Recent years have seen drastic changes in digital imaging technologies and markets. Anticipating such changes, Fujifilm has been doing its utmost to develop the technologies that will play important roles in the upcoming digital imaging era. It has successfully been developing numerous unique devices and software, including such superior charge-coupled devices (CCDs) as the Super CCD and such sophisticated digital image processing software as Image Intelligence™. These technologies—which reflect Fujifilm’s diverse advanced technologies and abundant experience and expertise—are being incorporated in many different kinds of products that provide images featuring high quality and intelligently optimized characteristics.

**Development of the 4th-Generation Super CCD**

Since the 1st-Generation Super CCD was developed in 1999, Fujifilm has worked to further improve the image quality of digital cameras by creating successive generations of the CCD that incorporate additional new technologies. Steady progress has been made in improving the Super CCD’s performance.

In January 2003, Fujifilm announced the development of the 4th-Generation Super CCD, which offers still higher resolution and wider dynamic range than previous Super CCDs, and digital cameras incorporating the 4th-Generation Super CCD were launched in March 2003. The 4th-Generation Super CCD has enabled the development of two new CCDs—the Super CCD HR (High Resolution) and the Super CCD SR (Super Dynamic Range). Fujifilm has used advanced miniature fabrication technologies to increase the number of pixels on the 4th-Generation Super CCD HR to 6.63 million, becoming the first company in the world to attain this number of pixels on a 1/1.7-inch CCD. Although each pixel on the new CCD has a surface area only half the surface area of pixels on the 3rd-Generation Super CCD, the sensitivity of the 3rd- and 4th-Generation pixels are almost equal.

The Super CCD SR is designed to simulate the mechanism and extended dynamic range of negative photographic films. Such films incorporate a high-sensitive layer with large-surface-area, high-sensitive silver-halide grains. The films also feature a low-sensitive layer with silver-halide grains that are tiny and therefore less sensitive, but that perform an important sensing function when the films are exposed to a large quantity of light. Similarly, the 4th-Generation Super CCD SR incorporates two kinds of pixels—a high-sensitivity S pixel and a wide-dynamic-range R pixel. Intelligent image processing combining information from the two types of sensors produces images with increased dynamic range and superior rendition of detail, particularly in dark and highlight areas.

**Further Progress of the Super CCD**

The Super CCD is a CCD image sensor based on a totally new structural design concept. Rather than using conventional rectangular photodiodes, the Super CCD features octagonal photodiodes in a 45-degree arrangement enabling for the first time a difficult-to-achieve combination of high sensitivity, wide dynamic range, high signal/noise ratio, and high image resolution. The Super CCD’s greater sensitivity has broadened the range of photographable scenes and the ease of photography in general. Thus, Fujifilm has been able to create unprecedented types of digital cameras with numerous greatly improved quality characteristics.
The Super CCD Provides High Image Quality in Diverse Fields

Besides digital cameras, the Super CCD is incorporated in other diverse products, such as mobile phones with camera functions, medical imaging products, and scientific systems. In each of these fields, the Super CCD is able to precisely satisfy special high-quality imaging needs.

### Consumer Imaging

**Giving Camera-Phones Full-Scale Digital Camera Capabilities**

The NTT DoCoMo D505i mobile phone with camera functions incorporates a Super CCD with approximately 630,000 effective pixels that is capable of the high-sensitivity, high-speed capture of SXGA-sized (960 x 1,280 pixel) images with approximately 1.23 million recorded pixels. The Super CCD made it possible for this new camera-phone to be able to provide a picture quality similar to that of a full-scale digital camera, especially in the photographs of dimly lit scenes as well as distant people and scenery.

Fujifilm has also developed a 37mm x 52mm large-scale Super CCD for use in digital camera backs for medium-format cameras. As these CCDs have approximately 20.68 million effective pixels and can take ultrahigh-quality 5,408 x 7,648 pixel images with approximately 41.4 million recorded pixels, the Company is confident that they can fully meet the rigorous requirements of professional photographers.

The Digital Minilab Frontier 330 incorporates the Super CCD (Area Type) to input image data from film and enable the printing of ultrahigh-quality images.

### Medical Imaging

**Powerful Support for the Examination and Treatment of High-Precision Images**

In the medical imaging field, Fuji Photo Optical Co., Ltd., has developed the FTS4000 leading-edge electronic endoscope system, which incorporates a Super CCD that has approximately 630,000 effective pixels and is capable of capturing 1,280 x 960 images with approximately 1.23 million recorded pixels. The endoscope systems are capable of high-sensitivity and high-resolution video recording at 30 frames/second, which promotes early diagnoses and timely medical treatment by lucidly portraying even subtle indications of disease symptoms.

The Digital Minilab Frontier 330 incorporates the Super CCD (Area Type) to input image data from film and enable the printing of ultrahigh-quality images.

### Scientific Systems

**Contributing to Progress in Leading-Edge Bio-Science Research**

Regarding scientific systems, Fujifilm has incorporated the Super CCD (Area Type) that has approximately 3.2 million effective pixels and is capable of capturing 3,072 x 2,048 image files with approximately 6.3 million recorded pixels in the cooled CCD camera system of the luminescent image analyzer LAS-3000, used by bio-science researchers for high-sensitive detection of such substances as DNA or proteins. The use of the Super CCD features greatly increased faint-light image capture and achieves both higher image quality and higher imaging sensitivity. The LAS-3000 provides bio-science researchers with a highly versatile new tool not only for chemiluminescent image but also for fluorescent image capture. As a result, the Super CCD is contributing to leading-edge bio-science research conducted by universities, governmental research institutes, pharmaceutical companies, and others.

**Receipt of the Walter Kosonocky Award**

A paper on the Super CCD written by 11 engineers of Fujifilm and FUJIFILM Microdevices Co., Ltd., was presented at a fiscal 2001 workshop of the Institute of Electrical and Electronics Engineers (IEEE), which chose the paper as the winner of the prestigious Walter Kosonocky Award. Named after the man who invented the CCD image sensor, this award is given to recognize the most significant advances in solid-state imaging sensors over two-year periods.

**Leading-Edge Clean Rooms and CCD Manufacturing Processes**

Fujifilm’s leading-edge Super CCD technology is made possible by the Company’s CCD image sensor development and manufacturing facilities. FUJIFILM Microdevices wields highly advanced manufacturing technologies. While all semiconductor manufacturing can be described as a battle with dust, a particularly clean environment is required for the manufacture of a CCD. Precisely creating ultrafine photodiodes, data transmission paths, and terminals requires the use of highly sophisticated control and processing technologies.