

High-Resolution 7.24M-Pixel Diagonal 9.107 mm (Type 1/1.8) Color CCD for Consumer Digital Still Cameras Supports VGA Moving Picture Imaging

ICX489AQF

The demands for higher pixel counts and further miniaturization continue to increase in the rapidly growing digital still camera market. To respond to these demands, Sony has developed the ICX489AQF diagonal 9.107 mm (Type 1/1.8) CCD image sensor that features 7.24M effective pixels.

The ICX489AQF takes full advantage of the latest fine fabrication technologies to achieve a $2.35\ \mu\text{m}$ unit pixel size. This results in both higher resolution and further miniaturization.

Sony's unique horizontal and vertical pixel addition technology allows the ICX489AQF to provide both 7M-pixel still picture and 30 frames/s VGA moving picture imaging.

- Primary color filters, 28-pin SOP
- Diagonal 9.107 mm (Type 1/1.8) Provides 7.24M effective pixels (3112H \times 2328V)
- 5-field readout method
- High sensitivity: 168 mV (G signal)
- High saturation signal: 385 mV

The ICX489AQF is a 7.24M-effective pixel diagonal 9.107 mm (Type 1/1.8) CCD image sensor that was developed for use in high-resolution consumer digital still cameras. It provides high-resolution image capture when a mechanical shutter is used. Figure 1 presents Sony's lineup of CCD image sensors for consumer digital still cameras. Since the ICX489AQF is positioned as a higher pixel count version of the earlier Sony ICX455AQF (diagonal 9.04 mm (Type 1/1.8), 5.13M effective pixels) product, it allows a 7M-pixel digital still camera to be imple-

mented based on an earlier ICX455AQF camera without changing the optical system. Table 1 lists the ICX489AQF device structure, and table 2 lists the imaging characteristics.

■ High Saturation Signal

The ICX489AQF adopts a 5-field readout method to improve the dynamic range and resolution in moving picture mode. This allows the area occupied by the photodiode block in the unit pixel to be increased and allows the ICX489AQF to provide a saturation signal of 385 mV.

■ High Sensitivity

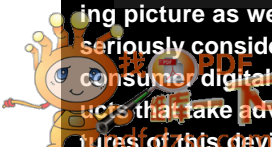
The light collecting ability of the individual pixels has been improved by optimization not only of the fine fabrication technology used for the on-chip microlenses, but also of the shape of the microlenses, and by the adoption of thin-film primary color filters. These technologies allow the ICX489AQF to achieve a sensitivity of 168 mV despite a pixel size of $2.35\ \mu\text{m}$.

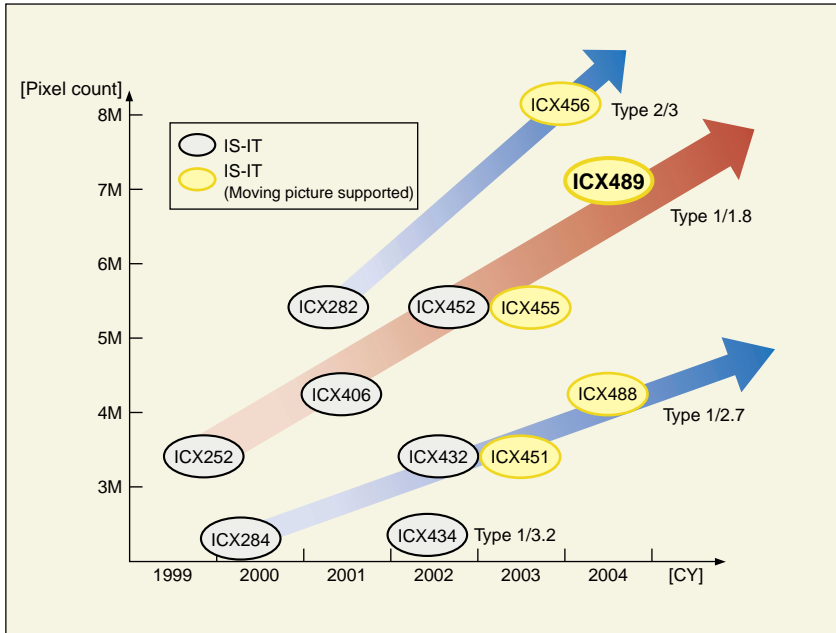
■ Timing Generator IC

Sony also provides the CXD3630GA timing generator IC that includes built-in horizontal and vertical drivers for the ICX489AQF. In addition to a VGA equivalent moving picture mode, this IC also supports a high frame rate readout mode and an AF mode as well.

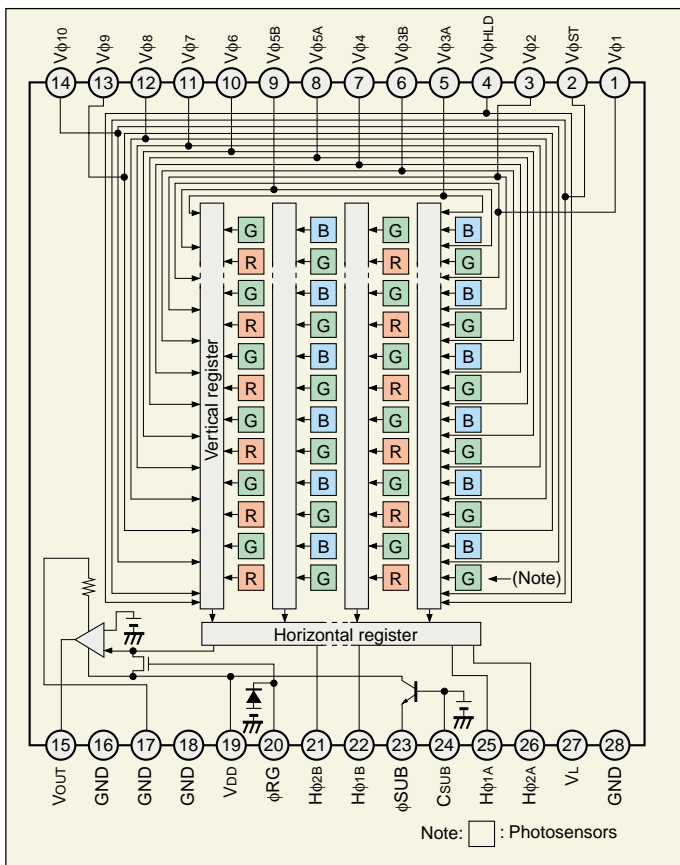
V O I C E

We developed a new 7M-pixel Type 1/1.8 CCD image sensor to respond to new demands for high-quality moving picture in addition to the higher pixel counts and miniaturization previously demanded by the digital still camera market. This new image sensor will allow digital still cameras to provide not only still picture, but high-quality moving picture as well. I hope you will seriously consider developing new consumer digital still camera products that take advantage of the features of this device.





■ Figure 1 Consumer Digital Still Camera CCD Lineup



■ Figure 2 ICX489AQF Block Diagram

■ Table 1 Device Structure

Item	ICX489AQF
Image size	Diagonal 9.107 mm (Type 1/1.8)
Transfer method	Frame readout interline transfer method
Readout method	5-field readout
Total number of pixels	Approx. 7.41M (3164H × 2342V)
Number of effective pixels	Approx. 7.24M (3112H × 2328V)
Number of active pixels	Approx. 7.20M (3104H × 2320V)
Number of recommended recording pixels (Aspect ratio: 4:3)	Approx. 7.08M (3072H × 2304V)
Unit cell size	2.35 μm (H) × 2.35 μm (V)
Horizontal drive frequency	33.75 MHz
Package	28-pin plastic SOP

■ Table 2 Imaging Characteristics

Item	ICX489AQF	Remarks	
Sensitivity (G signal)	168 mV	3200K, 706 cd/m ² , 1/30 s accumulation, F5.6	
Saturation signal	Frame readout mode	385 mV	
	4/10-line readout mode*	200 mV	Ta = 60°C, per pixel
	4/20-line readout mode*	200 mV	
Smear (F5.6)	Frame readout mode	-87.5 dB	None when a mechanical shutter is used, V/10 method
	4/10-line readout mode*	-79.5 dB	
	4/20-line readout mode*	-73.5 dB	
Frame rate	Frame readout mode	3.33 frames/s	Number of output lines: 466 Number of output lines: 232
	4/10-line readout mode*	30 frames/s	
	4/20-line readout mode*	60 frames/s	

*: With horizontal addition