

# Fujifilm's 3rd Generation Super CCD System:



## Raising FinePix Digital Cameras to A New Level

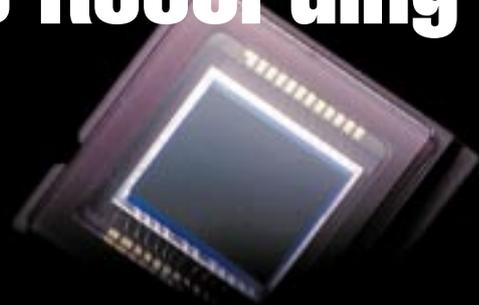


*FinePix S602 Zoom*



*FinePix F601 Zoom*

# Expanding the Possibilities of Digital Photography: **Ultra-high Sensitivity and High-quality VGA Movie Recording**



*In 1999, Fujifilm announced the successful development of its Super CCD image sensor. Ever since, Fujifilm has applied this sensor technology extensively and introduced a wide range of digital cameras to both the consumer and professional markets, opening up new possibilities in digital photography.*

*In 2002, the 3rd generation Super CCD system further expands the possibilities of FinePix digital*

*cameras by achieving an outstanding ultra-high ISO sensitivity of 1600 and high-quality VGA-sized movie recording.*

*Fujifilm's 3rd generation Super CCD is not just a new CCD, but instead reflects a comprehensive improvement in overall image quality through consideration of the complete system including the CCD and the new LSI featuring an advanced image-processing algorithm.*

Benefits of **the 3rd Generation Super CCD System: 1**

# Ultra-high ISO Sensitivity of 1600

In traditional film photography, ISO 400 or 800 high-speed films are often used for their advantage in affording the widest selection of shutter speeds. This allows the user to shoot under most lighting conditions and capture fast moving subjects, and helps to reduce the problem of camera shake in hand-held picture taking. The 3rd generation Super CCD system offers users the same advantages in digital photography.

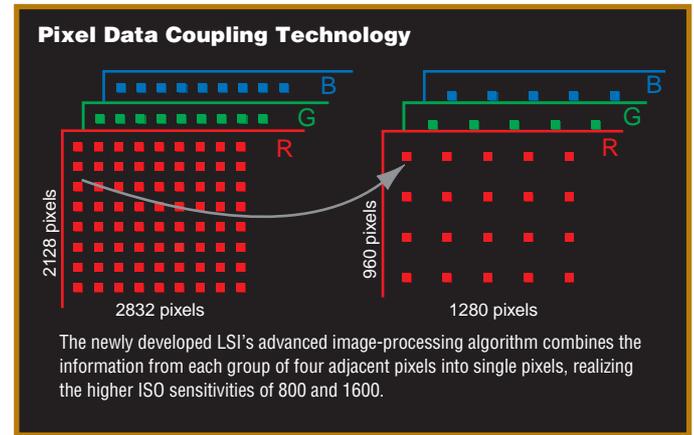
Although Fujifilm's Super CCDs have always had a higher sensitivity than conventional CCDs, the 3rd generation Super CCD system further enhances this characteristic to realize a wide range of sensitivities up to an ultra-high ISO speed of 1600. It achieves this highest ISO speed of any compact digital camera\* through further development and refinement of the CCD and the LSI.

Generally speaking, increasing the sensitivity of a CCD amplifies the noise in the images. However, with the 3rd generation Super CCD system, this problem has been resolved through the use of Fujifilm's new Noise Reduction Technology which utilizes a new LSI to process

both the luminescence and chroma information from captured images. As a result, the 3rd generation Super CCD system offers high sensitivity shooting while maintaining outstanding picture quality. Fujifilm has also newly developed a Pixel Data Coupling Technology that is applied by the new LSI to realize the higher ISO sensitivities of 800\*\* and 1600\*\*.

\* As of January, 2002

\*\* In 1280 x 960-pixel mode only



## Benefits of shooting at **ISO 1600:**

### 1. Allows non-flash shooting under low lighting conditions



ISO 200

Normal mode, 1280 x 960 pixels, 1/20 sec., F5.6, Manual exposure mode



ISO 1600

Normal mode, 1280 x 960 pixels, 1/20 sec., F5.6, Manual exposure mode

## Benefits of shooting at **ISO 1600**: 2. “Freezes” quickly moving subjects



Normal mode, 1280 × 960 pixels, 1/125 sec., F8, Manual exposure mode

ISO 200



Normal mode, 1280 × 960 pixels, 1/1000 sec., F8, Manual exposure mode

ISO 1600

Consequently, in addition to realizing superior image quality and natural colors under normal lighting situations at ISO settings of 160, 200 and 400, the new Super CCD is also suited to taking superior quality high-speed or low-light photographs when set to higher ISO settings of 800

and 1600. These higher ISO settings allow users to shoot a wider range of photographic subjects and situations including non-flash shooting under low-light conditions and fast-action shots, and also help to eliminate camera shake from hand-held picture taking.

## Benefits of shooting at **ISO 1600**: 3. Captures more background detail



Normal mode, 1280 × 960 pixels, 1/60 sec., F2.8, Manual exposure mode

ISO 200



Normal mode, 1280 × 960 pixels, 1/60 sec., F2.8, Manual exposure mode

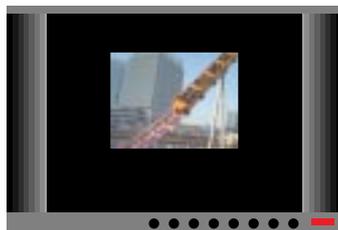
ISO 1600

## Benefits of the 3rd Generation Super CCD System: 2

# High-quality VGA-sized Movie Recording



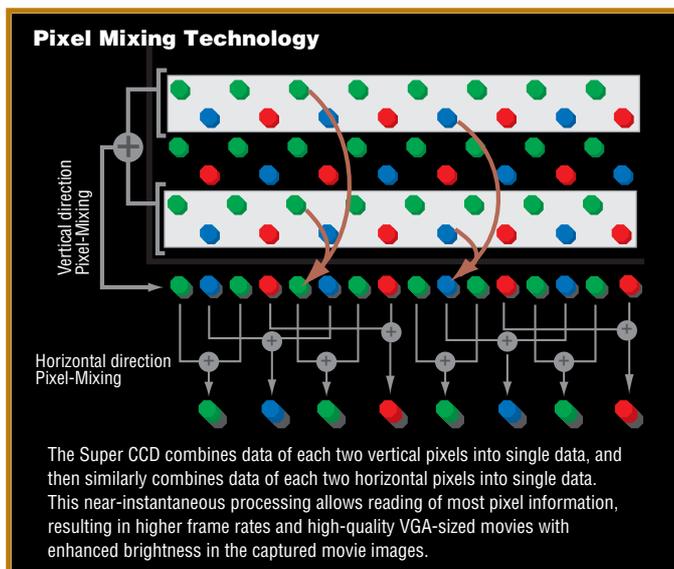
VGA movie (FinePix F601 Zoom) on TV monitor



QVGA movie (previous model) on TV monitor

In recent years, there has been a growing crossover between digital still and digital video cameras. Digital still cameras now offer a movie recording function, while digital video cameras provide a still picture-taking function. This is in response to user requirements for a single camera that is capable of taking both still and moving images. However, compared to the camera's main still or movie imaging function, these "additional" functions have not yet been fully developed. For digital still cameras, whose CCDs have many more pixels and give higher image quality than those in digital video cameras, maintaining the same quality in movie recording requires extremely high speed image processing technology.

The 3rd generation Super CCD system has a greatly improved movie recording function. This realizes high-quality VGA-sized movie recording at a higher frame rate of 30 frames/sec. in the FinePix S602 Zoom and 15 frames/sec. in the FinePix F601 Zoom through a world-leading breakthrough in horizontal and verti-



cal direction Pixel-Mixing Technology, realized by the Super CCD's unique interwoven pixel arrangement. The technology combines pixel information in the vertical and horizontal directions, realizing higher frame rates and high-quality VGA movies with enhanced brightness in captured movie images.



VGA movie (FinePix F601 Zoom)



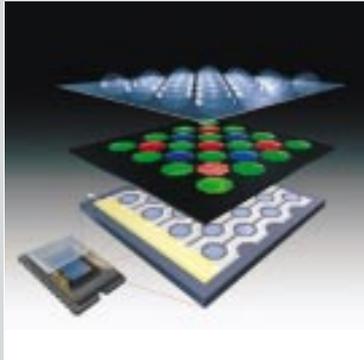
QVGA movie (previous model)

## Benefits of the 3rd Generation Super CCD System: 3

# Digital Camera Image Control Technologies

In the 3rd generation Super CCD System, improvements in image quality are not limited simply to the CCD and image processing. Other factors that greatly influence digital camera image quality such as the white balance, automatic exposure and focusing performance have also been fully revised. As a result, the Super CCD System lets users take successful pictures in most situations through support by technology inside the camera for the high image quality realized by the Super CCD. This technology includes Super

Intelligent Auto White Balance, which automatically and precisely determines the lighting conditions and faithfully recreates natural, bright colors, and Super Intelligent Automatic Exposure (AE) which precisely calculates the exposure to allow capturing of images that are correctly exposed both close to and far from the camera. The Automatic Focus (AF) system also realizes more accurate focusing than ever before.

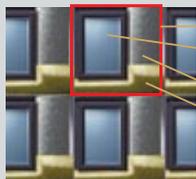


Conventional CCDs tend to have smaller pixel sizes due to the necessity to pack pixels more closely together in order to achieve higher resolutions.

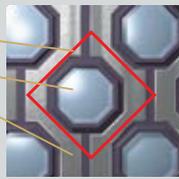
This leads to sacrifices in sensitivity, signal-to-noise ratio, dynamic range and color reproduction. The Super CCD, on the other hand, realizes beautifully balanced images by producing higher resolutions while improving the various features related to image quality.

Fujifilm's Super CCD features unique octagonal-shaped photodiodes in an interwoven arrangement that realizes a larger photodiode for each pixel. The sensor shape and

**Pixel Layout Comparison**



**Conventional CCD**



**Super CCD**

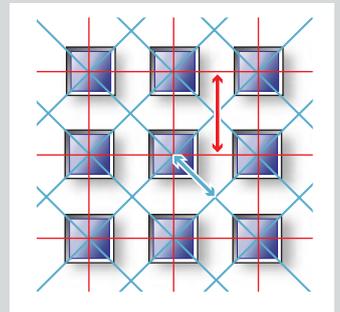
**ADVANTAGES  
OF  
FUJIFILM'S  
SUPER CCD**

arrangement of the Super CCD increases sensitivity, improves S/N ratio and offers a much wider dynamic range, an attribute that produces digital images with richer, true-to-life colors and sparkling clarity. Further, the innovative interwoven pixel arrangement increases resolution in the vertical and horizontal directions, result-

ing in higher overall resolutions. The Super CCD captures data

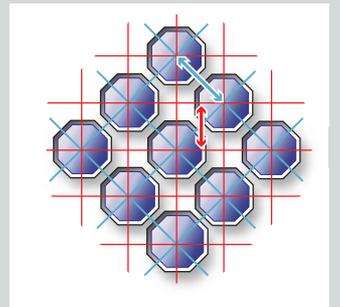
at 12 bits for each RGB and records it at an optimal 8 bits, depending on the situation.

In this way, the Super CCD delivers outstanding high quality image files.



**Conventional CCD**

*With conventional interline CCDs, pixel pitch in the diagonal direction is narrower than in the horizontal and vertical directions, resulting in higher diagonal resolution.*



**Super CCD**

*By rotating pixels 45 degrees to form an interwoven layout, the Super CCD's pixel pitch in the horizontal and vertical directions is narrower than in the diagonal direction, achieving higher horizontal and vertical resolution.*