



**SONY**  
**Rolling Shutter**  
**technology guide**

# SONY

---

## Rolling Shutter Image Sensor Technology

---

### *OVERVIEW*

Rolling shutters are a pixel readout method for CMOS image sensors. In 2009, Sony commercialized their professional rolling shutter CMOS image sensors outfitted with proprietary high-speed, low-noise, A/D conversion technology, and they have been evolving their performance continuously ever since. In this article, Sony explains the low-noise and high-sensitivity technologies specifically.

### *TECHNICAL FEATURES*

#### *Low-noise technology*

The primary characteristic of Sony's industrial rolling shutter image sensors is their low noise performance, which is achieved thanks to two main aspects of the technology. The first is noise reduction technology for each pixel in the image sensor. Using Sony's precise production technological capabilities and long-accumulated expertise in the design and development of pixel structure for image sensors, Sony's rolling shutter image sensors reduce to a low level the noise generated in pixels during photoelectric conversion or when transporting a charge.

The second is Sony's proprietary column-parallel A/D conversion circuit. When the charge is converted to signal after photoelectric conversion, this circuit removes noise twice, before and after A/D conversion.

#### *High-sensitivity technology*

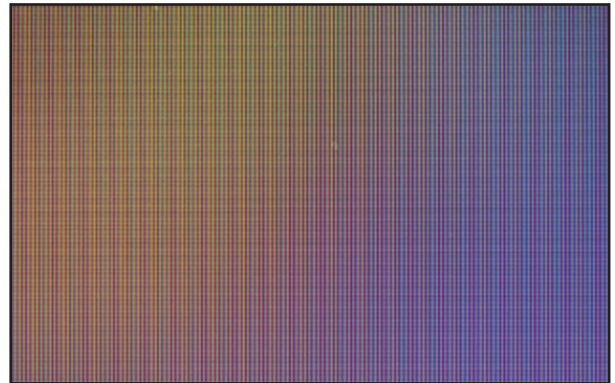
The secondary characteristic, high-sensitivity, is achieved through image sensor structure technology. Sony's industrial rolling shutter image sensors use a back-illuminated structure for the light-receiving parts. As shown in the figure below, in image sensors with a back-illuminated structure, the metal wiring is mounted below the photo diode layer. Compared to image sensors with a front-illuminated structure, they are less affected by the wiring layer so they can let in more light for photoelectric conversion, resulting in higher sensitivity.

The lineup also includes image sensors equipped with high-sensitivity STARVIS technology developed for security applications. STARVIS technology also uses the same back-illuminated structure technology mentioned above.

## APPLICATIONS

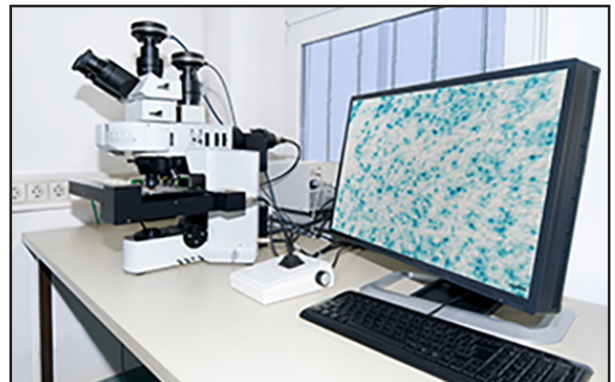
### *Flaw inspections for displays*

When large image sensors are applied for the flaw inspections of displays, it is required to accurately measure the brightness of each pixel on the inspection screen to detect any defects or unevenness. To improve the accuracy, uniform pixel performance is required in the image sensor side. Sony's large rolling shutter image sensors are suitable for such flaw inspection in precise level, because they offer not only high sensitivity performance but also low noise characteristics under dark conditions and less defects of pixels, despite having over 100 million pixels.



### *Digital microscopes*

Image sensors for digital microscope applications must be highly sensitive and low-noise. They also must have wide dynamic range and uniform performance of pixels. Sony's rolling shutter image sensors contribute to the improvement of accuracy of digital microscope observation by offering high uniformity of pixel performance as well as high sensitivity in a spectrum from the visible light to the near-infrared light.



### *Sorting for logistics lines*

When speed is not an issue, Sony's rolling shutter image sensors are often used in the sorting process on logistics lines. Offering low-noise, high-sensitivity performance, rolling shutter image sensors are regarded suitable for capturing images under low light conditions. Using a large image sensor, one camera can capture things on one meter width conveyor belt by one shot. Such an application is quite effective for the reduction of system installation cost.



## *Aerial imaging*

Large rolling shutter image sensors with high pixel counts are suitable for wide-area aerial photography during limited daylight hours. For example, the 4.2-type image sensor can capture about 17 times the area of a 1-type in just a single shot, enabling the effective capture of wide areas in a short time.



---

Sony's rolling shutter sensors are available  
through **Macnica ATD Europe.**

---



**MACNICA**  
ATD EUROPE

**Contact information:**  
Macnica ATD Europe  
[www.macnica.com/eu/atd-europe/en](http://www.macnica.com/eu/atd-europe/en)  
[sales.mae@macnica.com](mailto:sales.mae@macnica.com)