

**IMX250LLR/LQR, IMX252LLR/LQR**

**IMX250LLR/LQR**
Diagonal 11.1 mm (Type 2/3) Approx. 5.07M-Effective Pixel Monochrome and Color CMOS Image Sensor

**IMX252LLR/LQR**
Diagonal 8.9 mm (Type 1/1.8) Approx. 3.19M-Effective Pixel Monochrome and Color CMOS Image Sensor

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

Industrial applications demand imaging of fast-moving subjects. However, there is the issue that existing CMOS image sensors are unable to accurately identify fast-moving subjects due to focal plane distortion as a result of rolling shutter operation. To address this issue, Sony has developed CMOS image sensors with a global shutter function and a 3.45 μm pixel that is the smallest class in the industry. This small-sized 3.45 μm pixel realizes higher sensitivity and lower noise than that of the existing 5.86 μm pixel products, and achieves high picture quality, high resolution and high-speed imaging without focal plane distortion. In addition, these new CMOS image sensors are equipped with a variety of functions such as a trigger mode that arbitrarily controls the storage time using an external trigger signal, and ROI (region of interest) mode.

- **Global Shutter Function**
- **The Industry’s Smallest Pixel Size Class for Industrial Applications (3.45 μm)**
- **High sensitivity (1.1 times compared to the existing 5.86 μm product)**
- **High frame rate**
- **A variety of functions (external trigger mode, ROI mode(maximum 64 locations), supports multiple frame set output, etc.)**

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**Global Shutter Function**

Industrial applications require imaging of fast-moving subjects. However, there is the issue that existing CMOS image sensors are unable to accurately identify fast-moving subjects due to focal plane distortion as a result of rolling shutter operation. The IMX250LLR/LQR and IMX252LLR/LQR address this issue by providing analog memory inside each pixel and realizing a global shutter function, which enables high-picture-quality imaging without focal plane distortion.

**The Industry’s Smallest Pixel Size Class for Industrial Applications**

Analog memory, transistors and other elements must be added to the inside of each pixel to realize a global shutter function, which made it a challenge to reduce the pixel size. The newly developed products use Sony’s fine pixel fabrication technology to realize a small pixel with a size of 3.45 μm compared to the 5 μm range that is the existing standard for global shutter pixels. This enables high-resolution imaging using a smaller lens than that of the existing products.

**High Sensitivity**

In order to reduce the size of pixels equipped with a global shutter function, it is necessary to secure a sufficient pixel light-detecting area while also securing an analog memory area within the pixel, so there were concerns over a drop in sensitivity. However, high-sensitivity pixel design technology and condensing process technology were used to increase the sensitivity of the newly developed 3.45 μm pixel, and realized high sensitivity exceeding that of the existing 5.86 μm product (1.1 times compared to the existing 5.86 μm product).

In addition, EXview HAD CCD*1 technology also increases sensitivity in the near-infrared range, enabling use with high picture quality even under near infrared light.

* 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.

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**High Frame Rate**

Customers have strongly demanded higher frame rates for industrial applications, so an ADC 8-bit mode was added to the IMX250LLR/LQR and IMX252LLR/LQR in addition to the existing ADC 10-bit and 12-bit modes. Also, the column-parallel A/D conversion technology of Sony CMOS image sensors is used to realize high-speed imaging of up to 163.4 [frame/s] (ADC 8-bit) for the IMX250LLR/LQR and up to 216.3 [frame/s] (ADC 8-bit) for the IMX252LLR/LQR (Table-3). This enabled further increasing the processing speed for industrial applications.

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**A Variety of Functions**

The IMX250LLR/LQR and IMX252LLR/LQR are equipped with a variety of functions needed for industrial applications, such as ROI mode and trigger mode. ROI mode crops arbitrary areas, and up to 8 x 8 = 64 locations can be set. Various exposure methods are provided for trigger mode, which controls the exposure time using an external pulse. In addition, the IMX250LQR and IMX252LQR (color products) are equipped with functions such as subsampling, horizontal and/or vertical inverted readout, and multiple frame set output, and the IMX250LLR and IMX252LLR (monochrome products) also have a pixel addition function in addition to color product functions.

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* 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 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.

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<Photo 1>
Global Shutter vs. Rolling Shutter

![Global Shutter]

![Rolling Shutter]

<Photo 2>
Sample Images
Condition: 2000 lx F = 5.6
(ADC 12 bit mode, 60 frame/s, internal gain 0 dB)

![Sample Images]

<Photo 3>
Sample Images
(Near Infrared Light)
Condition: LED lighting of 850 nm wavelength
F = 4.0 (ADC 12 bit mode, 60 frame/s, internal gain 0 dB)

![Sample Images]

### Table 1: Device Structure

<table>
<thead>
<tr>
<th>Item</th>
<th>IMX250LLR/LQR</th>
<th>IMX252LLR/LQR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image size</td>
<td>Diagonal 11.1 mm (Type 2/3) progressive scan mode</td>
<td>Diagonal 8.9 mm (Type 1/1.8) progressive scan mode</td>
</tr>
<tr>
<td></td>
<td>Diagonal 7.7 mm (Type 1/2.35) Full-HD mode</td>
<td>Diagonal 7.7 mm (Type 1/2.35) Full-HD mode</td>
</tr>
<tr>
<td>Number of effective pixels</td>
<td>2464 (H) × 2056 (V) approx. 5.07M pixels</td>
<td>2064 (H) × 1544 (V) approx. 3.19M pixels</td>
</tr>
<tr>
<td>Unit cell size</td>
<td>3.45 μm (H) × 3.45 μm (V)</td>
<td>3.45 μm (H) × 3.45 μm (V)</td>
</tr>
<tr>
<td>Optical blacks</td>
<td>Horizontal</td>
<td>Front : 0 pixels, rear : 0 pixels</td>
</tr>
<tr>
<td></td>
<td>Vertical</td>
<td>Front : 10 pixels, rear : 0 pixels</td>
</tr>
<tr>
<td>Input drive frequency</td>
<td>37.125 MHz / 54.0 MHz / 74.25 MHz</td>
<td>37.125 MHz / 54.0 MHz / 74.25 MHz</td>
</tr>
<tr>
<td>Package</td>
<td>226-pin LGA</td>
<td>226-pin LGA</td>
</tr>
<tr>
<td>Supply voltage VDD (Typ.)</td>
<td>3.3 V / 1.8 V / 1.2 V</td>
<td>3.3 V / 1.8 V / 1.2 V</td>
</tr>
</tbody>
</table>

### Table 2: Image Sensor Characteristics

<table>
<thead>
<tr>
<th>Item</th>
<th>IMX250</th>
<th>IMX252</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>sensitivity (black-and-white)</td>
<td>915 mV</td>
<td>915 mV</td>
<td></td>
</tr>
<tr>
<td>Sensitivity (color)</td>
<td>1146 mV</td>
<td>1146 mV</td>
<td></td>
</tr>
<tr>
<td>Saturation signal</td>
<td>1001 mV</td>
<td>1001 mV</td>
<td></td>
</tr>
</tbody>
</table>

*Sony reserves the right to change products and specifications without prior notice.*

### Table 3: Basic Drive Mode

<table>
<thead>
<tr>
<th>Product name</th>
<th>Drive mode</th>
<th>Recommended number of recording pixels</th>
<th>ADC [bit]</th>
<th>Frame rate (Max.) [frame/s]</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMX250LLR/LQR</td>
<td>Progressive</td>
<td>2448 (H) × 2048 (V) approx. 5.01M pixels</td>
<td>12</td>
<td>89.5</td>
</tr>
<tr>
<td></td>
<td>Full-HD</td>
<td>1920 (H) × 1080 (V) approx. 2.07M pixels</td>
<td>8</td>
<td>163.4</td>
</tr>
<tr>
<td>IMX252LLR/LQR</td>
<td>Progressive</td>
<td>2048 (H) × 1536 (V) approx. 3.15M pixels</td>
<td>12</td>
<td>118.5</td>
</tr>
<tr>
<td></td>
<td>Full-HD</td>
<td>1920 (H) × 1080 (V) approx. 2.07M pixels</td>
<td>8</td>
<td>216.2</td>
</tr>
</tbody>
</table>

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existing product (5.86 μm)