

IMX174LLJ/IMX174LQJ

Diagonal 13.4mm (Type 1/1.2) 2.35M-Effective Pixel
Monochrome and Color CMOS Image Sensors

CMOS Image Sensors with Global Shutter Function for Industrial Use

In such cases where a high-speed moving subject is to be shot with standard CMOS Image sensors, focal plane distortion will occur and it might be a problem especially for the fields of industrial use. The new sensors feature a global

shutter function and able to capture a high-speed moving image without focal plane distortion. Also the sensors have various functions including trigger mode or ROI (Region of interest) mode specially required in the fields of industrial use.

- Global shutter function
- High frame rate (10 bit 164.5 frame/s,
12 bit 128.2 frame/s)
- ROI mode (able to set at a maximum of 16 areas)
- Trigger mode (able to control accumulation
time by external pulse)
- A variety of operating modes (V inversion
output and multiple frame set output mode)

Exmor

* Exmor is a trademark of Sony Corporation. The Exmor is a version of Sony's high performance CMOS image sensor with high-speed processing, low noise and low power dissipation by using column-parallel A/D conversion.

Pregius

* Pregius is a trademark of Sony Corporation. The Pregius is global shutter pixel technology for active pixel-type CMOS image sensors that use Sony's low-noise CCD structure, and realizes high picture quality.

Global Shutter Function

For industrial use, it is required to capture the exact shape of a high-speed moving subject. The existing CMOS image sensors have a rolling shutter as the electronic shutter function; therefore, focal plane distortion was inevitable in principle. A new pixel with analog memory was developed for the IMX174LLJ/LQJ and eliminated generation of the focal

plane distortion by enabling to scan all pixel signals at once (referred to as "global shutter function" below). (See photograph 1.) The sensors accomplished high-picture quality combining with the column-parallel A/D conversion technology used for the existing Sony's CMOS Image sensors. (See photograph 2.)

High Frame Rate

For industrial use, it is required to capture the sequence of high-speed moving subject; therefore, frame rate is equally important as global shutter function. The IMX174LLJ/LQJ optimized the internal circuit and adopted LVDS 8ch output,

and then realized high-speed imaging by achieving high frame rate with a maximum 164.5 frame/s using 10 bit ADC, and with a maximum 128.2 frame/s using 12 bit ADC. (See table 3.)

ROI Mode

To meet market needs, there is a requirement to capture moving subject only in partial areas rather than a whole image view angle. ROI mode makes this possible. The IMX174LLJ/LQJ have the ROI mode and able to set at a

maximum of 16 areas inside the effective pixels and output cropped partial pictures out of the image view angle. Also, since ROI mode scans less pixel count, even higher frame rate is achievable. (See photograph 3.)

Trigger Mode

The IMX174LLJ/LQJ are equipped with trigger mode, and the external pulse can control accumulation time. The sensors also have a pulse output function to indicate respective condi-

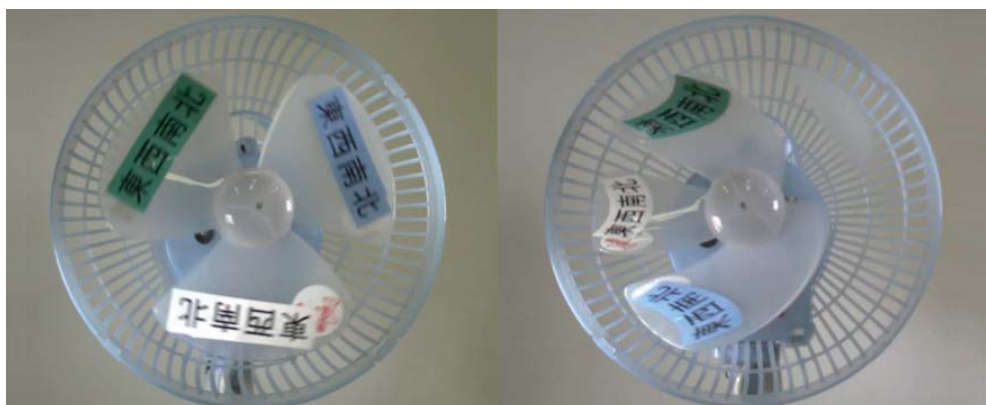
tions during shutter operation and can be coordinated with peripheral circuits.

A Variety of Operating Modes

The IMX174LLJ/LQJ have internal register settings which can switch vertical scan direction (normal/inverted) of the sensors and support 2 frame set output mode utilizing high-speed frame rate. In this 2 frame set output mode, separate exposure time can be set for 2 consecutive frames, and each set of 2 frames

can be handled as 1 set to automatically output consecutive images. This mode can generate a picture with a wide dynamic range as a result of the combination of multiple frames. Also the sensors support all-pixel scan (WUXGA), including UXGA, and full HD scan mode as the image data output format.

< photograph 1 >
Moving Object Image



IMX174LQJ (Global Shutter)

The existing type (Rolling Shutter)

< Photograph 2 >
Sample Images

Condition: 2000 lx F5.6 (UXGA image
ADC 12 bit mode, 60 frame/s,
internal gain 0 dB)



IMX174LLJ



IMX174LQJ

< Photograph 3 >
ROI Mode Cropping Images

Condition: 2000 lx F5.6 (UXGA image
ADC 12 bit mode, 60 frame/s, internal
gain 0 dB)



ROI mode (Cropping areas)



ROI mode (After cropped)

< Table 1 > Device Structure

Item		IMX174LLJ/IMX174LQJ
Image size		Diagonal 13.4 mm (Type 1/1.2) (WUXGA mode) Diagonal 11.9 mm (Type 1/1.35) (UXGA mode) Diagonal 13.0 mm (Type 1/1.23) (full HD mode)
Number of effective pixels		1936 (H) × 1216 (V) Approx. 2.35M pixels
Unit cell size		5.86 μm (H) × 5.86 μm (V)
Optical blacks	Horizontal	Front: 0 pixels, rear: 0 pixels
	Vertical	Front: 10 pixels, rear: 0 pixels
Input drive frequency		37.125 MHz / 74.25 MHz
Package		118-pin LGA
Power supply voltage V _{DD} (Typ.)		3.3 V / 1.8 V / 1.2 V

< Table 2 > Image Sensor Characteristics

Item		IMX174LLJ/IMX174LQJ	Remarks
sensitivity	Typ.	825mV (F8.0 Monochrome) / 1000mV (F5.6 color)	1/30s accumulation
Saturation signal	Min.	850 mV	T _j = 60 °C

< Table 3 > Basic Drive Mode

Drive mode	Number of recommended recording pixels	ADC	Frame rate
All-pixel scan (WUXGA)	1920 (H) × 1200 (V) Approx. 2.30M pixels	10 bit	164.5 frame/s
		12 bit	128.2 frame/s
UXGA	1600 (H) × 1200 (V) Approx. 1.92M pixels	10 bit	164.5 frame/s
		12 bit	128.2 frame/s
Full HD	1920 (H) × 1080 (V) Approx. 2.07M pixels	10 bit	120.0 frame/s
		12 bit	120.0 frame/s