

1/6-inch 380K/440K Effective Pixel  
Ultrasmall High-picture Quality Camera CCDs

# ICX238AKE (NTSC) ICX239AKE (PAL)

There are now increasingly strong demands for even further miniaturization and improved picture quality in CCD devices, which are widely used for image input.

Sony has now developed two new high picture quality ultrasmall CCD image sensors to respond to these demands.

By developing the industry's smallest unit pixel, a pixel with a horizontal pixel pitch of only 3.2  $\mu\text{m}$ , Sony has achieved effective pixel counts of 380K and 440K in the ICX238AKE and ICX239AKE, which are 1/6-inch optical system devices, and Sony has also achieved even further reductions in device power consumption in these products.

These features can contribute to increased picture quality, further miniaturization, and reduced power consumption in digital cameras.

- **Further miniaturization and higher picture quality**  
Due to the development of the industry's smallest unit pixel, these devices achieve the largest number of pixels in a 1/6-inch optical system device.
- **Improved basic characteristics**  
The sensitivity per unit area has been increased by 48%, and the saturation signal level has been increased by 65%.\*
- **Power consumption reduced by 38%\***

\*: As compared to Sony 1/4-inch devices with the same number of pixels.

The ICX238AKE (NTSC) and ICX239AKE (PAL) are 1/6-inch optical system color CCD image sensors with 380K and 440K effective pixels, respectively. Despite being ultrasmall devices, they provide the high level characteristics required by camcorders, surveillance cameras, and similar products. Furthermore, since they achieve the low power consumption and other characteristics required by notebook personal computers, PDAs, and other portable information terminals, they are optimal for use in a wide range of applications.

## ■ Further Miniaturization and Higher Picture Quality

Due to the development of fine fabrication technology that can create devices with a horizontal pixel pitch of 3.2  $\mu\text{m}$ , which corresponds to the industry's smallest unit pixel, Sony achieved effective pixel counts of 380K and 440K, which are the largest pixels for a 1/6-inch optical system device. Thus these devices achieve both further miniaturization and higher picture quality. (See figure 1.)

## ■ Improved Basic Characteristics

A newly developed optical structure was introduced in these devices. This structure adds internal lenses above the photo shielding film to the Sony Super HAD CCD technology. (See figure 2.) By further optimizing the lens shape using an optical simulator, Sony was able to increase the sensitivity per unit area by 48% over Sony 1/4-inch CCDs with the same number of pixels, thus achieving a level of 300 mV.

The saturation signal level was also improved by 65% on a per unit area basis by optimizing the sensor structure, achieving values of 600 mV (NTSC) and 540 mV (PAL). Thus these devices achieve excellent performance in their imaging characteristics despite being miniature devices. (See table 2.)

## ■ Reduced Power Consumption

Current consumption was reduced by optimizing the output circuits, and furthermore, power consumption was reduced by 38% over Sony 1/4-inch CCDs with the same number of pixels by reducing the capacitance of the transfer register. These devices achieve the lower power consumption of 88 mW, including the driver power consumption. (See figure 3.)

## ■ Device Specifications

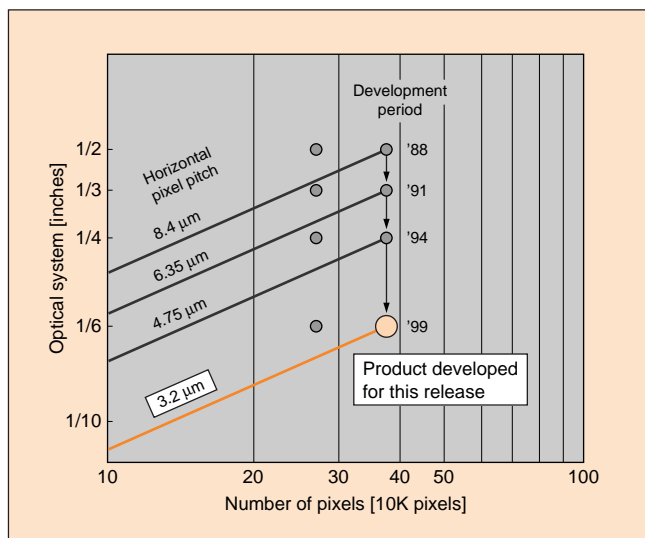
The specifications of these devices, including the number of pixels and the drive specifications, are identical to those of current Sony 1/4-inch CCDs with the same number of pixels. This means that current system IC products can be used without modification. (See table 1.)

## V O I C E

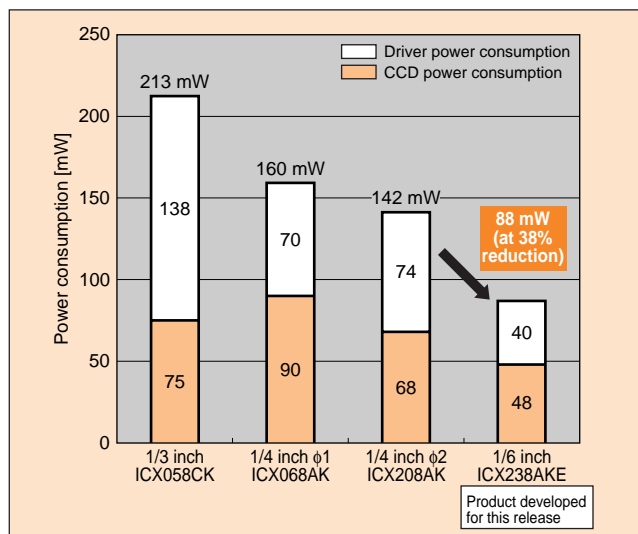
Despite being ultrasmall devices, these CCDs achieve excellent picture quality and high performance. Thus we think that these are optimal CCDs not only for current products that use CCDs, but for products in new application areas that desire image input functionality. I recommend that you will look into using the ICX238AKE or ICX239AKE in unique new products that can take advantage of the miniature size and low power consumption that are the features of these devices.



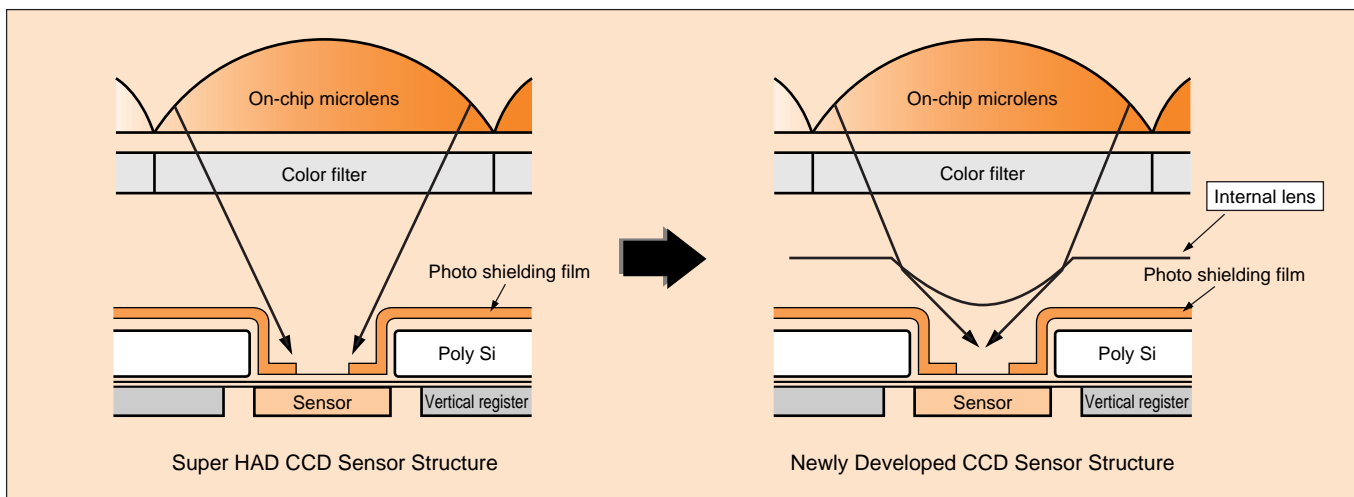
# New Products



■ Figure 1 Trends in CCD Development



■ Figure 3 Trends in Power Consumption in 380K-pixel CCDs



■ Figure 2 Sensor Structure Comparison

■ Table 1 Device Structure

Item	ICX238AKE	ICX239AKE
Optical size	1/6-inch format	1/6-inch format
TV format	NTSC	PAL
Transfer method	Interline transfer	Interline transfer
Total number of pixels	811H × 508V Approximately 410K pixels	795H × 596V Approximately 470K pixels
Number of effective pixels	768H × 494V Approximately 380K pixels	752H × 582V Approximately 440K pixels
Chip size	3.30 mm (H) × 2.95 mm (V)	3.30 mm (H) × 2.95 mm (V)
Unit cell size	3.200 μm (H) × 3.725 μm (V)	3.275 μm (H) × 3.150 μm (V)
Horizontal drive frequency	14.3182 MHz	14.1875 MHz
Package	12 pin SON (Ceramic) 9.25 mm (H) × 8.00 mm (V) × 2.30 mm (t)	12 pin SON (Ceramic) 9.25 mm (H) × 8.00 mm (V) × 2.30 mm (t)

■ Table 2 Imaging Characteristics

Item	ICX238AKE	ICX239AKE	Remarks
Sensitivity F5.6	300 mV	300 mV	3200K, 706 cd/m <sup>2</sup>
Saturation signal level	600 mV	540 mV	Ta = 60°C
Smear F5.6	-86 dB	-86 dB	V/10 method