

Third Generation Diagonal 4.5 mm (Type 1/4)  
250K/380K-pixel Color CCD Image Sensor

## 250K/290K Pixels ICX226AK (NTSC), ICX227AK (PAL) 380K/440K Pixels ICX228AK (NTSC), ICX229AK (PAL)

Currently, Type 1/4 CCDs are widely used in camcorders and surveillance, endoscope, and automotive cameras. However, due to their characteristics, there are now increasingly strong demands for lower power consumption from all of these application areas.

In addition to the conventional Super HAD CCD technology, the ICX226AK, ICX227AK, ICX228AK, and ICX229AK incorporate Sony's unique new structure technology. As a result, these devices achieve the industry's highest level of sensitivity and smear characteristics in a Type 1/4 CCD.

Furthermore, at the same time as achieving improved picture quality, these products also feature lower power consumption.

- Diagonal 4.5 mm (Type 1/4)
- Improved sensitivity at the wide-open lens F No. (Sensitivity improved +3 dB from conventional Sony products.)
- Reduced smear: better than -100 dB achieved
- Lower power consumption (Power consumption reduced by 32.5 to 35% from conventional Sony products.)

The ICX226AK (NTSC), ICX227AK (PAL), ICX228AK (NTSC), and ICX229AK (PAL) are diagonal 4.5 mm (Type 1/4) color video camera CCDs providing 250K, 290K, 380K, and 440K pixels respectively and are upwardly compatible with the conventional Sony ICX206AK, ICX207AK, ICX208AK, and ICX209AK products. These new products provide improvements in the basic device characteristics and reduced power consumption over conventional devices.

### V O I C E

Since we were aiming to create a CCD that would be even easier to use, we took improving the basic device characteristics and reducing power consumption as our main goals. The result is an environmentally friendly Type 1/4 CCD that achieves characteristics rivaling those of commercial CCDs yet also achieves reduced power consumption. This is a truly radical device. We are convinced that the ICX226AK through ICX229AK products can contribute to improved performance in camcorders and surveillance cameras.

#### ■ Improved Sensitivity at the Wide-open Lens F No.

In conventional Type 1/4 CCDs, Sony increased the condensing efficiency of on-chip microlens with the Super HAD CCD technology. However, since the amount of light incident at an angle increases when the camera lens is widely opened to lens F No., part of the incident light did not reach the sensor, and thus the sensitivity was reduced for this component relative to that for the parallel component. (See figure 1.) In these devices, Sony has introduced a new structure technology for forming internal lenses between the color filter and the photo-shielding film. This technology increases the condensing efficiency by changing the optical path with internal lenses so that the slanted component of the incident light that passes through the on-chip microlenses can be collected in the sensor. (See figure 2.) This results in a +3 dB improvement in sensitivity with a wide-open lens F1.2 over conventional products. (See photograph 1.)

#### ■ Reduced Smear

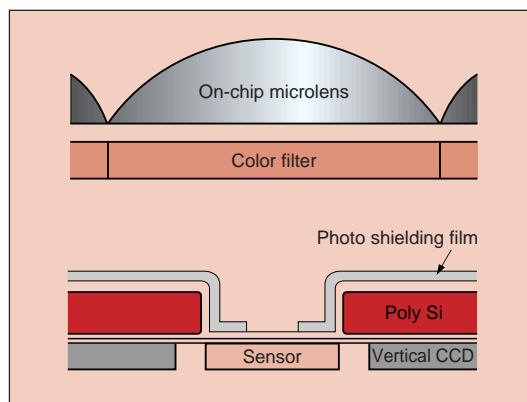
By introducing a technology for the formation of an even thinner insulating film between the silicon substrate and the electrode, Sony achieved a significant reduction in smear in these products. These devices achieve a smear level of better than -100 dB, which is a -10 to -15 dB improvement over conventional devices. (See figure 2 and photograph 2.)

#### ■ Reduced Power Consumption

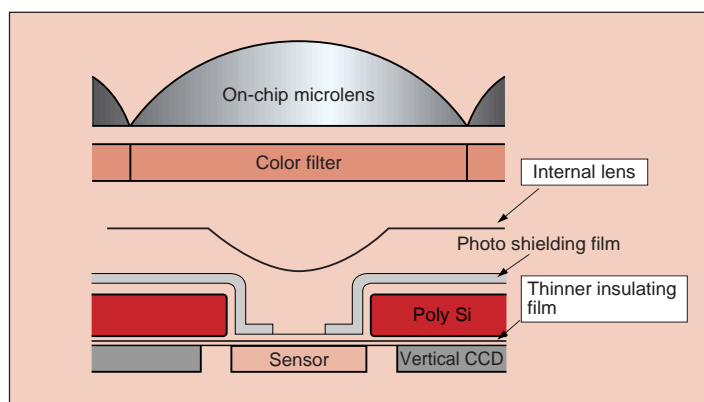
By reducing the current consumption in the output circuit, reducing the power consumption in the built-in peripheral circuits, reducing the vertical driver signal amplitude, and reducing the horizontal driver load capacitance, Sony reduced the power consumption, including the driver power, to 65 mW (a 35% reduction from conventional products) in the 250K-pixel device and to 118 mW (a 32.5% reduction) in the 380K-pixel device. (See figures 3 and 4.)



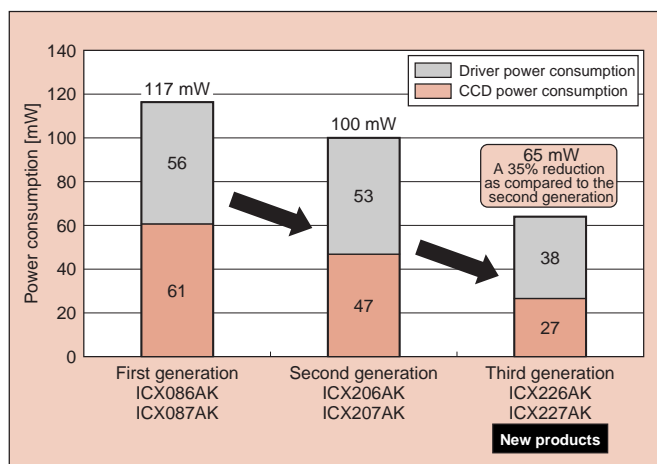
# New Products



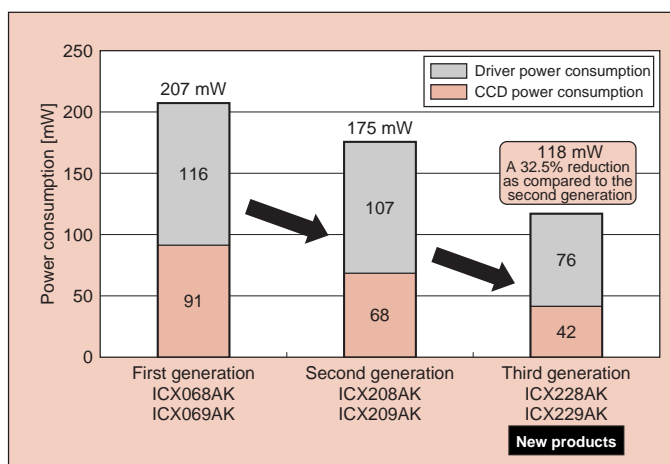
■ Figure 1 Super HAD CCD Sensor Structure



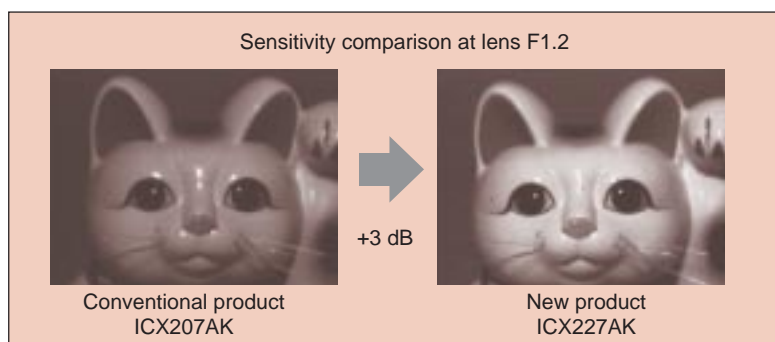
■ Figure 2 New Structure CCD Sensor Structure



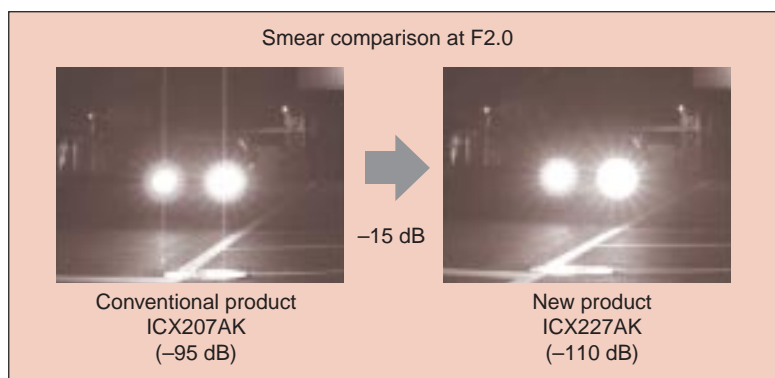
■ Figure 3 Trends in Power Consumption in 250K-pixel CCDs



■ Figure 4 Trends in Power Consumption in 380K-pixel CCDs



■ Photograph 1 Sensitivity Characteristics Comparison at the Wide-open lens F No.



■ Photograph 2 Smear Characteristics Comparison