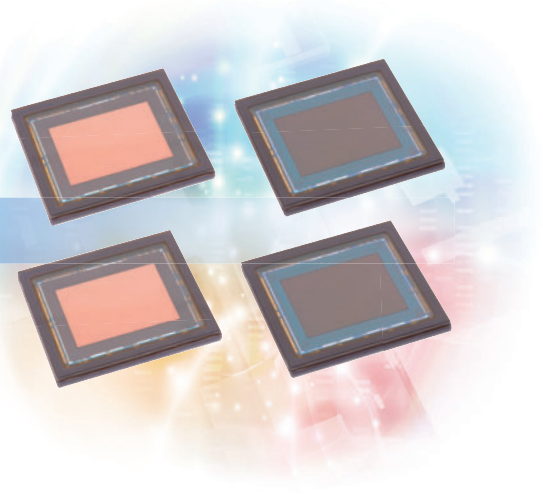
SONY

IMX253LLR/LQR, IMX255LLR/LQR



IMX253LLR/LQR

Diagonal 17.6 mm (Type 1.1) Approx. 12.37M-Effective Pixel
Monochrome and Color CMOS Image Sensor

IMX255LLR/LQR

Diagonal 16.1 mm (Type 1) Approx. 8.95M-Effective Pixel
Monochrome and Color CMOS Image Sensor

CMOS Image Sensors with a 3.45 µm Pixel and Global Shutter Function for Industrial Applications

Sony has developed the IMX253LLR/LQR optical size Type 1.1 CMOS image sensor with approximately 12.37 M effective pixels for industrial applications. The CMOS image sensor, which features a global shutter function and a 3.45 µm pixel that is the smallest class in the industry*1, achieves high picture quality, high resolution, and high-speed imaging without distortion. Other features include a trigger mode that arbitrarily controls the storage time using an external trigger signal, an ROI (Region of interest) mode for cropping only the required region for output of image data, and functions required by machine vision cameras.
The IMX255LLR/LQR, a Type 1 CMOS image sensor with approximately 8.95 M effective pixels, uses the same package as the IMX253LLR/LQR to ensure pin compatibility. In addition, the IMX255LLR/LQR can cover 4K pixels, making it suitable not only for industrial applications but also for traffic surveillance and other specialized uses.

*1: As of December 2015 (based on Sony's research)

- Global shutter function
- High picture quality/high resolution (Type 1.1 with approximately 12.37 M effective pixels / Type 1 with approximately 8.95 M effective pixels)
- High frame rate
- A variety of functions (external trigger mode, ROI mode (overlap allowed), multiple exposure functions, and others)
- Compatibility with existing Sony products

Exmor

* Exmor is a registered trademark or trademark of Sony Group Corporation or its affiliates. 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 registered trademark or trademark of Sony Group Corporation or its affiliates. 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

Industrial applications require accurate imaging of fast-moving subjects, but conventional rolling shutter type image sensors have trouble properly capturing fast-moving subjects due to problems such as flash bands and the distortion of the subject due to focal plane phenomena. The IMX253LLR/LQR and IMX255LLR/LQR are equipped with a global shutter-compatible pixel, enabling high-quality image capture that is not affected by focal plane distortion and flash bands.

High Picture Quality/High Resolution

The IMX253LLR/LQR is an optical size Type 1.1 CMOS image sensor with approximately 12.37 M effective pixels. With more than twice the pixels of the IMX250LLR/LQR, our existing product employing the same pixel technology*2 (with approximately 5.07 M effective pixels), the IMX253LLR/LQR is suited for subjects and scenes that require higher resolution. Also, the IMX255LLR/LQR, which covers 4K pixels in a Type 1 optical size, can also be used for applications such as traffic surveillance. Whereas conventional traffic cameras must be installed one per lane, the IMX255LLR/LQR can capture multiple lanes with a single camera while maintaining the same resolution.

*2: See the New Product Information released in May 2015.

High Frame Rate

In response to the growing demand for higher frame rates for industrial applications, the column-parallel A/D conversion technology of Sony CMOS image sensors was used to realize a frame rate of up to 68.3 frame/s (ADC 8-bit) for the IMX253LLR/LQR, and up to 93.7 frame/s (ADC 8-bit) for the IMX255LLR/LQR. This enabled further increasing the processing speed for industrial applications.

A Variety of Functions

The IMX253LLR/LQR and IMX255LLR/LQR are equipped with a variety of functions needed for industrial applications, such as trigger mode and ROI mode. There is an ROI mode for cropping a desired region for output, which in addition to setting the conventional 8 × 8 = 64 locations, features greater freedom for specifying regions to allow overlap of specified regions. Various exposure methods are provided for Trigger mode, which controls the exposure time using an external pulse, Fast Trigger mode, which reduces the delay from trigger input until the start of exposure, Multi Exposure mode, and other modes. In addition, the IMX253LQR and IMX255LQR (color products) are equipped with functions such as subsampling, horizontal and/or vertical inverted readout, and multiple frame set output. The IMX253LLR and IMX255LLR (monochrome products) also have a vertical/horizontal pixel addition function in addition to color product functions.

Compatibility with existing Sony products

The IMX253LLR/LQR and IMX255LLR/LQR facilitate an expanded lineup for customers by aligning the optical center and back pin layout of the package with the IMX250LLR/LQR (with 5.07 M effective pixels), which is already in production.

＜photograph 1＞ Sample Images

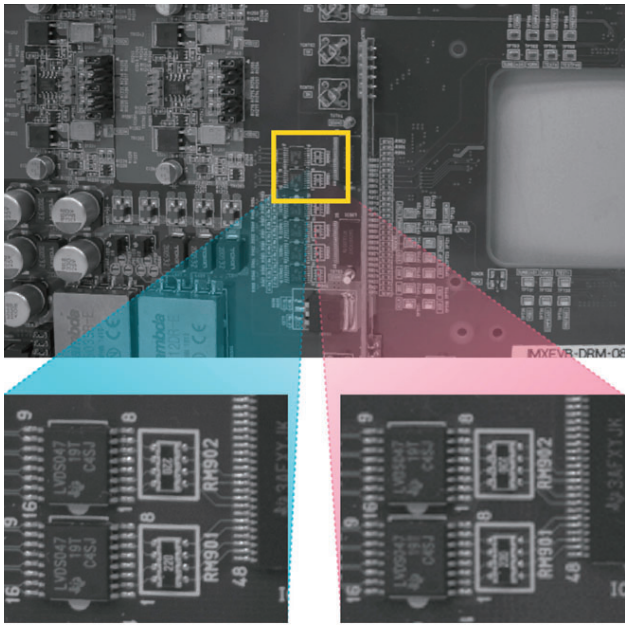
Condition: 2000 lx F = 5.6 (ADC 12-bit mode, 60 frame/s, internal gain 0 dB)

IMX253LQR (3.45 µm)

The Existing Sony Product (5.86 µm)

＜Photograph 2＞ Sample Images (Resolution)

Condition: F = 4.0 (ADC 12-bit mode, internal gain 0 dB)



IMX253LLR (12 Mp)

The Existing Sony Product (2.3Mp)

＜Photograph 3＞ Sample Images (Overlap ROI)

Setting example of the two areas

ROI area (2 spots) setting image

ROI output image

＜photograph 4＞ Global Shutter vs. Rolling Shutter

＜Table 1＞ Device Structure

Item		IMX253LLR/LQR	IMX255LLR/LQR
Image size		Diagonal 17.6 mm (Type 1.1) progressive scan mode	Diagonal 16.1 mm (Type 1) progressive scan mode
Number of effective pixels		4112 (H) × 3008 (V) approx. 12.37M pixels	4112 (H) × 2176 (V) approx. 8.95M pixels
Unit cell size		3.45 µm (H) × 3.45 µm (V)	
Optical blacks	Horizontal	Front: 0 pixels, rear: 0 pixels	
	Vertical	Front: 10 pixels, rear: 0 pixels	
Input drive frequency		37.125 MHz / 54.0 MHz / 74.25 MHz	
Package		226-pin LGA	
Supply voltage V_{DD} (Typ.)		3.3 V / 1.8 V / 1.2 V	

＜Table 2＞ Image Sensor Characteristics

Item		IMX253	IMX255	Remarks
Sensitivity (monochrome)	Typ.[F8]	915 mV		3200 K, 706 cd/m^2, 1/30s accumulation
Sensitivity (color)	Typ.[F5.6]	1146 mV		
Saturation signal	Min.	1001 mV		Tj = 60 °C

＜Table 3＞ Basic Drive Mode

Product name	Drive mode	Recommended number of recording pixels	ADC [bit]	Frame rate (Max.) [frame/s]
IMX253LLR/LQR	Progressive scan	4112 (H) × 3008 (V) approx. 12.37M pixels	12	46.4
			10	64.6
			8	68.3
IMX255LLR/LQR		4112 (H) × 2176 (V) approx. 8.95M pixels	12	63.7
			10	88.7
			8	93.7

Image Sensors for Industrial Applications:
https://www.sony.net/cis-industry