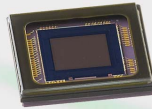


IMX104LQJ

Diagonal 6.28 mm (Type 1/3) 1.37M-Effective Pixel Color HD CMOS Image Sensor for Industrial Applications Achieves High Sensitivity and High S/N Ratio That Greatly Exceeds That of Existing Products



Sony has now developed the IMX104LQJ CMOS image sensor for industrial applications that far surpasses existing products in terms of high picture quality in low light achieving high sensitivity and high signal-to-noise ratio. Newly developed processing and pixel technologies have quadrupled the signal-to-noise ratio under low-light conditions when compared to the IMX035LQR*¹, the Sony existing Type 1/3 1.3M-pixel CMOS image sensor. A versatile interface enables the image sensor to be tailored to different applications. This new product is pin compatible with the full HD capable IMX136LQJ*², which simplifies making additions to the lineup.

*1: See the New Products section in CX-NEWS, Volume 56.

*2: For details on the IMX136LQJ, see the New Products section of this volume.

- High sensitivity (960 mV typ.)
- High signal-to-noise ratio (+12 dB compared to existing Sony products)
- High frame rate (120 frame/s)
- Supporting SXGA/HD 720p mode
- Switchable I/O interface

Exmor™

* "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.

High Sensitivity and High Signal-to-Noise Ratio Characteristics

The industrial field is experiencing a greater demand for better picture quality under low-light conditions.

Sony developed the IMX104LQJ with its 3.75 μm unit pixels to satisfy this demand.

In the course of development, new process and pixel technologies were originated for industrial applications to achieve higher sensitivity and higher signal-to-noise ratio. Picture quality under low-light conditions is substantially better even when compared

to the widely acclaimed IMX035LQR. This means that the sensor can capture clear images of subjects under moonlight or even starlight.

Improved process technology has enabled greater control of the drop in sensitivity caused by vignetting at full aperture. Also, optimization of pixel and peripheral circuits has reduced fixed patterned noise and minimized picture degradation caused by rising temperature.

Operating Modes

In addition to the roughly all 1.37M-pixel scan mode and HD 720p mode, the IMX104LQJ also provides a window cropping mode.

Moving picture performance is as high as 120 frame/s in 10-bit A/D conversion mode and 60 frame/s in 12-bit A/D conversion mode.

Serial Interface

The IMX104LQJ comes with a low-voltage LVDS serial output (594 Mbps/channel) that enables selecting 1, 2 or 4 channels (Data-CLK system).

4-channel output provides the same 120 frame/s performance as parallel output, which will reduce the need for customers to obtain additional equipment.

Since the IMX104LQJ also provides the

existing type of low-voltage LVDS parallel output and CMOS parallel output, it can easily meet customer requirements.

Being pin compatible with the full HD capable IMX136LQJ, it will simplify making an extensive HD series product lineup when combined with the IMX136LQJ.

Ease of Mounting

Compared to the IMX035LQR the package size is 30% smaller. Furthermore, the center of the package is aligned with the center of the pixels, which makes the package much easier to mount.

The IMX104LQJ is provided in a package that can withstand high-temperature reflow soldering (peak temperature: 240°C).

VOICE

To improve picture quality for industrial applications in the IMX104 in low light, not only pixel and circuits but also processes have been optimized.

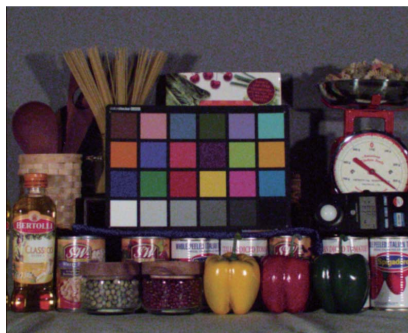
Thanks to the uncompromising efforts of the development team we were able to develop an image sensor with even higher performance than our existing products.

Be sure to check the low-light picture quality of this new CMOS image sensor, we are sure you will not be disappointed.

Photograph 1 Sample Images (in all-pixel scan and 12-bit A/D conversion mode, 60 frame/s)

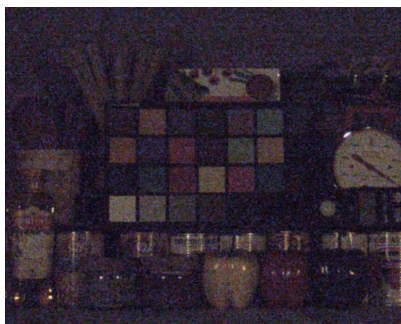


2000 lx, 5 dB with built-in PGA at F5.6

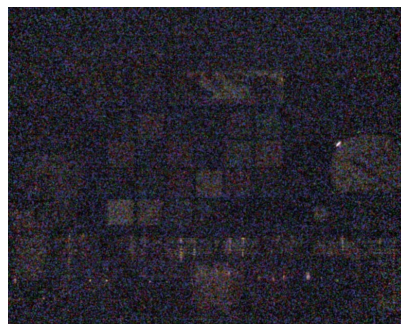


20 lx, 33 dB with built-in PGA at F2.8

Photograph 2 Comparing Low-light Picture Quality (in all-pixel scan and 12-bit A/D conversion mode, 30 frame/s, 0.1 lx, 42 dB with built-in PGA + 12 dB in rear end, at F2.0)



IMX104LQJ



IMX035LQR

Table 1 Device Structure

Item		IMX104LQJ	IMX035LQR
Image size		Diagonal 6.28 mm (Type 1/3)	Diagonal 6.08 mm (Type 1/3)
Transfer method		All-pixel scan	All-pixel scan
Number of effective pixels		1305H × 1049V, approx. 1.37M pixels	1329H × 1049V, approx. 1.39M pixels
Chip size		7.80mm (H) × 7.50mm (V)	7.64mm (H) × 7.64mm (V)
Unit cell size		3.75μm (H) × 3.75μm (V)	3.63μm (H) × 3.63μm (V)
Optical blacks	Horizontal	Front: 4 pixels, rear: 0 pixels	Front: 44 pixels, rear: 7 pixels
	Vertical	Front: 20 pixels, rear: 0 pixels	Front: 24 pixels, rear: 3 pixels
Input drive frequency		54 MHz/27 MHz/74.25 MHz/37.125 MHz	54 MHz
Package		94-pin LGA	152-pin LGA
Supply voltage V _{DD} (typ.)		3.3 V/1.8 V/1.2 V	3.0 V/1.8 V

Table 2 Image Sensor Characteristics

Item		IMX104LQJ	IMX035LQR	Remarks
Sensitivity (F5.6)	Typ.	960 mV	460 mV	3200K, 706 cd/m ² , 1/30s accumulation
Saturation signal	Min.	1440 mV	830 mV	T _j = 60°C

Table 3 Basic Drive Mode (at low voltage LVDS parallel output)

Drive mode	Number of effective pixels	ADC	Frame rate (Max.)
All-pixel scan	1305H × 1069V Approx. 1.37M pixels	10 bits	120 frame/s
		12 bits	60 frame/s
HD720p	1305H × 733V Approx. 0.96M pixels	10 bits	120 frame/s
		12 bits	60 frame/s