

High-Sensitivity “Super HAD CCD II” Security Camera Image Sensors

ICX632AKA/ICX633AKA Diagonal 6.0 mm (Type 1/3) 250K/290K Effective Pixels
ICX648AKA/ICX649AKA Diagonal 4.5 mm (Type 1/4) 380K/440K Effective Pixels



The Type 1/3 and Type 1/4 CCDs have both become mainstream optical systems in the security camera market, where superb imaging characteristics are required.

Compared to Sony's existing ICX404AK/ICX405AK*1 and ICX228AK/ICX229AK*2 products, the ICX632AKA/ICX633AKA and ICX648AKA/ICX649AKA of this release feature significantly improved sensitivity achieved through improved condensing and optimized spectral sensitivity characteristics.

The ICX632AKA/ICX633AKA 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 See CX-News Vol. 23 *2 See CX-News Vol. 20

ICX632AKA: Diagonal 6.0 mm (Type 1/3), NTSC, 250K pixels

ICX633AKA: Diagonal 6.0 mm (Type 1/3), PAL, 290K pixels

ICX648AKA: Diagonal 4.5 mm (Type 1/4), NTSC, 380K pixels

ICX649AKA: Diagonal 4.5 mm (Type 1/4), PAL, 440K pixels

- High sensitivity (+7 dB over existing Sony products), new spectral sensitivity characteristics
- Support for reduced drive voltage amplitudes (3.3 V typical)
- Compatibility with existing Sony products

*: “Super HAD CCD” and **Super HAD CCD** are registered trademarks of Sony Corporation.

The ICX632AKA/ICX633AKA and ICX648AKA/ICX649AKA are color CCD image sensors mainly designed for security camera applications. These devices feature improved characteristics compared to the existing Sony ICX404AK/ICX405AK and ICX228AK/ICX229AK.

While the saturation signal and smear level performance has been maintained in the ICX632AKA/ICX633AKA and improved in the ICX648AKA/ICX649AKA, Sony has significantly improved the sensitivity, which is critical for security camera applications.

High Sensitivity and New Spectral Sensitivity Characteristics

The ICX632AKA/ICX633AKA and ICX648AKA/ICX649AKA 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. (See figure 1.)

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 2.)

The combination of these technological improvements results in a significant increase in the sensitivity characteristics that totals +7 dB. Compared to the existing ICX228AK/ICX229AK, the adoption of these new color filters achieves a significant improvement in light resistance as well. As a result, these devices are resistant to color filter fading when subjected to bright light for extended periods, and are thus also appropriate for use in outdoor applications.

Support for Reduced Amplitude Drive Voltage

The ICX632AKA/ICX633AKA 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 power consumption by using a common power supply

for both the image sensors and peripheral circuits.

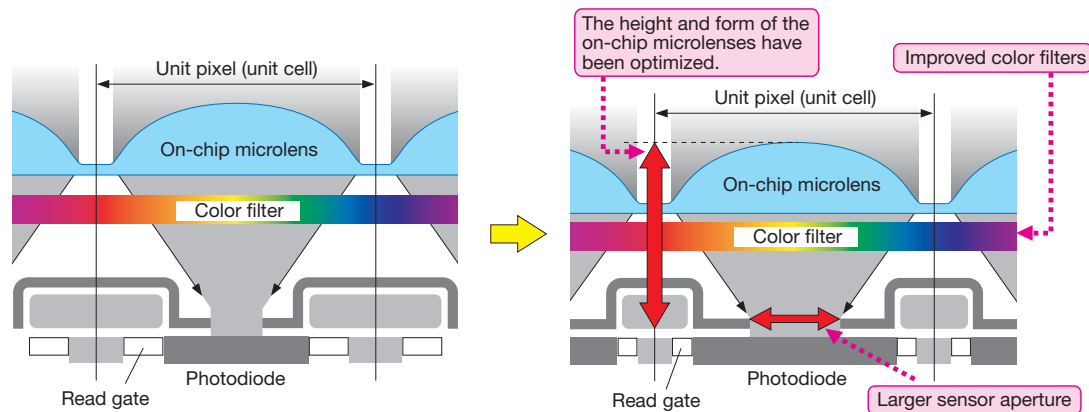
Compatibility with Existing Sony Products

In these new products, Sony has achieved compatibility by making the image size, pixel count, drive timing, package, and pin assignment the same as in existing products (the ICX404AK/ICX405AK and ICX228AK/ICX229AK). The ICX632AKA/ICX633AKA feature improved reset gate drive and, compared to the existing ICX404AK/ICX405AK, allow a reduction in the number of components in the external drive circuit. Furthermore, the ICX648AKA/ICX649AKA use 12 V as the supply voltage and -5 V as the vertical clock bias and as a result achieve the same low power (118 mW) as the existing products.

V O I C E

The security camera market has been expanding rapidly in recent years and CCD devices that have evolved proportionally to this growth are strongly desired. To respond to these needs, we developed these CCD products which achieve higher sensitivity and lower power consumption. I hope that improved security camera performance due to these improved characteristics will lead to reduced crime. I strongly recommend these CCDs, which achieve the industry's highest level of image sensor sensitivity.

Figure 1 “Super HAD CCD II” Structure



Super HAD CCD

Super HAD CCD II

Figure 2 Spectral Sensitivity Characteristics Comparison

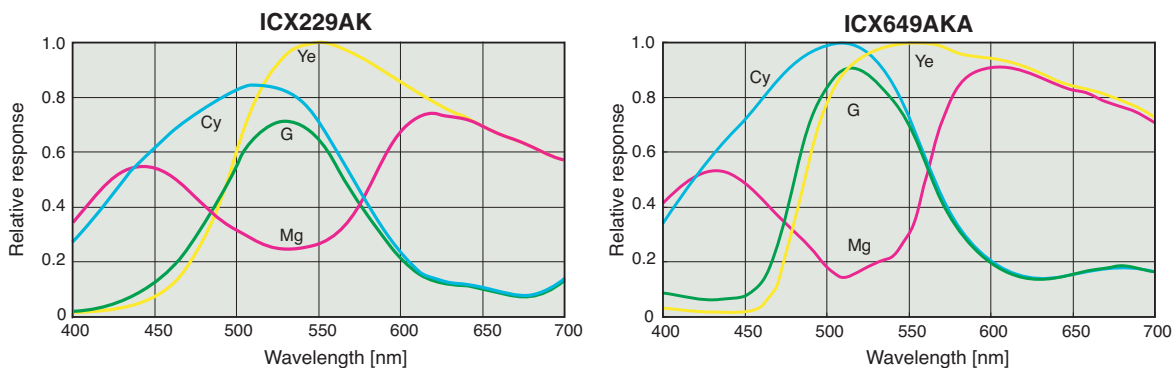


Table 1 Device Structure

Item	ICX632AKA	ICX633AKA	ICX648AKA	ICX649AKA
Image size	Diagonal 6.0 mm (Type 1/3)	←	Diagonal 4.5 mm (Type 1/4)	←
TV format	NTSC	PAL	NTSC	PAL
Transfer method	Interline transfer method	←	←	←
Total number of pixels	Approx. 270K pixels (537H × 505V)	Approx. 320K pixels (537H × 597V)	Approx. 410K pixels (811H × 508V)	Approx. 470K pixels (795H × 596V)
Number of effective pixels	Approx. 250K pixels (510H × 492V)	Approx. 290K pixels (500H × 582V)	Approx. 380K pixels (768H × 494V)	Approx. 440K pixels (752H × 582V)
Chip size (H) × (V)	5.59 mm × 4.68 mm	←	4.34 mm × 3.69 mm	←
Unit cell size (H) × (V)	9.60 μm × 7.50 μm	9.80 μm × 6.30 μm	4.75 μm × 5.55 μm	4.85 μm × 4.65 μm
Optical blacks	Horizontal	Front: 2 pixels, rear: 25 pixels	Front: 7 pixels, rear: 30 pixels	Front: 3 pixels, rear: 40 pixels
	Vertical	Front: 12 pixels, rear: 1 pixel	Front: 14 pixels, rear: 1 pixel	Front: 12 pixels, rear: 2 pixels
Number of dummy bits	Horizontal: 16 Vertical: 1 (Only in even fields)	←	Horizontal: 22 Vertical: 1 (Only in even fields)	←
Horizontal drive frequency	9.54562 MHz	9.4581 MHz	14.3182 MHz	14.1875 MHz
Package	16-pin DIP (Plastic)	←	14-pin DIP (Plastic)	←
Supply voltages VDD/VL (typical values)	15 V / -7 V	←	12 V / -5 V	←

Table 2 Imaging Characteristics

Item	ICX404AK ICX405AK	ICX632AKA ICX633AKA	ICX228AK ICX229AK	ICX648AKA ICX649AKA	Remarks
Sensitivity (F5.6)	Typ. 1700mV	3800mV	450mV 440mV	1050mV 950mV	3200K, 706cd/m ²
Saturation signal	Min. 1000mV	←	800mV 720mV	1000mV	Ta = 60°C
Smear (F5.6)	Typ. -115dB	←	-100dB	-105dB	V/10 method