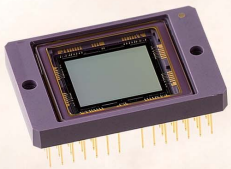
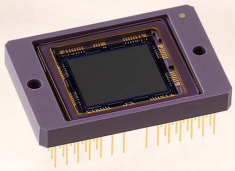
# ICX694ALG/ ICX694AQG

# Diagonal 15.99 mm (Large Optical System, Type 1) 6.09M-Effective Pixel Black-and-White and Color CCD Image Sensors with Multichannel Output Switching for Both High Sensitivity and High Resolution





**In the industrial camera market, there is an increasing demand for full HD format appropriate for video applications in addition to high pixel counts and high frame rate outputs.**
**Sony has now released the ICX694ALG (black and white) and the ICX694AQG (color) 6.09M-effective pixel progressive scan method CCD image sensors built-in four-channel output circuit and provide full HD video output.**
**The ICX694ALG and ICX694AQG employ a large optical system (full-size sensor) having a diagonal size of 15.99 mm (Type 1) that have "the same or better sensitivity" than the current Sony ICX674ALG (black and white) and ICX674AQG (color)*1 and provide "high resolution as about 6.09M effective pixels".**
**For ease of use, they have the same package size and compatible pin configuration as their predecessors.**

*1: See the New Products section in CX-NEWS, Volume 62.

- Diagonal 15.99 mm (Type 1) 6.09M-effective pixel progressive scan method CCD image sensors
- Extensive set of drive modes
- Both high sensitivity and high resolution
- Compatibility with ICX674ALG and ICX674AQG

**EXview HAD CCD II**™

* "EXview HAD CCD II" is a trademark of Sony Corporation. The "EXview HAD CCD II" is a CCD image sensor that realizes sensitivity (typical) of 1000 mV or more per 1 $\mu m^2$ (Color: F5.6/BW: F8 in 1 s accumulation equivalent) and improves light efficiency by including near infrared light region as a basic structure of Sony's "EXview HAD CCD".

The ICX694ALG and ICX694AQG are diagonal 15.99 mm (Type 1) 6.09M-effective pixel CCD image sensors designed for use in industrial and scientific instrumentation cameras.
They include multichannel output switching and an extensive set of drive modes.

## Extensive Set of Drive Modes

Like the current Sony products, the ICX674ALG and the ICX674AQG, by changing the vertical and horizontal transfer register drive timing according to the required frame rate, the ICX694ALG and the ICX694AQG achieve multichannel output switching, that can switch between single-channel output, horizontal division 2-channel output, vertical division 2-channel output, and horizontal and vertical division 4-channel output. (See figure 1.)
When 4-channel output is used, these devices are capable of 25 frame/s output in progressive scan method, and of 46 frame/s output in vertical 1092-line cropping mode.
These image sensors can support a wide range of customer needs by combining these diverse drive modes with multichannel output switching.
For example, in vertical 1092-line cropping mode, a single camera can handle the multiple lanes that traffic monitoring requires.

## Both High Sensitivity and High Resolution

So far diagonal 11 mm (Type 2/3) were the upper optical limit of Sony lineup of image sensors for industrial cameras.
The problem with this configuration is that in attempts to achieve high pixel counts, high sensitivity, a characteristic valued in security applications, had to be sacrificed for high resolution.
However, large optical sensors with a diagonal 15.99 mm (Type 1) provide equivalent or better sensitivity and high resolution compared to the current ICX674ALG and ICX674AQG.
And since they employ the "EXviewHAD CCD II" structure, they also offer high sensitivity in the near infrared region. (See figure 2 and table 2.)

## Compatibility with ICX674ALG and ICX674AQG

For ease of use, the ICX694ALG and ICX694AQG have the same package size as and share the pin configuration of the ICX674ALG and ICX674AQG, the current Sony products.
Taking advantage of their high sensitivity in the near infrared region, they can be used not only for industrial applications, but as a black and white high-sensitivity camera for day and night security camera applications by removing the IR cut-off filter at night time.
These sensors will be able to meet diverse customer needs since they can be used in a wide variety of camera applications.

## V O I C E

In addition to the extensive set of drive modes that multichannel output switching permits, the large optical sensors used in the ICX694ALG and ICX694AQG allowed us to create a commercial product lineup that offer both high resolution and high sensitivity.
Maintaining backward compatibility with the ICX674ALG and ICX674AQG, the current Sony products, was one of the design goals to make the product user friendly.
Be sure to consider these image sensors for your next product.

**Figure 1** Output Channel Count/Frame Rate Relationship

Readout Modes

| Drive mode | Output channels | Output pin VOUT | Horizontal drive frequency [MHz] | Frame rate [frame/s] |
|---|---|---|---|---|
| Progressive scan Active: 2750H × 2200V | 1 | 1 | 54 | 7.5 |
| | 2 | 1/2 | ↑ | 13 |
| | 2 | 1/3 | ↑ | 15 |
| | 4 | 1/2/3/4 | ↑ | 25 |
| 1092-line vertical cropping Active: 2750H × 1092V | 1 | 1 | ↑ | 14 |
| | 2 | 1/2 | ↑ | 24 |
| | 2 | 1/3 | ↑ | 26 |
| | 4 | 1/2/3/4 | ↑ | 46 |

Pixel Array Structure

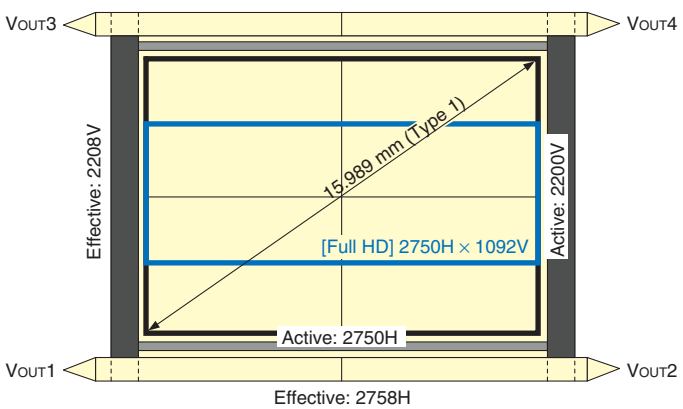
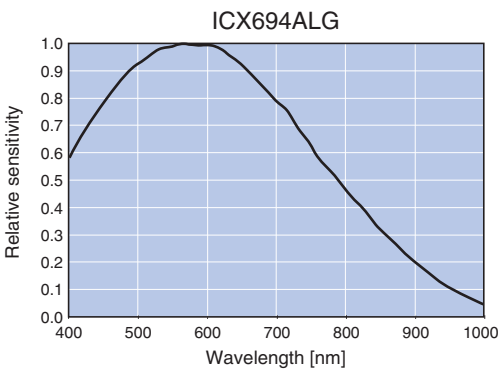



**Figure 2** Spectral Sensitivity Characteristics



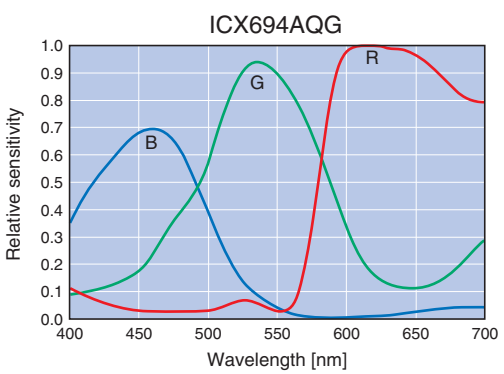




**Table 1** Device Structure

| Item | | ICX694ALG | ICX694AQG |
|---|---|---|---|
| Image size | | Diagonal 15.99 mm (Type 1) | ← |
| Transfer method | | Progressive scan interline transfer method | ← |
| Total number of pixels | | 2838H × 2224V Approx. 6.31M pixels | ← |
| Number of effective pixels | | 2758H × 2208V Approx. 6.09M pixels | ← |
| Number of active pixels | | 2750H × 2200V Approx. 6.05M pixels | ← |
| Unit cell size | | 4.54 µm (H) × 4.54 µm (V) | ← |
| Optical blacks | Horizontal | Front: 40 pixels (per channel) | ← |
| | Vertical | Front: 8 pixels (per channel) | ← |
| Number of dummy bits | | Horizontal: Front 1 (per channel) | ← |
| Horizontal drive frequency | | 54 MHz | ← |
| Package | | 68-pin Ceramic PGA | ← |

**Table 2** Image Sensor Characteristics

| Item | | ICX694ALG | ICX694AQG | Remarks |
|---|---|---|---|---|
| Sensitivity | Typ. | 1000 mV (F8.0) | 880 mV (G signal, F5.6) | 3200K, 706 cd/m$^2$ 1/30 s accumulation |
| Saturation signal | Min. | 800 mV | ← | Ta = 60°C |
| Smear | Typ. | –110 dB (F8.0) | –110 dB (F5.6) | V/10 method |