Diagonal 9.04 mm (Type 1/1.8) 5.13M-Pixel CCD Image Sensor
for High-Resolution Digital Still Cameras

ICX452AQ
ICX452AQF

The needs for higher pixel counts and further miniaturization are increasing in the digital still camera market that has been experiencing rapid and continuous growth for several years.
Sony has now developed the ICX452AQ/AQF diagonal 9.04 mm (Type 1/1.8) 5.13M-pixel CCD image sensor to respond to these needs.
The ICX452AQ/AQF takes full advantage of the latest semiconductor fabrication technologies and achieves not only the high resolution of 5M pixels, but also better sensitivity and saturation signal level characteristics than the ICX406AQ, which shares the same optical system size.

- **ICX452AQ: Primary color filters, DIP**
  ICX452AQF: Primary color filters, SOP
- **Diagonal 9.04 mm (Type 1/1.8), effective 5.13M pixels (2616H × 1960V)**
- **Three-field readout method**
- **High sensitivity: 235 mV (G signal)**
- **High saturation signal level: 500 mV**

The ICX452AQ/AQF is a diagonal 9.04 mm (Type 1/1.8), 5.13M-pixel CCD image sensor that was developed for high-resolution digital still cameras. In conjunction with a mechanical shutter, this sensor can acquire high-resolution images. Since this product has the same image diagonal as the conventional ICX406AQ, a 5M-pixel digital still camera can be implemented without changes to the lens optical system. Table 1 lists the device structure of the ICX452AQ/AQF and table 2 lists its imaging characteristics.

V O I C E

We developed this new Type 1/1.8 5M-pixel CCD to respond to market demands for further miniaturization and higher pixel counts. The idea behind this product is to enable miniature digital still cameras to achieve even better picture quality. I strongly recommend that you consider developing a digital still camera that can take advantage of the characteristics of this device.

Extensive Lineup

Figure 1 shows Sony's digital still camera CCD lineup. Sony supports customer needs with its extensive product line that, starting with the ICX202 developed in 1997, covers image sizes from Type 2/3 to Type 1/3.6 with pixel counts from 1.25M to 5M pixels. The newly-developed ICX452AQ/AQF can be seen as both a reduced size version of the ICX282 Type 2/3 5M-pixel sensor, and as an increased pixel count version of the ICX406 Type 1/1.8 4M-pixel sensor. As such, Sony is confident that it will contribute to even further growth of the consumer digital still camera market.

High Saturation Signal Level

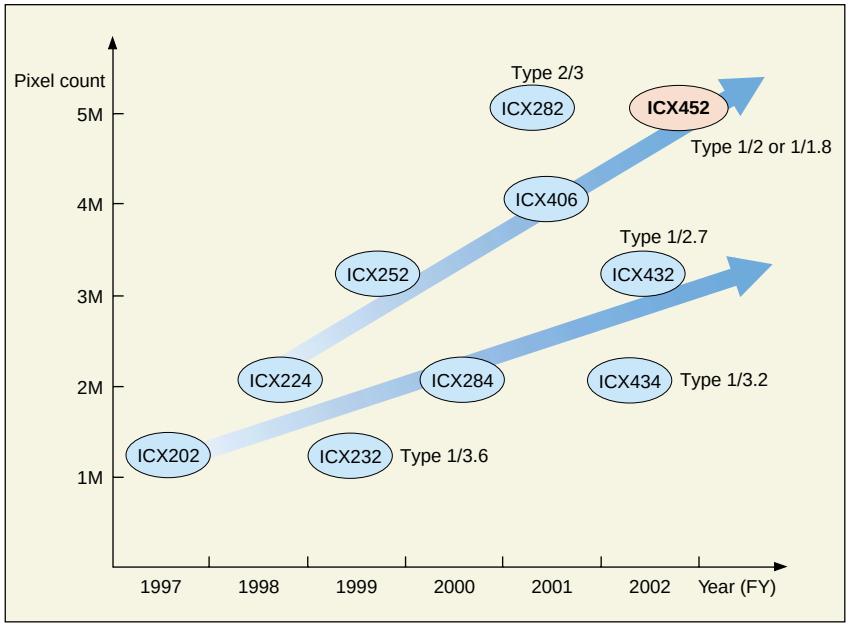
To increase the dynamic range even further, the ICX452AQ/AQF adopts the same three-field readout system used in the ICX432DQ/DQF. This allows the area occupied by the photodiode in the unit pixel to be increased over that of conventional Sony products, and achieves a saturation signal of 500 mV.

High Sensitivity

In addition to the fabrication technology used for the on-chip microlenses, Sony has optimized the lens shape and adopted thin-film primary color filters to improve the optical condensing characteristics. This improved technology allows the ICX452AQ/AQF to achieve a sensitivity of 235 mV, despite the 2.775 μm diagonal unit pixel.

Timing Generator IC

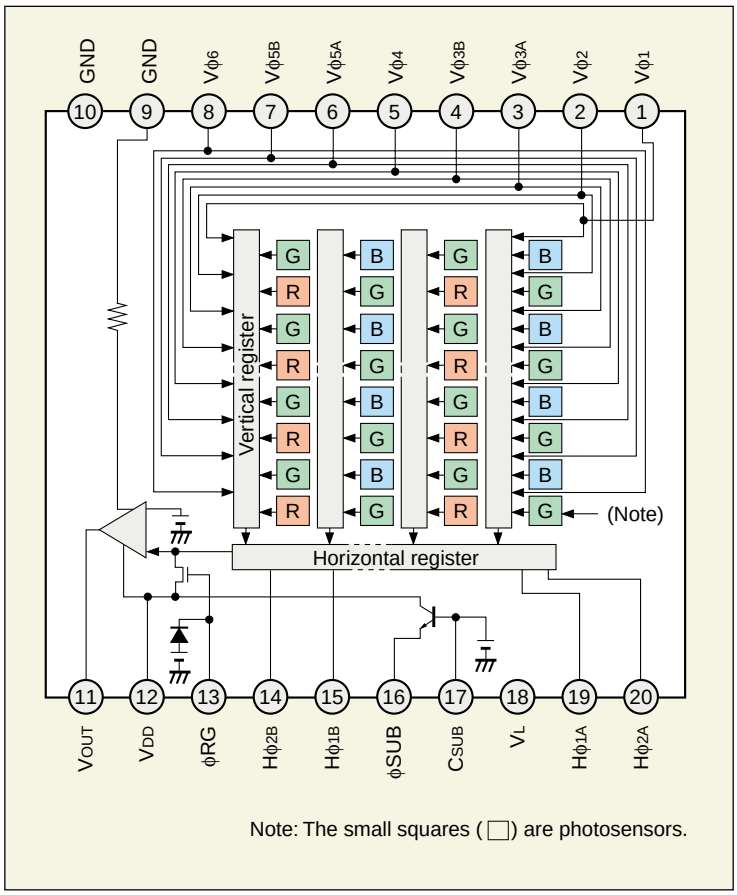
Sony provides the CXD3619R drive timing generator IC, which includes vertical and horizontal drivers. This IC supports both high frame rate readout mode and AF mode.



■ Figure 1 Digital Still Camera CCD Lineup

■ Table 1 Device Structure

Item	ICX452AQ
Image size	Diagonal 9.04 mm (Type 1/1.8)
Transfer method	Frame readout interline transfer method
Readout method	Three field readout method
Vertical register transfer clock signals	8 signal lines
Total number of pixels	Approx. 5.25M (2668H × 1970V)
Number of effective pixels	Approx. 5.13M (2616H × 1960V)
Number of active pixels	Approx. 5.09M (2608H × 1952V)
Number of recommended recording pixels (Aspect ratio: 4:3)	Approx. 5.04M (2592H × 1944V)
Chip size	8.23 mm (H) × 6.68 mm (V)
Unit cell size	2.775 µm (H) × 2.775 µm (V) Square pixels
Horizontal drive frequency	24.3 MHz
Package	20-pin plastic DIP/SOP



■ Figure 2 ICX452 Block Diagram

■ Table 2 Image Sensor Characteristics

Item		ICX452AQ	Remarks
Sensitivity (G sensitivity)		235 mV	3200K, 706 cd/m², F5.6, 1/30 s accumulation
Saturation signal		500 mV	During frame readout
Smear	Frame readout mode	–90 dB	None when a mechanical shutter is used
	High frame rate readout mode	–77 dB	
Frame rate	Frame readout mode	3.75 frames/s	
	High frame rate readout mode	30 frames/s (NTSC mode) 25 frames/s (PAL mode)	
	AF mode	60 frames/s (NTSC mode) 50 frames/s (PAL mode)	