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.

### IMX253LLR/LQR

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

### IMX255LLR/LQR

- Diagonal 17.6 mm (Type 1.1) Approx. 12.37M-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 CMOS image sensors with a 3.45 μm pixel that is the smallest class in the industry, achieving 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 IMX253LLR/LQR, a Type 1.1 CMOS image sensor with approximately 12.37 M effective pixels, 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

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 B × B = 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 IMX253LLR and IMX255LLR (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 frames/s, internal gain 0 dB)

![Sample Images](image)

**The Existing Sony Product (5.86 μm)**

**IMX253LQR (3.45 μm)**

---

**<photograph 2> Sample Images (Resolution)**

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

![Sample Images (Resolution)](image)

**IMX253LLR (12 Mpx)**

**The Existing Sony Product (2.3 Mpx)**

---

**<photograph 3> Sample Images (Overlap ROI)**

Setting example of the two areas

![Sample Images (Overlap ROI)](image)

**ROI area (2 spots) setting image**

**ROI output image**

---

**<photograph 4> Global Shutter vs. Rolling Shutter**

Global Shutter

Rolling Shutter

---

**<Table 1> Device Structure**

<table>
<thead>
<tr>
<th>Item</th>
<th>IMX253LLR/LQR</th>
<th>IMX255LLR/LQR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image size</td>
<td>Diagonal 17.6 mm (Type 1.1) progressive scan mode</td>
<td>Diagonal 16.1 mm (Type 1) progressive scan mode</td>
</tr>
<tr>
<td>Number of effective pixels</td>
<td>4112 (H) x 3008 (V) approx. 12.37M pixels</td>
<td>4112 (H) x 2176 (V) approx. 8.96M pixels</td>
</tr>
<tr>
<td>Unit cell size</td>
<td>3.45 μm (H) x 3.45 μm (V)</td>
<td></td>
</tr>
<tr>
<td>Optical blacks</td>
<td>Horizontal: Front: 0 pixels, rear: 0 pixels</td>
<td>Vertical: 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></td>
</tr>
<tr>
<td>Package</td>
<td>226-pin LGA</td>
<td></td>
</tr>
<tr>
<td>Supply voltage VDD (Typ.)</td>
<td>3.3 V / 1.8 V / 1.2 V</td>
<td></td>
</tr>
</tbody>
</table>

**<Table 2> Image Sensor Characteristics**

<table>
<thead>
<tr>
<th>Item</th>
<th>IMX253</th>
<th>IMX255</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity (monochrome)</td>
<td>Typ. [F8]</td>
<td></td>
<td>915 mV</td>
</tr>
<tr>
<td>Sensitivity (color)</td>
<td>Typ. [F5.6]</td>
<td></td>
<td>1146 mV</td>
</tr>
<tr>
<td>Saturation signal</td>
<td>Min.</td>
<td></td>
<td>1001 mV</td>
</tr>
</tbody>
</table>

**Sensitivity (monochrome) Typ. [F8]**

**Sensitivity (color) Typ. [F5.6]**

**Saturation signal Min.**

**3200 K, 706 cd/m², 1/30s accumulation**

**1/30s accumulation**

**Tj = 60 °C**

---

**<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>IMX253LLR/LQR</td>
<td>Progressive scan</td>
<td>4112 (H) x 3008 (V) approx. 12.37M pixels</td>
<td>12</td>
<td>46.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td>64.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8</td>
<td>68.3</td>
</tr>
<tr>
<td>IMX255LLR/LQR</td>
<td>Progressive scan</td>
<td>4112 (H) x 2176 (V) approx. 8.96M pixels</td>
<td>12</td>
<td>63.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td>88.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8</td>
<td>93.7</td>
</tr>
</tbody>
</table>

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