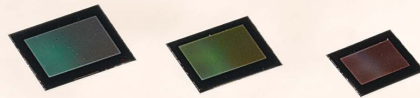


IMX081PQ, IMX091PQ, IMX111PQ

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



Due to the recent improvements in communications infrastructure and falling prices for data storage, it is now possible for ordinary users to handle large amounts of data on cellular phones.

According to these developments, there are now increasing opportunities for shooting high-definition still and moving images with a cellular phone, including demands for picture quality that exceeds the framework of existing cellular phone camera functionality. Sony has now developed a product line of 16M-pixel, 13M-pixel and 8M-pixel CMOS image sensors with 1.12 μm unit pixel*¹, the industry's smallest, and that provide full HD video imaging (1080 p at 60 or 30 frame/s)*².

*1: As of October, 2010 (based on Sony's research)

*2: The IMX091P and IMX111PQ are under development now (July 2011)

IMX081PQ

- Diagonal 6.52 mm (Type 1/2.8)
16.41M effective pixels
- Frame rate: 15 frame/s

IMX091PQ

- Diagonal 5.87 mm (Type 1/3.06)
13.25M effective pixels
- Frame rate: 15 frame/s

IMX111PQ

- Diagonal 4.60 mm (Type 1/4.0)
8.17M effective pixels
- Frame rate: 22.5 frame/s

Exmor R™

* "Exmor R" is a trademark of Sony Corporation. The "Exmor R" is a Sony's CMOS image sensor with significantly enhanced imaging characteristics including sensitivity and low noise by changing fundamental structure of "Exmor" pixel adopted column-parallel A/D converter to back-illuminated type.

There are increasing market requirements for not only high picture quality but also smaller and thinner model to increase design flexibility in recent cellular phones represented by smartphones.

To respond to these market needs, Sony is now the first in the industry to succeed in the mass production of back-illuminated CMOS image sensors with the industry's smallest 1.12 μm unit pixel cell configuration.

High S/N Ratio and High Picture Quality Achieved through High Color Reproducibility

This is not the first time for Sony to develop back-illuminated CMOS image sensors. This configuration is more efficient at converting incident light on the sensor into electrons than current front-illuminated structure. In creating the IMX081PQ, IMX091PQ and IMX111PQ products of this release, Sony improved the back-illumination process to obtain an ultrafine pixel of 1.12 μm unit pixel.

As a result, we managed to increase the sensitivity of the photodetector per unit pixel by about 1.35 times compared to a current 1.4 μm front-illuminated structure.

This has also increased the saturation signal level by 1.15 times (converted to value per unit area) enabling capture of higher picture quality images.

In addition, the color mixture issue was improved by optimizing a condensing structure and the back-illuminated structure, when compared to a current front-illuminated structure with a 1.4 μm unit pixel. (See figure 1).

As a result of these improvements, despite their small size these sensors allow the capture of even higher definition images that faithfully reproduces the color of the subject with less image graininess.

High-Resolution Still Images and High Sensitivity Video

Sony provides the IMX081PQ and IMX091PQ with 16.41M and 13.25M 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 (CSI-2 compliant), a high-speed serial interface for cellular phones, both sensors are capable of an

all-pixel data output at 15 frame/s.

Thanks to addition/averaging processing of up to four pixels of the same color in vertical and horizontal direction of 1080 p 60 frame/s video, a high signal-to-noise ratio is achieved. And these 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.

Ideal for Smartphones

A feature of recent smartphone design is the increasing demand for cellular phones with even thinner cameras.

To meet this demand, the IMX091PQ and IMX111PQ can be provided with optical lenses that allow even thinner cellular phones.

Also, substituting high-speed CPUs to process images for dedicated image processors is a strong ongoing trend. The IMX081PQ, IMX091PQ and IMX111PQ have a function for correcting image quality to optimum image data built into the sensor. This function easily provides high picture quality even without processing by a dedicated image processor (See figure 2).

V O I C E

Thanks to the concerted effort by the members of our project team, we were able to develop a back-illuminated CMOS image sensor with a unit pixel of a mere 1.12 μm and quickly build a 16M-pixel, 13M-pixel and 8M-pixel product lineup. These products will meet the requirements for mobile device miniaturization like smartphones and cellular phones while also satisfying the demand for high picture quality.

Please select Sony image sensors for your products to experience Sony image sensor technology.

Figure 1 Spectral Sensitivity Characteristics

Spectral characteristics for the 1.12 μm back-illuminated CMOS image sensor and the 1.4 μm front-illuminated CMOS image sensor standardized for each G peak

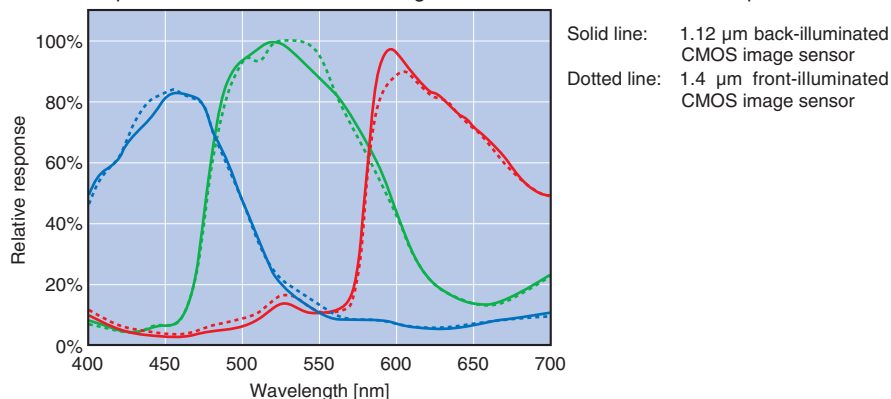


Figure 2 Comparison Image Samples

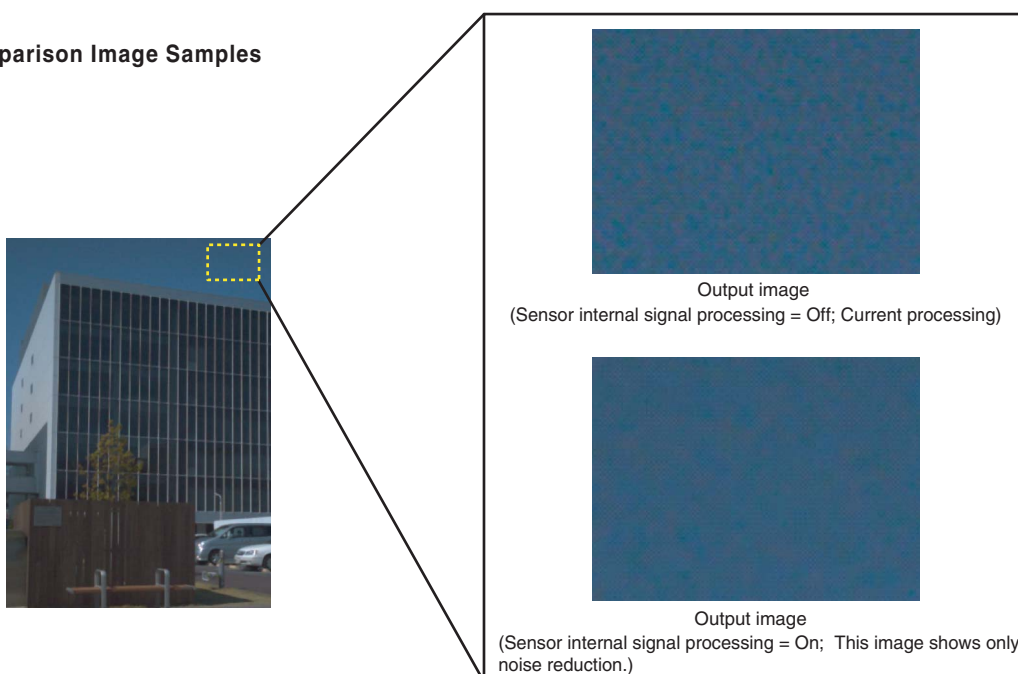


Table 1 Device Structure

Item	IMX081PQ	IMX091PQ	IMX111PQ	
Image size	Diagonal 6.52 mm (Type1/2.8)	Diagonal 5.87 mm (Type 1/3.06)	Diagonal 4.60 mm (Type 1/4.0)	
Total number of pixels	4672H \times 3552V Approx. 16.59M pixels	4224H \times 3176V Approx. 13.42M pixels	3296H \times 2512V Approx. 8.28M pixels	
Number of effective pixels	4656H \times 3496V Approx. 16.28M pixels	4208H \times 3120V Approx. 13.13M pixels	3280H \times 2464V Approx. 8.08M pixels	
Fabrication process	Back-illuminated process	←	←	
Unit cell size	1.12 μm (H) \times 1.12 μm (V)	←	←	
Output format	MIPI 4, 2, 1 Lane	←	MIPI 2, 1 Lane	
Control signal interface	I ² C	←	←	
Power supply specifications	Analog	2.7 +0.2/-0.1 V	←	
	Digital	1.2 \pm 0.1 V	←	
	I/O	1.8 \pm 0.1 V	←	
PGA	41.7 dB (Max.)	←	←	
Input clock frequency	6 to 60 MHz	←	←	
Signal processing function within sensors	Dot defect compensation	✓	←	
	Noise reduction	✓	←	
Moving picture specifications	720 p	60 frame/s 225 Mbps/Lane \times 4 Lane	60 frame/s 186 Mbps/Lane \times 4 Lane	60 frame/s 540 Mbps/Lane \times 2 Lane
	1080 p	60 frame/s 432 Mbps/Lane \times 4 Lane	60 frame/s 432 Mbps/Lane \times 4 Lane	30 frame/s 405 Mbps/Lane \times 2 Lane