

High-Sensitivity Diagonal 4.5 mm (Type 1/4) 250K/290K-Effective Pixel Color CCDs Super HAD CCDs for Security Cameras

ICX642AKA ICX643AKA

Sony has developed two new image sensors to respond to the increasing demands for superb imaging characteristics in the Type 1/4 CCD, which along with the Type 1/3 CCD is becoming the mainstream optical system in the security camera market. Compared to Sony's existing ICX226AK and ICX227AK*1, the ICX642AKA and ICX643AKA of this release feature significantly improved sensitivity achieved through improved condensing and optimized spectral sensitivity characteristics.

*1 Refer to CX-NEWS Vol. 20.

The ICX642AKA and ICX643AKA are products mainly designed for security camera, interphone and similar applications and are diagonal 4.5 mm (Type 1/4) 250K/290K-pixel color CCDs.

These products provide improved characteristics compared to the existing ICX226AK and ICX227AK.

These new devices provide significant improvements in the sensitivity characteristics, which are critical for security camera applications, while maintaining the same smear level characteristics as the existing products.

Furthermore the saturation signal levels in both the ICX642AKA and ICX643AKA were improved by 1000 mV as compared to the existing products (ICX226AK: 900 mV, ICX227AK: 810 mV).



In developing this device, we focused on the sensor sensitivity, which is seen as one of the most important characteristics for security cameras. As a result of the product team working together and striving for improvements from a variety of standpoints, we were able to achieve characteristics that we were satisfied with. I strongly suggest that you look into this product.

High Sensitivity and New Spectral Sensitivity Characteristics

The ICX642AKA and ICX643AKA of this release provide a significantly improved condensing efficiencies by improvements to the upper section structure and photodiode structure. Also, by adopting new complementary color pigments in the color filters, Sony increased the sensitivity to the blue end of the spectrum (shorter wavelengths) and achieved wellbalanced spectral sensitivity characteristics. (See figure 1.)

The combination of these technological improvements results in a significant increase in the sensitivity characteristics that totals +6 dB. When one compares actual images, one can clearly see that the sensitivity has been improved significantly. (See photograph 1.)

Note that the adoption of these new color filters also results in a significant improvement in light resistance compared to the existing products (the ICX226AK and ICX227AK). This means that fading of the color filters when exposed to strong light for long periods is less likely to occur, making these devices appropriate for applications such as interphones used outside.

- Diagonal 4.5 mm (Type 1/4)
- ICX642AKA: NTSC, 250K-effective pixels ICX643AKA: PAL, 290K-effective pixels
- High sensitivity (+6 dB over existing Sony products)
 New spectral sensitivity characteristics
- Low supply voltage support: VDD = 12 V, VL = -5 V
- Pin compatible with existing Sony products

Compatibility with Existing Sony Products

In these new products, Sony has achieved compatibility by making the image size, pixel count, drive timing, package, and pin configuration the same as the existing products (the ICX226AK and ICX227AK). These devices also feature a 12 V supply voltage and a -5 V vertical clock bias, and have a power consumption of approximately 65 mW, which is equivalent to that of the existing products.





■ Figure 1 Spectral Sensitivity Characteristics Comparison





■ Table 1 Device Structure

Item		ICX642AKA	ICX226AK	ICX643AKA	ICX227AK
Image size		Diagonal 4.5 mm (Type 1/4)	\leftarrow	\leftarrow	\leftarrow
TV format		NTSC	\leftarrow	PAL	\leftarrow
Transfer method		Interline transfer method	\leftarrow	\leftarrow	\leftarrow
Total number of pixels		Approx. 270K pixels $(537H \times 505V)$	\leftarrow	Approx. 320K pixels (537H × 597V)	\leftarrow
Number of effective pixels		Approx. 250K pixels $(510H \times 492V)$	\leftarrow	Approx. 290K pixels (500H × 582V)	\leftarrow
Chip size		4.34 mm(H) × 3.69 mm(V)	\leftarrow	\leftarrow	\leftarrow
Unit cell size		7.15 μ m(H) $ imes$ 5.55 μ m(V)	\leftarrow	7.30 $\mu\text{m}(\text{H}) \times 4.70~\mu\text{m}(\text{V})$	\leftarrow
Optical blacks	Horizontal	Front: 2 pixels, rear: 25 pixels	\leftarrow	Front: 7 pixels, rear: 30 pixels	\leftarrow
	Vertical	Front: 12 pixels, rear: 1 pixel	\leftarrow	Front: 14 pixels, rear: 1 pixel	\leftarrow
Number of dummy bits		Horizontal: 16 Vertical: 1 (Even fields only)	\leftarrow	←	\leftarrow
Horizontal drive frequency		9.54562 MHz	\leftarrow	9.4581 MHz	\leftarrow
Package		14-pin DIP (Plastic)	\leftarrow	\leftarrow	\leftarrow
Supply voltages VDD/VL (Typ.)		12V/–5V	\leftarrow	\leftarrow	\leftarrow

■ Table 2 Imaging Characteristics

Item		ICX642AKA	ICX226AK	Characteristics improvement	ICX643AKA	ICX227AK	Characteristics improvement	Remarks
Sensitivity (F5.6)	Тур.	1950 mV	900 mV	+6 dB or greater	1850 mV	880 mV	+6 dB or greater	3200K, 706cd/m ²
Saturation signal	Min.	1000 mV	900 mV	+100 mV	1000 mV	810 mV	+190 mV	Ta = 60°C
Smear (F5.6)	Тур.	–105 dB	\leftarrow	Equivalent	–105 dB	\leftarrow	Equivalent	V/10 method