIS-Elements allows functions from basic imaging to control of the microscope and peripheral devices to be performed, as well as the measurement, analysis, and management of acquired images. Four basic packages and a variety of optional modules are available to suit every application and objective.

* See the NIS-Elements Catalog for details.

Integration with the comprehensive imaging software series

**Free package**
The bundled free package offers functions for the display of scale on live images, full-screen display, and more. The simple operation screen makes shooting easy.

**Documentation package**
The documentation package is equipped with measurement and report creation functions. It enables general microscopic image acquisition in fields from biomedical to industrial, and is expandable through optional added features such as EDF and databases.

**Research package**
The research package enables the construction of advanced image acquisition systems, including multidimensional imaging (up to 4 dimensions for Br, 6 dimensions for Ar), through integration with systemized microscopes. Sets equipped with a rich range of image processing and analysis functions are available for every application.

**Compatible OS:** Windows® 10 Pro 64bit, Windows® 7 Pro 32/64bit

* Nikon provides confirmed compatible PCs with up-to-date specifications. Contact Nikon for details.

**Multichannel (multi color)**
NIS-Elements can acquire full bit depth multi-color images, combining multiple fluorescence wavelengths and different illumination methods (DIC, phase contrast etc.), while offering independently scalable channels.

**Z-series**
Through motorized focus control, NIS-Elements reconstructs and renders 3D images from multiple Z-axis planes.

**Multi-dimensional Image Display**
NIS-Elements displays time lapse, multi-channel, multiple X, Y, Z positions in an intuitive layout, which allows for automatic playback and the ability to select subsections of the data to be saved as a new file.

**HDR (High Dynamic Range) image acquisition**
HDR creates an image with appropriate brightness in both the dark and bright regions in a sample by combining multiple images acquired with different exposure settings. It is also possible to create HDR image using multiple captured images.

**EDF (Extended Depth of Focus)**
Creates a single, all-in-focus image from images of differing focus. Such images can now be created by simply turning the focus knobs.

**Image stitching (Large Image)**
Stitches together images from multiple fields of view during shooting to create an image with wide field of view. Images already acquired can also be stitched together.

**Manual measurement and image annotation**
Manual Measurement allows easy measurement of length and area by drawing lines or an object directly on the image. The results can be attached to the image, and also exported as text or to an Excel spreadsheet.

**Auto measurement (Object Counting)**
Performs binarization on images using previously set thresholds to measure the number, area, brightness, etc. of identified objects.

**Grain size analysis**
Detects and measures grains in one and two phase samples according to JIS G0551, ASTM E112-96/E1382-97 and ISO643 standards.

**Cast iron analysis**
Detects, measures and classifies graphite content as well as ferrite content in graphite-corrected samples according to JIS G5502, ASTM A247-96 and ISO945-1 standards.
Allows intuitive control of microscope cameras from tablet PCs

Simply installing NIS-Elements L on a tablet PC enables setting and control of DS-Fi3/DS-R2i2 microscope cameras, live image display, and image acquisition.

Compatible OS: Windows® 10 Pro * Nikon provides confirmed compatible tablet PCs with up-to-date specifications. Contact Nikon for details.

User Interface for naturally simple operation

NIS-Elements L displays various menus for image capture, saving, display, measurement and annotations using intuitive icons. It also supports touch screen operation.

A wide variety of tools

NIS-Elements L enables the conducting of simple measurements on images, with input of lines and comments. These can also be written onto and saved with the image, and measurement data can be output.

Measurement function

Line distance
Area
Circle
Circle distance
Pitch distance
Angle

Annotate function

Line
Arrow
Text
Marker
Polyline

Graticule/scale function

Crosshairs
Simple crosshairs
Circle
Horizontal scale
Vertical scale

Scene mode

Ten camera setting patterns for optimal color reproduction and contrast for each microscope light source, observation method and type of sample, as well as custom settings, can be selected.

Biological Scene Mode

• Brightfield + ELISA
• LED-Brightfield + Asbestos

Industrial Scene Mode

• Water/C + Metal
• Circuit board + Flat Panel Display

Other functions

• Split screen display function: A live image is displayed on the left side of the screen and the saved image is displayed on the right side. When synchronization is activated, synchronized magnification is applied to the both images.
• Camera information: A histogram and metadata of the image are displayed.
• Full screen: The image is displayed across the entire screen.
• Saving: The displayed image is saved with a new file name.

Specifications

<table>
<thead>
<tr>
<th>Mode name</th>
<th>DS-Fi3</th>
<th>DS-R2i2</th>
<th>DS-Qi2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image sensor</td>
<td>1/1.8 inch Color CMOS image sensor</td>
<td>Nikon DX format Color CMOS image sensor</td>
<td>Nikon DX format Monochrome CMOS image sensor</td>
</tr>
<tr>
<td>Size:</td>
<td>6.91 × 4.92 mm</td>
<td>36.0 × 23.9 mm</td>
<td>36.0 × 23.9 mm</td>
</tr>
<tr>
<td>Recordable pixels</td>
<td>All pixels: 2880 × 2048</td>
<td>All pixels: 4908 × 3264</td>
<td>All pixels: 3564 × 1950</td>
</tr>
<tr>
<td>2 Vertical and 2 horizontal pixels average: 3 × 3 pixels average: 1636 × 1088</td>
<td>1440 × 1024</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lens mount</td>
<td>C-mount</td>
<td></td>
<td>F-mount</td>
</tr>
<tr>
<td>ISO sensitivity</td>
<td>Standard: equivalent to ISO 50 (Selectable from ISO 50 to 3200 equivalent)</td>
<td>Standard: equivalent to ISO 200 (Selectable from ISO 200 to 51200 equivalent)</td>
<td>Standard: equivalent to ISO 800 (Selectable from ISO 800 to 51200 equivalent)</td>
</tr>
<tr>
<td>Quantum efficiency</td>
<td>77%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full well Capacity</td>
<td>60000e- (typ.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Readout noise</td>
<td>2.2e- (typ.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dark current</td>
<td>0.6e-/p/s (Ta=25°C) (typ.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Live display mode (maximum fps)</td>
<td>15 fps</td>
<td>6 fps</td>
<td>45 fps</td>
</tr>
<tr>
<td>Exposure time</td>
<td>100 µsec ~ 30 sec</td>
<td>100 µsec ~ 120 sec</td>
<td>100 µsec ~ 240 sec</td>
</tr>
<tr>
<td>Photometry mode</td>
<td>Average photometry: Average intensity within the photometry area Peak photometry: Maximum intensity within the photometry area</td>
<td>Peak photometry: Maximum intensity within the photometry area</td>
<td></td>
</tr>
<tr>
<td>Exposure control</td>
<td>One-time automatic exposure: Exposure time is adjusted automatically for one-time within the optimum range for the camera Continuous automatic exposure: Automatic exposure adjustment is performed continuously to keep the exposure within the camera Manual exposure: Exposure time and gain settings are made manually</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exposure correction</td>
<td>±1EV</td>
<td>Step:1/6EV</td>
<td>±1EV</td>
</tr>
</tbody>
</table>
| Annotate function | Line distance
Area
Circle
Circle distance
Pitch distance
Angle |
| Annotate function | Line
Arrow
Text
Marker
Polyline |
| Graticule/scale function | Crosshairs
Simple crosshairs
Circle
Horizontal scale
Vertical scale |
| Interface | USB3.0 (connect with PC or tablet PC) × 1, External trigger × 1 | USB 3.0 (connect with PC) × 1, External trigger × 1 | USB 3.0 (connect with PC) × 1, External trigger × 1 |
| Power supply | AC100-240V 50Hz/60Hz | | |
| Power consumption | 4.0W | | |
| Weight | 400g (approx.) | 1200g (approx.) | |