

# IMX072PQ IMX073PQ IMX074PQ

## High Picture Quality Cellular Phone CMOS Image Sensors Feature Full HD Video



Due to the recent improvements in the communication infrastructure and falling prices for data storage, it is now possible for ordinary users to handle large amounts of data on cellular phones. Due to these developments, there are now increasing demands for imaging performance that exceeds the framework of existing cellular phone camera functionality, including demands for even higher picture quality and even higher resolution in both still and moving images.

Sony has now developed their product line 5M-pixel, 8M-pixel, and 13M-pixel CMOS image sensors with a 1.4  $\mu\text{m}$  unit pixel, the industry's smallest\*<sup>1</sup>, and that provide full HD video imaging (1080p at 30 frame/s).

Due to improvements in process technology and the development of a new condensing structure, Sony can now provide diverse solutions that achieve a S/N ratio even higher than current Sony products.

\*1 As of October, 2009 (based on Sony's research)

### IMX072PQ

- Diagonal 4.5 mm (Type 1/4)  
5.15M effective pixels
- Frame rate: 22.5 frame/s

### IMX073PQ

- Diagonal 5.76 mm (Type 1/3.2)  
8.12M effective pixels
- Frame rate: 15 frame/s

### IMX074PQ

- Diagonal 7.35 mm (Type 1/2.45)  
13.19M effective pixels
- Frame rate: 15 frame/s

**Exmor™**

\*: "Exmor" is a trademark of Sony Corporation. "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.

### High S/N Ratio and Good Picture Quality Achieved

In creating the IMX072PQ, IMX073PQ, and IMX074PQ products of this release, we added further improvements to Sony's 1.4  $\mu\text{m}$  unit pixel fabrication process and succeeded in increasing the number of electrons collected in the photodetector (the saturation signal level) by a factor of 1.6. As a result, we succeeded in improving the S/N ratio by 4.1 dB from the current IMX046PQ\*<sup>2</sup>, even though that device has the same 1.4  $\mu\text{m}$  unit pixel size. Furthermore, we developed a new condensing structure, which leads light to the ultrafine pixels, and increased the sensitivity by 17% over current products. Additionally, we also addressed the shading issue, which refers to lack of uniformity across the image, and achieved significant improvements. (See figure 1.) As a result of these improvements, despite their small size the image graininess problem has been resolved and these sensors allow the capture of even higher quality images. (See photograph 1.)

\*2 See the New Products section: IMX045PQ/IMX046PQ/IMX060PQ in CX-News Vol. 56.

### Developing a 13M-Pixel Sensor

Sony provides the IMX074PQ, which features 13.19M effective pixels, to respond to end user needs to take more detailed images and to capture even clearer videos. By providing 4 lanes of MIPI interface, a high-speed serial interface for cellular phones, the IMX074PQ is capable of outputting data at up to 2.16 Gbps, which corresponds to all-pixel data output at 15 frame/s. (See table 1.) For video imaging, the IMX074PQ is capable of 1080p

output at 30 frame/s and 720p output at 60 frame/s. Furthermore, even during 1080p video imaging, the IMX074PQ can produce full HD video with minimal camera shake by setting the margin pixel area and using the image stabilization function provided by the image processor.

### Compatibility with Current Products

The IMX072PQ and IMX073PQ provide close compatibility with current Sony products IMX045PQ and IMX046PQ and, in modules that use the current products, end products can operate simply by switching the CMOS image sensor. This allows our customers to reuse many of their design assets while improving the camera performance of their cellular phones at minimal cost.

Furthermore, since these new products, like the current products, support 720p and 1080p (at 30 frame/s) high-definition video imaging, they can respond to a wide range of customer needs. (See table 1.)

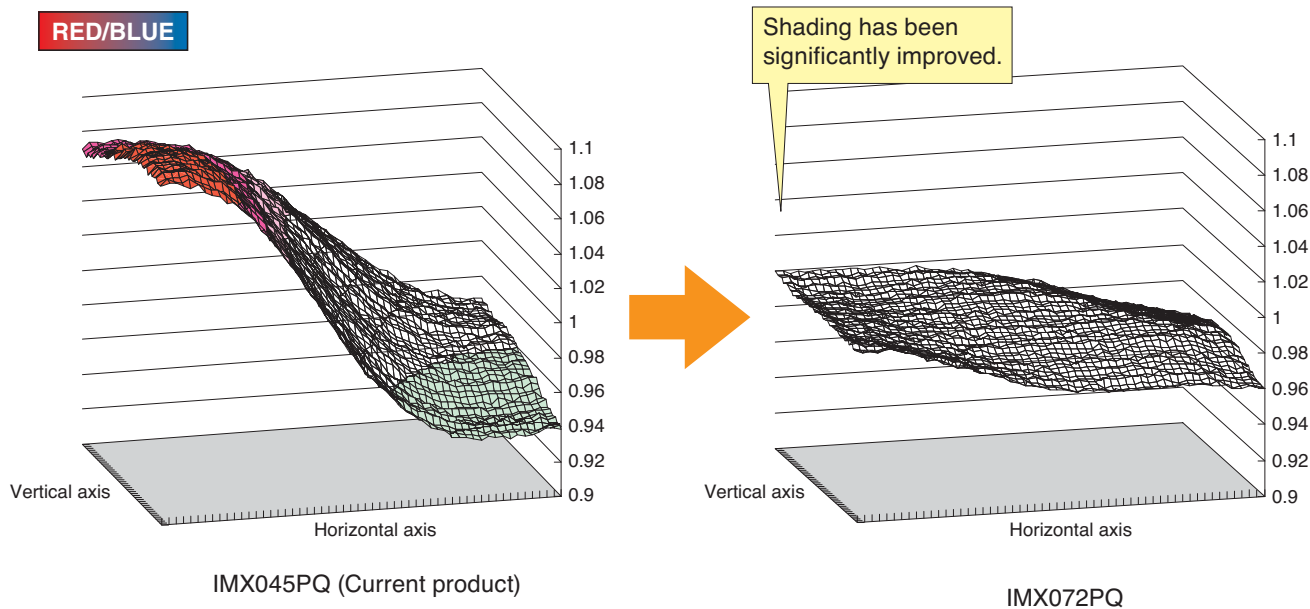
There are increasing market requirements for even smaller and thinner built-in cameras to increase design flexibility in cellular phones.

To respond to these market needs, Sony is now the first in the industry to succeed in the mass production of CMOS image sensors with the industry's smallest 1.4  $\mu\text{m}$  unit pixel. Sony has also succeeded in achieving highly respected imaging characteristics in these devices.

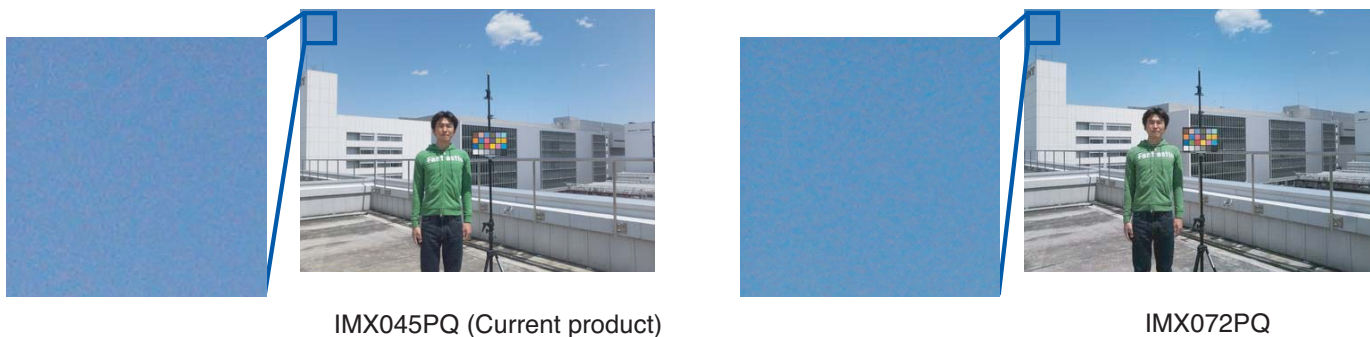
## V O I C E

We created these products by not limiting ourselves to design and process concerns only, but by also sharing our knowledge and experience with the production process members. We considered idea after idea to create products with even higher picture quality and reliability. Since these devices are incredibly miniaturized despite their high functionality, they can be included in a wide range of cellular phones and can capture, with high resolution and superb picture quality, whatever scene or event moves the user's heart. We strongly recommend that you look into using these devices in your products.

**Figure 1** Color Shading Contour Graphs



**Photograph 1** Comparison Images at 86,000 lx, 5800K, and Minimum Gain



**Table 1** Device Structure

Item		IMX072PQ	IMX073PQ	IMX074PQ
Image size		Diagonal 4.5 mm (Type 1/4)	Diagonal 5.76 mm (Type 1/3.2)	Diagonal 7.35 mm (Type 1/2.45)
Format		4:3	←	←
Fabrication process		1-poly 5-metal 90 nm CMOS	←	←
Output format		Digital 10-bit 2ch Sub-LVDS/MIPI	←	Digital 10-bit 4ch MIPI
Control signal interface		3-wire serial, I <sup>2</sup> C	←	←
Total number of pixels		Approx. 5.33M pixels (2664H × 2000V)	Approx. 8.30M pixels (3320H × 2500V)	Approx. 13.32M pixels (4216H × 3160V)
Number of effective pixels		Approx. 5.15M pixels (2616H × 1968V)	Approx. 8.12M pixels (3288H × 2468V)	Approx. 13.19M pixels (4216H × 3128V)
Unit cell size		1.4 μm (H) × 1.4 μm (V)	←	←
Power supply specifications	Analog	2.7 +0.2/-0.1 V	←	←
	Digital	1.2 ± 0.1 V	←	←
	Digital interface	1.8 ± 0.1 V	←	←
PGA		Analog: 18 dB (Max.) Digital: 24 dB (Max.)	←	←
Frame rate	All-pixel scan	22.5 frame/s	15 frame/s	15 frame/s
	Vertical 1/2 elimination	45 frame/s	30 frame/s	30 frame/s
	Vertical 1/4 elimination	90 frame/s	60 frame/s	60 frame/s
	Vertical 1/8 elimination	180 frame/s	120 frame/s	120 frame/s
	HD720p	60 frame/s	30 frame/s	60 frame/s
	HD1080p	30 frame/s	30 frame/s	30 frame/s