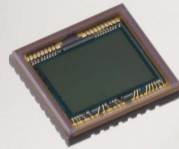


ICX681SQW

Diagonal 7.763 mm (Type 1/2.3) 14.2M-Effective Pixel High-Resolution Consumer Digital Still Camera CCD Image Sensor Supports 720p Moving Picture and 1/4 Resolution Still Picture Imaging



In addition to the needs for even higher resolution in the consumer compact digital still camera market, there are also increasing needs for improved high ISO sensitivity and wider dynamic range.

Sony has now developed unique fine pixel fabrication technologies and has used these to create the ICX681SQW 1.43 μm unit pixel CCD image sensor, which features the industry's smallest*¹ unit pixel. At the same time as increasing resolution by increasing the number of pixels, Sony has also achieved excellent imaging characteristics.

This CCD image sensor also achieves high-definition television equivalent (720p) video imaging and high-sensitivity continuous still imaging (3.55M pixels at 5.389 frame/s).

*¹ As of February 2010.

- Diagonal 7.763 mm (Type 1/2.3) 14.2M effective pixels
- Pixels size: 1.43 μm unit pixel
- Eight-field readout
- Horizontal divided into fourths output
- Horizontal 2-phase drive

The Industry's Smallest Pixel Size Achieved

Through even finer fabrication technologies, Sony reduced the unit pixel size in the ICX681SQW to 1.43 μm from the 1.55 μm unit pixels in the current Sony ICX677 Series devices (diagonal 7.791 mm (Type 1/2.3) 12.19M effective pixels) and achieved an even higher pixel count in a Type 1/2.3 CCD image sensor.

To assure imaging performance in the industry's smallest pixel size, Sony adopted a new optical condensing structure that adds an upwardly convex lens below the existing microlens as a technology to improve optical condensing. Furthermore, by introducing thin-film technologies for the Poly-Si transfer electrodes and microlenses, Sony reduced the smear component contamination from

the vertical register and furthermore assured high optical condensing performance. (See figure 1.)

As a result, despite a 15% reduction in the area per pixel from current products, this device achieves the superb imaging characteristics of a 165 mV (typ.) sensitivity (G signal), a 465 mV (min.) saturation signal, and a -86.0 dB (typ.) smear. (See table 2.)

Power Consumption Reduced by 12%

In the ICX681SQW, along with the finer pixels, the area of the vertical register was also reduced by about 16% from current products. Sony also optimized the vertical register structure and the circuits used on the chip so that it was possible to assure that the amount of charge handled and the charge transfer characteristics, which are the representative characteristics of the vertical register, were maintained. Furthermore, we also achieved a reduction in the V_L supply voltage (from -7.5 to -6.5 V), which is in a tradeoff relationship with those characteristics, by structural optimizations. As a result, the power consumption was reduced by about 12% to 378 mW from the 431 mW of the current products. (When a CXD5141GG is used and the chip is operated in mode 3.)

Continuous 1/4 Resolution Still Imaging

In addition to the higher resolution provided increased pixel count, the ICX681SQW also adds a 1/4 resolution still imaging mode that achieves higher ISO sensitivity and an improved continuous imaging function. In this mode, improved high-sensitivity characteristics can be acquired by adding two pixels in the vertical direction and two pixels in the horizontal direction. In addition, by compressing the number of pixels to 1/4 the actual count, images can be output at high speed. This allows the ICX681SQW to achieve high frame rates and produce high-sensitivity 3.55M-pixel still images at the high speed of 5.389 frame/s.

V O I C E

Through a continuous process of trial and error, the project members worked together to evolve Sony's fine pixel fabrication technologies even further. At the same time as allowing us to respond to market needs for miniaturization and higher pixel counts, these technologies also assure excellent imaging characteristics.

I strongly recommend that you look into using the ICX681SQW, which responds to the needs of the consumer digital still camera market.

Figure 1 Reducing the Pixel Size

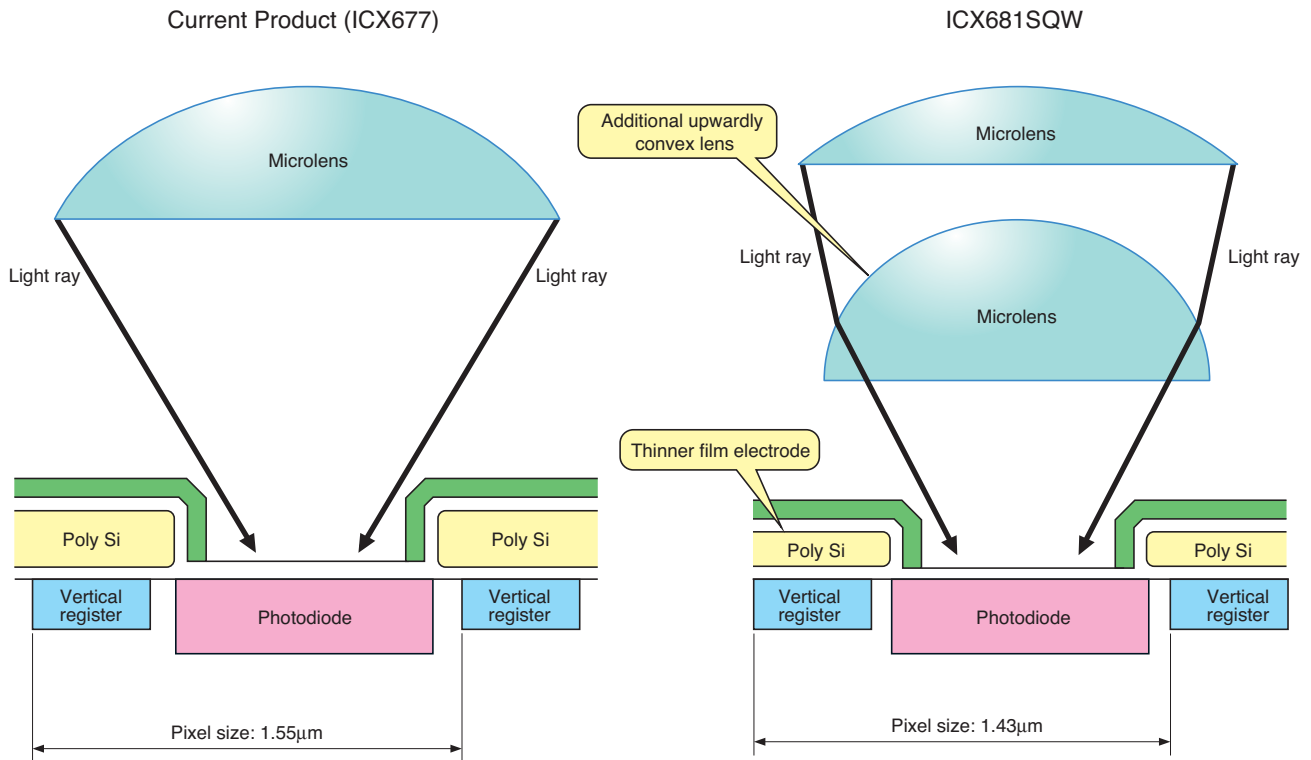


Table 1 Device Structure

Item	ICX681SQW	
Image size	Diagonal 7.763 mm (Type 1/2.3)	
Transfer method	Frame readout interline transfer method	
Readout method	Vertical	8-field readout
	Horizontal	2-phase drive, divided into fourths
Total number of pixels	Approx. 14.48M pixels (4412H × 3282V)	
Number of effective pixels	Approx. 14.20M pixels (4352H × 3264V)	
Number of active pixels	Approx. 14.14M pixels (4344H × 3256V)	
Number of recommended recording pixels (Aspect ratio: 4:3)	Approx. 14.00M pixels (4320H × 3240V)	
Unit cell size	1.430 µm (H) × 1.430 µm (V)	
Horizontal drive frequency	38 MHz	
Package	38-pin QFN (Ceramic)	

Table 2 Image Sensor Characteristics

Item	ICX681SQW	Remarks
Sensitivity (G signal)	165 mV (Typ.)	3200K, 706 cd/m ² , 1/30 s accumulation, F5.6
Saturation signal	Frame readout mode	465 mV (Min.) Ta = 60°C
Smear	Frame readout mode	-86.0 dB (Typ.) None when a mechanical shutter is used, V/10 method, F5.6
Frame rate	Frame readout mode	1.616 frame/s Number of output lines: 3264 lines
	Frame readout mode (HD2 reduced version)	1.879 frame/s Number of output lines: 3264 lines
	Frame readout mode (1/4 resolution still imaging)*1	5.389 frame/s Number of output lines: 1632 lines
	Mode 1 *1	29.97 frame/s Number of output lines: 816 lines
	Mode 2 *1	29.97 frame/s Number of output lines: 408 lines
	Mode 3 *1	59.94 frame/s Number of output lines: 204 lines

*1 With horizontal addition

Note: This device was designed for use in consumer digital still cameras and may not be appropriate for other applications. Contact your Sony representative for consultation when considering this product for use in other applications.