Progressive Scan Diagonal 6.0 mm (Type 1/3)
1.25M-Effective Pixel Color EXview HAD CCDTM

ICX445AKA

There are now increasing demands for high resolution from the security camera industry to support better identification of persons captured by these cameras. There is also a trend towards switching from the conventional TV format to a digital formats in IP cameras and other products. To respond to these needs, Sony has developed and is now releasing the ICX445AKA, the first megapixel class CCD for security cameras. In this device, Sony achieved both high resolution (1.25M effective pixels) and high sensitivity by achieving even finer feature sizes in a new generation of the EXview HAD CCD structure and by taking advantage of Sony's progressive scan CCD technology developed through extensive experience in digital camera sensors. This new product also includes a "horizontal and vertical pixel addition function" that allows it to capture VGA resolution images at 60 frame/s.

EXview HAD CCD™

*: EXview HAD CCD is a trademark of Sony Corporation. This is a CCD that drastically improves light efficiency by including near infrared light region.

- **Complementary color filters, 24-pin DIP**
- **Progressive scan CCD**
- **Diagonal 6.0 mm (Type 1/3)**
- **High near-infrared sensitivity**
- **Progressive scan rate: 22.5 frame/s**
- **VGA resolution readout rate: 60 frame/s**

The ICX445AKA is a progressive scan diagonal 6.0 mm (Type 1/3) 1.25M-effective pixel color CCD designed for security camera applications. The ICX445AKA features high resolution than conventional security camera CCDs. (See figure 2.) Furthermore, it supports signal output in a wide variety of formats, including progressive scan, center cut-out readout, and 4-pixel addition mode readout. (See table 1.)

V O I C E

■ High Sensitivity and Low Smear

In addition to both optimization of the pixel pattern and on-chip microlenses and adoption of complementary color filters, Sony also adopted a new generation of the EXview HAD CCD technology, which achieves a further increase in sensitivity. As a result, Sony was able to achieve the high sensitivity of 460 mV (at F5.6) despite the small unit pixel cell size of 3.75 μm. Additionally, this device boasts high near infrared sensitivity and is appropriate for imaging in day/night cameras and in conjunction with a near infrared light source. Furthermore, this device achieves the smear characteristics of -104 dB (at F5.6). (See table 3.)

■ Diverse Set of Operating Modes

The ICX445AKA's output circuits support high-speed operation and can be operated at horizontal drive frequencies up to 40.5 MHz. This allows this sensor to achieve a high pixel count and high frame rates.

In progressive scan mode, the ICX445AKA can output all pixels independently at frame rates up to 22.5 frame/s. It also implements interlaced operation with ten phases of independent vertical transfer registers and is capable of outputting 60 field/s in a vertical 720-line cut-out mode. Furthermore, it can output images with a pixel count equivalent to VGA resolution (640 × 480 pixels) with four times the usual sensitivity by using the included "horizontal and vertical pixel addition function". At the same VGA equivalent resolution, it can also output two types of signal that differ in their charge accumulation time with a period corresponding to 30 frame/s.

■ Lineup Deployment

Sony plans further deployment of this technology both in products that use primary color filters and in products that support black-and-white imaging. We are confident in recommending these products for security, IP, and similar camera applications.
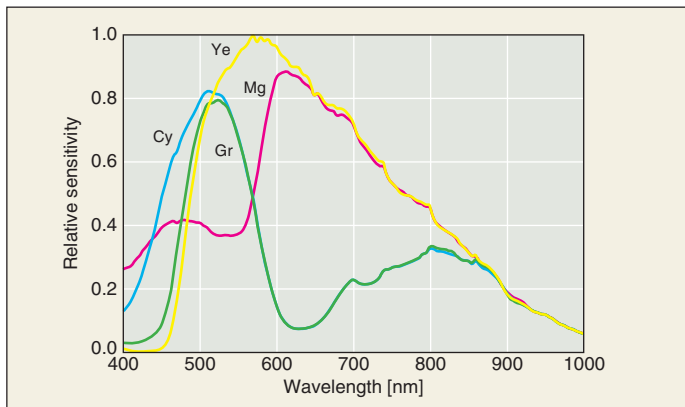
■ **Figure 1   Spectral Sensitivity Characteristics**

■ **Figure 2   Example Image**

■ **Table 1   Readout Modes**

Mode		Frame rate	Effective pixels output
Progressive scan mode (progressive)	NTSC	15 frame/s	1296 (H) × 966 (V)
	PAL	12.5 frame/s	
	MAX	22.5 frame/s	
Center cut-out mode (progressive)	NTSC	30 frame/s	1296 (H) × 728 (V)
	PAL	25 frame/s	
4-pixel addition mode	NTSC	60 frame/s	648 (H) × 483 (V)
	PAL	50 frame/s	
4-pixel addition mode 2	NTSC	30 frame/s	648 (H) × 483 (V)
	PAL	25 frame/s	
Progressive scan mode (interlaced)	NTSC	30 field/s	1296 (H) × 966 (V)
	PAL	25 field/s	
Center cut-out mode (interlaced)	NTSC	60 field/s	1296 (H) × 728 (V)
	PAL	50 field/s	

■ **Table 2   Device Structure**

Item	ICX445AKA
Image size	Diagonal 6.0 mm (Type 1/3)
Transfer method	Progressive scan interline transfer method
Total number of pixels	Approx. 1.32M (1348H × 976V)
Number of effective pixels	Approx. 1.25M (1296H × 966V)
Number of active pixels	Approx. 1.23M (1280H × 960V)
Unit cell size	3.75 μm (H) × 3.75 μm (V)
Optical black	Horizontal (H): Front: 12 pixels, rear: 40 pixels Vertical (V): Front: 8 pixels, rear: 2 pixels
Number of dummy bits	Horizontal: 4 Vertical: 2
Horizontal drive frequency	36 MHz (NTSC) 29 MHz (PAL) *: This device supports drive at up to 40.5 MHz.
Package	24-pin DIP (Plastic)

■ **Table 3   Imaging Characteristics**

Item	ICX445AKA	Remarks
Sensitivity (F5.6)	460 mV	3200K, 706 cd/m², Y signal, 1/30 s accumulation
Saturation signal	350 mV	Ta = 60°C
Smear (F5.6)	−104 dB	V/10 method