

High-Sensitivity Diagonal 6.0 mm (Type 1/3) 380K/440K-Effective Pixel Color CCDs
Super HAD CCDs for Security Cameras

ICX638AKA ICX639AKA

The Type 1/3 CCD has become the mainstream optical system in the security camera market, where superb imaging characteristics are required. Compared to Sony's existing ICX408AK and ICX409AK*¹, the ICX638AKA and ICX639AKA of this release feature significantly improved sensitivity achieved through improved condensing and optimized spectral sensitivity characteristics.

These devices also feature improved ease of use, since in addition to the earlier 5.0 V, they also support the use of 3.3 V for both the horizontal transfer clock voltage and the reset gate clock voltage.

*¹ Refer to CX-NEWS Vol. 23.

- Diagonal 6.0 mm (Type 1/3)
- ICX638AKA: NTSC, 380K-effective pixels
ICX639AKA: PAL, 440K-effective pixels
- High sensitivity (+7 dB over existing Sony products)
New spectral sensitivity characteristics
- Support for reduced drive voltage amplitudes (typical value: 3.3 V)
- Compatibility with existing Sony products

The ICX638AKA and ICX639AKA are products mainly designed for security camera application and are diagonal 6.0 mm (Type 1/3) 380K/440K-pixel color CCDs. These products provide improved characteristics compared to the existing ICX408AK and ICX409AK. These new devices provide significant improvements in the sensitivity characteristics, which are critical for security camera applications, while maintaining the same saturation signal level and smear level characteristics as the existing products.

■ High Sensitivity and New Spectral Sensitivity Characteristics

The ICX638AKA and ICX639AKA of this release provide a significantly improved focusing of light onto the photodiodes due to an increased aperture ratio and an improved upper section structure. This suppresses the reduction in collection ratio due to the increased angles of incident light rays that occurs when the lens is used at its widest aperture. 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 well-balanced spectral sensitivity characteristics. (See figure 1.)

The combination of these technological improvements results in a significant increase in the sensitivity characteristics that totals +7 dB. When one compares actual images, one can clearly see that the image quality under the low-light conditions that are critical for security camera applications has been improved significantly. (See photograph 1.)

■ Support for Reduced Amplitude Drive Voltage

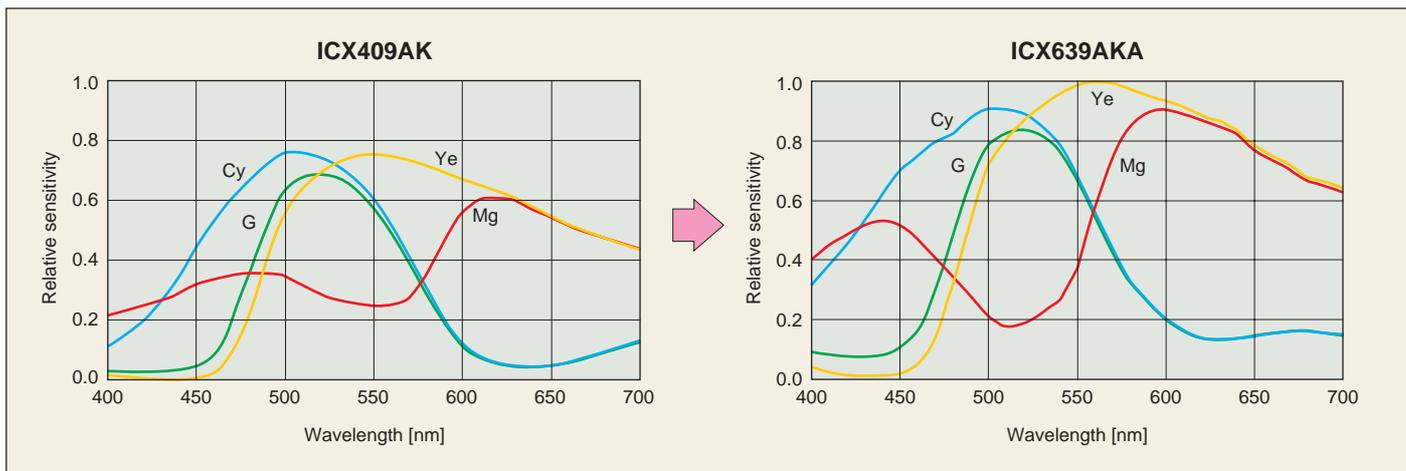
These products support not only the same 5.0 V (typical) level used in existing products but also a 3.3 V (typical) level for both the horizontal transfer clock voltage and the reset gate clock voltage. This can have a large effect in reducing both power consumption and heat generation.

■ Compatibility with Existing Sony Products

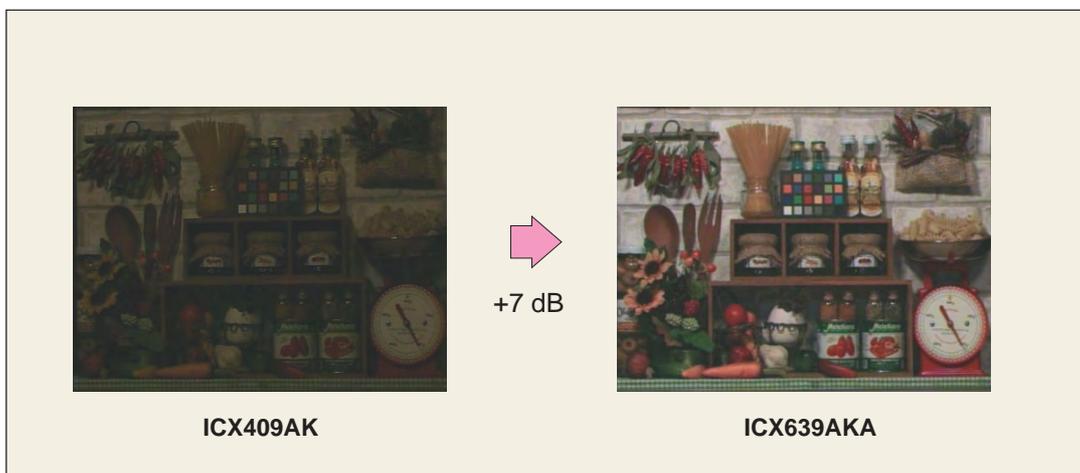
In these new products, Sony has achieved compatibility by making the image size, pixel count, drive timing, package, and pin configuration the same as the existing products (the ICX408AK and ICX409AK). These new products adopt a technique in which the reset gate DC bias is generated by circuits internal to the CCD and thus allow a reduction in the number of external components associated with bias application from the supply voltage in the drive circuit.

V O I C E

While the Type 1/3 CCD has been used for many years in a wide range of applications, we are now providing an even more evolved CCD product. I strongly recommend that you look into this high-sensitivity CCD, which can more than adequately respond to the needs of customers worldwide who require high picture quality video.



■ Figure 1 Spectral Sensitivity Characteristics Comparison



■ Photograph 1 Sensitivity Characteristics Comparison (Using the Sony CXD3172AR)

■ Table 1 Device Structure

Item	ICX638AKA	ICX408AK	ICX639AKA	ICX409AK
Image size	Diagonal 6.0 mm (Type 1/3)	←	←	←
TV format	NTSC	←	PAL	←
Transfer method	Interline transfer method	←	←	←
Total number of pixels	Approx. 410K pixels (811H × 508V)	←	Approx. 470K pixels (795H × 596V)	←
Number of effective pixels	Approx. 380K pixels (768H × 494V)	←	Approx. 440K pixels (752H × 582V)	←
Chip size	5.59 mm (H) × 4.68 mm (V)	←	←	←
Unit cell size	6.35 μm (H) × 7.40 μm (V)	←	6.50 μm (H) × 6.25 μm (V)	←
Optical blacks	Horizontal	Front: 3 pixels, rear: 40 pixels	←	←
	Vertical	Front: 12 pixels, rear: 2 pixels	←	←
Number of dummy bits	Horizontal: 22 Vertical: 1 (Only in even fields)	←	←	←
Horizontal drive frequency	14.3182 MHz	←	14.1875 MHz	←
Package	16-pin DIP (Plastic)	←	←	←

■ Table 2 Imaging Characteristics

Item		ICX638AKA ICX639AKA	ICX408AK ICX409AK	Characteristics improvement	Remarks
Sensitivity (F5.6)	Typ.	2250 mV	950 mV	+7 dB	3200K, 706 cd/m ²
Saturation signal	Min.	1000 mV	←	Equivalent	T _a = 60 °C
Smear (F5.6)	Typ.	-110 dB	←	Equivalent	V/10 method