NEWS RELEASE: Immediate

Sony Releases the Industry’s Highest Resolution\(^1\) 7.42 Effective Megapixel Stacked CMOS Image Sensor for Automotive Cameras

(ASIA PACIFIC, 23 October 2017) – Sony Corporation today announced the release of the IMX324, a new 1/1.7-type stacked CMOS image sensor equipped with the industry’s highest resolution\(^1\) 7.42 effective megapixel RCCC filter\(^2\) for forward-sensing cameras in advanced driver-assistance systems (ADAS). Sony will begin shipping samples in November 2017.

This image sensor is capable of approximately three times the horizontal resolution of conventional products\(^3\), which enables high-definition image capture of distant road signs approximately 160 meters\(^4\) ahead of the camera. Furthermore, the sensor

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\(^1\) As of announcement on October 23, 2017, according to Sony research.

\(^2\) A color filter that combines R (red) and C (clear).

\(^3\) When compared to IMX224MQV.

\(^4\) With a FOV 32° lens on the camera.
equipped with a pixel binning mode\(^5\) for further raising the sensitivity in low-light environments, achieving the high sensitivity of 2666 mV, making it possible to capture images of pedestrians and obstacles even in dark nighttime situations that are equivalent to the brightness of moonlight. Even in environments with uneven, mixed levels of brightness, due to headlights and streetlights when driving at night, the sensor is equipped with a function that alternately captures dark sections at high-sensitivity settings and bright sections at high resolution, enabling high-precision image recognition when combined with the signal processing of the latter stage.

This is the first time in the industry\(^6\) where a stacked configuration has been employed on an automotive grade sensor. This arranges the pixel array and signal processing circuit in layers to allow for a compact size and low power consumption while still delivering high resolution.

This image sensor is expected to be compatible with the "EyeQ\(^4\)" and "EyeQ\(^5\)" image processors currently being developed by Mobileye, an Intel Company headquartered in Israel, for use in ADAS and autonomous vehicle technology.

This sensor is planned to meet the AEC-Q100 Grade 2 reliability testing standards for automotive electronic components by June 2018. Sony has also introduced a development process compliant with ISO 26262 automobile functional safety standards, to ensure design quality that satisfies the functional safety requirements for an automotive product, and this has led to its supporting functional safety requirement level ASIL B(D)\(^7\) for failure detection, notification, and control. Moreover, the new sensor comes with a security feature that protects the output image from being altered, which is the industry’s first\(^6\) application of such a function in an image sensor for automotive cameras.

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\(^5\) Reading mode that adds multiple pixel data to further raise sensitivity.

\(^6\) As of October 2017, according to Sony research.

\(^7\) This image sensor supports ASIL B (safety goal of the system is ASIL D) requirements.
Main Features

1. 7.42 megapixels — the industry’s highest resolution¹ for image sensors for automotive cameras

The new image sensor is capable of approximately three times the horizontal resolution of conventional products³, which enables high-definition image capture of distant road signs approximately 160 meters⁴ ahead of the camera.

➢ Distant sample image comparison

IMX324 sample image

IMX324 (7.42 Megapixel) magnified image

IMX224 (1.27 Megapixel) magnified image
2. High sensitivity of 2666 mV (Standard value F5.6, when using pixel binning mode)

The sensor is equipped with a pixel binning mode for raising the sensitivity in low-light environments. The pixel binning mode on this sensor adds data from a total of four pixels and processes it as a single pixel to raise the sensitivity when reading image data. The pixel binning mode and RCCC filter\(^2\) together achieve the high sensitivity of 2666 mV, making it possible to capture images of distant obstacles and people even in low-light environments as low as 0.1 lux, equivalent to the brightness of moonlight. Also, by switching between pixel binning mode and full pixel mode for each frame it is possible to capture bright sections illuminated by the headlights in high resolution, and dark sections not illuminated by headlights at high sensitivity, thereby enabling high-precision image recognition when combined with the signal processing of the latter stage.

- Low-light (0.1 lux) image comparison

![IMX324 sample image](image1)

![IMX224 sample image](image2)

3. Industry’s first\(^6\) automotive grade stacked image sensor delivers compact size and low power consumption

A stacked configuration has been implemented on the image sensor, arranging the pixel array and signal processing circuits in different layers to achieve compact size and low power consumption while delivering high resolution.
4. Meets quality standards and functions required for automotive applications
   • Set to meet the requirements of the AEC-Q100 Grade 2 automotive electronic
     component reliability tests by June 2018.
   • Development process compliant with ISO 26262 automobile functional safety
     standards results in a high level of design quality that satisfies the functional
     safety requirements for an automotive product.
   • Supports functional safety requirement level ASIL B (D)\textsuperscript{7}.
   • Equipped with an industry-first\textsuperscript{6} security feature that protects the output image
     from being altered.

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**Specification Sheet**

<table>
<thead>
<tr>
<th>Model name</th>
<th>IMX324</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of effective pixels</td>
<td>3849 (H) x 1929 (V) 7.42 megapixels</td>
</tr>
<tr>
<td>Image size</td>
<td>Diagonal 9.69mm (type 1/1.7)</td>
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<tr>
<td>Unit cell size</td>
<td>2.25μm (H) x 2.25μm (V)</td>
</tr>
<tr>
<td>Frame rate</td>
<td>Full pixel reading Max. 40 fps</td>
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<tr>
<td>Sensitivity (F5.6 standard value, 1/30 second exposure time)</td>
<td>784 mV (Clear Pixel), 2666 mV (pixel binning mode)</td>
</tr>
<tr>
<td>Dynamic range (EMVA1288 standard)</td>
<td>120dB</td>
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<tr>
<td>Saturation signal (minimum value)</td>
<td>800mV</td>
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<tr>
<td>Power supply Analog</td>
<td>2.9V</td>
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<tr>
<td>Digital</td>
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<tr>
<td>Interface</td>
<td>1.8V</td>
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<tr>
<td>Interface MIPI CSI-2 serial output (4 lane / 2 lane)</td>
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<tr>
<td>Package</td>
<td>108pin plastic BGA</td>
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<tr>
<td>Package size</td>
<td>13.23mm x 8.97mm</td>
</tr>
</tbody>
</table>

* Product names mentioned here are registered trademarks of their respective owners.
About Sony Electronics Asia Pacific Pte. Ltd.

Based in Singapore, Sony Electronics Asia Pacific Pte. Ltd. is a subsidiary of Sony Corporation. It serves as the regional management and marketing headquarters for Sony’s consumer as well as broadcasting and professional products, overseeing Asia, Middle East and Africa regions. For more information on Sony’s products and services in Asia Pacific, please visit www.sony-asia.com

About Sony Corporation

Sony Corporation is a leading manufacturer of audio, video, imaging, game, communications, key device and information technology products for the consumer and professional markets. With its music, pictures, computer entertainment and online businesses, Sony is uniquely positioned to be the leading electronics and entertainment company in the world. Sony recorded consolidated annual sales of approximately $76 billion for the fiscal year ended March 31, 2017. Sony Global Web Site: http://www.sony.net/