

High-Resolution Diagonal 7.17 mm (Type 1/2.5) 5.13M-Pixel Color CCD
for Consumer Digital Still Cameras Supports VGA Moving Picture Imaging

ICX495AQN

The demands for further miniaturization and higher pixel counts in the digital still camera market grow stronger every year. Given these market needs, Sony led the industry in starting development in the 5M-pixel class sensor, the high pixel count most strongly desired by the market, and has now developed and released the ICX495AQN diagonal 7.17 mm (Type 1/2.5) 5.13M-effective pixel interline CCD image sensor. Sony's unique fine fabrication technologies made it possible to achieve a 2.2 μm unit pixel. This sensor not only achieves miniaturization and higher resolution, it also achieves excellent basic characteristics. Sony has also included a horizontal and vertical pixel addition function that makes 30 frames/s VGA moving picture imaging possible in addition to the image sensor's primary function of 5M-pixel still image capture.

Sony is committed to continuing to supply image sensors that respond to market needs.

- Diagonal 7.17 mm (Type 1/2.5) 5.13M effective pixels (2616H \times 1960V)
- Pixel size: 2.2 μm unit pixel
- 4-field readout method
- Supports 30 frames/s VGA moving picture imaging

The ICX495AQN is a diagonal 7.17 mm (Type 1/2.5) 5.13M-effective pixel CCD image sensor designed for high-resolution consumer digital still cameras. When combined with a mechanical shutter, it can capture high-resolution images. Table 1 lists the device structure and table 2 lists its imaging characteristics.

Pixel Size

Due to the continuing demands for even higher pixel counts from the digital still camera market, the market mainstream is

moving from the 4M-pixel class sensor to the 5M-pixel class sensor. To expand the Sony lineup of 5M-pixel class sensors, Sony has developed a 2.2 μm unit pixel and released a new 5.13M-effective pixel CCD in the Type 1/2.5 size, the main sensor size for compact digital still cameras.

Excellent Basic Characteristics

Since basic characteristics cannot be assured if the pixel size is simply reduced, in developing the 2.2 μm unit pixel Sony had to develop fundamentally new process technologies. In particular, Sony designed this new sensor with the idea of achieving even better basic characteristics than conventional sensors. The result of these efforts in the sensor structure, the area that most directly affects sensor performance, was success in reducing the vertical register area and greatly increasing the photodiode area.

By combining these new technologies with a 4-field readout method, Sony succeeded in increasing the saturation signal per unit area by 24% and achieved the high dynamic range of 420 mV (minimum) in frame readout mode.

Sony also achieved the high sensitivity of 150 mV and the low smear of -86 dB (at F5.6 in frame readout mode) despite the small 2.2 μm pixel size by lowering the

on-chip microlenses in conjunction with increasing the photodiode area. This resulted in a 5M-pixel class CCD in the easy-to-use Type 1/2.5 size.

Readout Modes

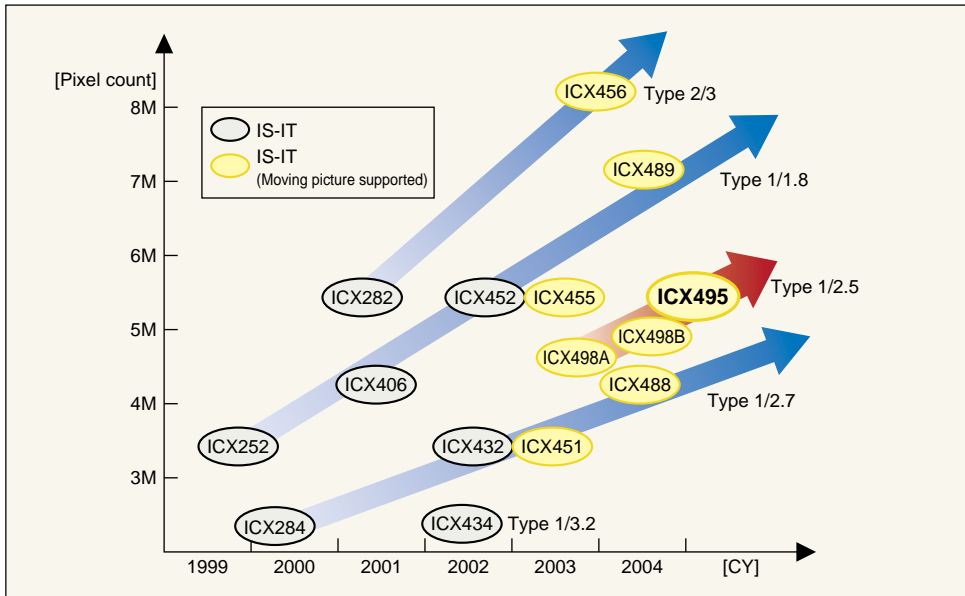
The ICX495AQN includes Sony's unique horizontal and vertical pixel addition function and implements an extensive set of readout modes by using a variety of pixel addition methods. In particular, it supports a "frame readout mode" that reads out all the pixel signals independently and is appropriate for high-resolution image acquisition as well as a "4/8-line readout mode" (with horizontal addition) that can acquire a 30 frames/s VGA resolution moving picture signal. It also supports a "4/16-line readout mode" and an "AF mode".

Timing Generator IC

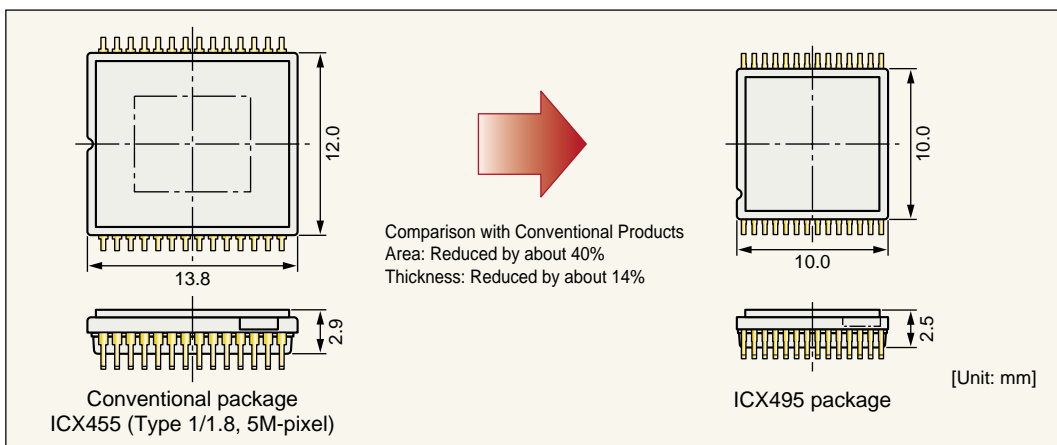
Sony also provides the CXD3633GA drive timing generation IC with built-in horizontal and vertical drivers for use with the ICX495AQN. In addition to a VGA equivalent moving picture mode, this IC also supports a high frame rate readout mode and an AF mode.

V O I C E

To support market demands for further miniaturization and even higher pixel counts we developed a 2.2 μm unit pixel and have now released a diagonal 7.17 mm (Type 1/2.5) 5.13M-pixel CCD using that unit pixel. We had to develop and adopt several new technologies to acquire imaging characteristics in the tiny 2.2 μm cell size that are as good as or better than those in earlier products. I recommend that you look into this product as a means of responding to digital still camera market needs.



■ Figure 1 Consumer Digital Still Camera CCD Lineup



■ Figure 2 Package Dimensions

■ Table 1 Device Structure

Item	ICX495AQN
Image size	Diagonal 7.17 mm (Type 1/2.5)
Transfer method	Frame readout interline transfer method
Readout method	4-field readout
Total number of pixels	Approx. 5.25M (2668H × 1970V)
Number of effective pixels	Approx. 5.13M (2616H × 1960V)
Number of active pixels	Approx. 5.09M (2608H × 1952V)
Number of recommended recording pixels (Aspect ratio: 4:3)	Approx. 5.04M (2592H × 1944V)
Unit cell size	2.2 μm (H) × 2.2 μm (V)
Horizontal drive frequency	27 MHz
Package	28-pin SOP (Plastic)

■ Table 2 Image Sensor Characteristics

Item	ICX495AQN	Remarks
Sensitivity (F5.6)	150 mV (Typ.)	3200K, 706 cd/m ² , 1/30 s accumulation, G signal
Saturation signal	Frame readout mode	420 mV (Min.)
	4/8-line readout mode	200 mV (Min.)
	4/16-line readout mode	200 mV (Min.)
Smear (F5.6)	Frame readout mode	-86 dB (Typ.)
	4/8-line readout mode	-80 dB (Typ.)
	4/16-line readout mode	-74 dB (Typ.)
Frame rate	Frame readout mode	4.28 frames/s
	4/8-line readout mode*	30 frames/s
	4/16-line readout mode*	60 frames/s
		Number of output lines: 490
		Number of output lines: 245

* : 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.