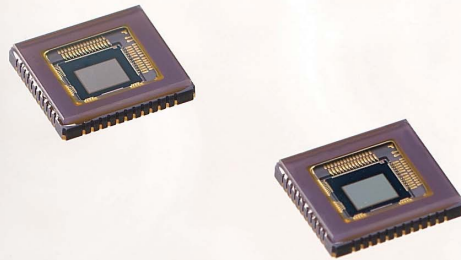


IMX076LQZ/ IMX076CQZ

Diagonal 4.58 mm (Type 1/4) 1.43M-Effective Pixel Color CMOS Image Sensor for Industrial Applications Achieves High Picture Quality under Low Illumination Due to High Sensitivity and High S/N Ratio



Sony, aiming at improved sensitivity and signal-to-noise ratio in industrial applications, has developed the IMX076 CMOS image sensor that achieves high picture quality imaging under low illumination levels.

Although this device is a Type 1/4 1.43M-effective pixel miniature CMOS image sensor, due to improvements to the pixel technology, it achieves equivalent high sensitivity and an identical signal-to-noise ratio to the current Sony IMX035* Type 1/3 1.39M-effective pixel CMOS image sensor.

This CMOS image sensor provides high picture quality even in low illumination levels.

Furthermore, it can output images at frame rates up to 60 frame/s (in 10-bit A/D conversion mode).

Note that in addition to the long exit pupil distance IMX076LQZ,

Sony has also developed the short exit pupil distance IMX076CQZ.

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

- High sensitivity (425 mV typ.)
- High signal-to-noise ratio (+4 dB compared to existing Sony products)
- Supports 720p HD
- Switchable I/O interface
- Built-in 10 and 12-bit A/D converters

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 Signal-to-Noise Ratio Characteristics

Responding to the desires for Type 1/4 1.43M-effective pixel (SXGA resolution) high-sensitivity CMOS image sensors for industrial applications, Sony has now developed the IMX076LQZ/CQZ devices that are based on a 2.8 μm diagonal pixel.

In particular, these devices achieve the high sensitivity required for industrial applications through improvements to the pixel process technology and design of pixel conditions and layout optimized for the 2.8 μm diagonal pixel.

Furthermore, these devices minimize both random and fixed pattern noise and assure a high saturation signal level. Peripheral circuits

were also designed to reduce noise, support low supply voltage operation, and to achieve a low signal-to-noise ratio and an expanded dynamic range.

As a result of these improvements, Sony was able to acquire, in a Type 1/4 small-pixel (2.8 μm diagonal) image sensor, sensitivity and signal-to-noise ratio characteristics equivalent to the Sony's existing Type 1/3 1.39M-effective pixel CMOS image sensors. These new image sensors provide high picture quality even in low ambient light levels and allow imaging with a higher gain. (See photograph 1.)

Extensive Set of Drive Modes, Including HD

In addition to all-pixel scan mode, the IMX076LQZ/CQZ also support 720p HD mode, window cropping mode, and other drive modes. These devices also provide switching between 10 and 12-bit A/D conversion modes, in particular providing 30 frame/s imaging in 12-bit A/D conversion mode and 30 and 60 frame/s imaging in 10-bit A/D conversion mode. Furthermore, they provide 120 frame/s imaging in VGA size window cropping mode.

These image sensors also provide a wide range of other functions to support industrial applications.

Serial Output Interface

In addition to the CMOS parallel output interface provided by existing products, these devices also provide a low-voltage 1 or 2-port

LVDS serial output function that users can select according to their usage conditions.

Easy-to-Mount LCC Package

The IMX076LQZ/CQZ are provided in a reduced-pin-count 50-pin LCC package that only has pins around its periphery. This package contributes to reduced burden on our customers' mounting processes and furthermore supports high-temperature reflow soldering with a peak temperature of 240 °C.

Lineup

In addition to the long exit pupil distance IMX076LQZ, Sony has also at the same time developed the short exit pupil distance IMX076CQZ. The IMX076CQZ is appropriate for use in modules and other applications that use a wide lens, thus allowing customers to choose a product that matches their needs.

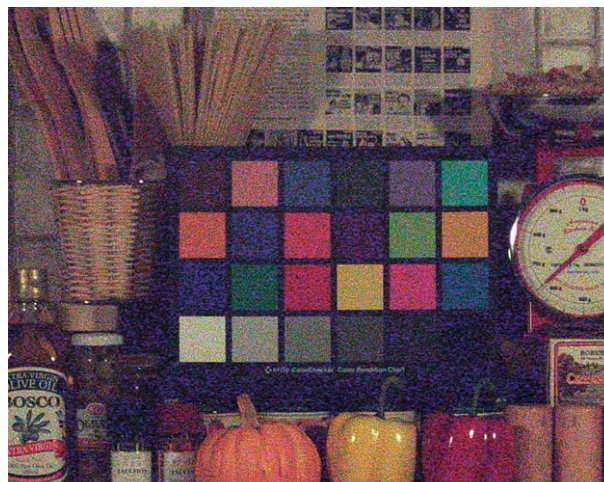
V O I C E

Those of us working on developing the IMX076 set high goals for this effort and proceeded with development in an uncompromising manner. As a result, we were able to reduce the pixel size without adversely affecting sensitivity and to increase the signal-to-noise ratio. Thus these products can capture high picture quality HD images even in low illumination levels. We strongly recommend that you look into these devices.

Photograph 1 Sample Images (1.3M pixels, 12-bit A/D conversion mode, 30 frame/s)



2000 lx Gain 0 dB



5 lx Gain 42 dB
(Gain Analog 24 dB + Gain Digital 18 dB)

Table 1 Device Structure

Item	IMX076	
Image size	Diagonal 4.58 mm (Type 1/4)	
Transfer method	All-pixel scan	
Total number of pixels	1392H × 1076V Approx. 1.50M	
Number of effective pixels	1368H × 1049V Approx. 1.43M	
Chip size	6.05 mm (H) × 5.4 mm (V)	
Unit cell size	2.8 μm (H) × 2.8 μm (V)	
Optical blacks	Horizontal	Front: 24 pixels, rear: 0 pixels
	Vertical	Front: 24 pixels, rear: 3 pixels
Horizontal drive frequency	54 MHz/27 MHz 37.125 MHz (HD720p)	
Package	50-pin LCC	
Supply voltage V _{DD} /V _L (typ.)	2.7 V / 1.2 V / 1.8 V	

Table 2 Image Sensor Characteristics

Item	IMX076	Remarks
Sensitivity (F5.6)	Typ. 425 mV	3200 K, 706 cd/m ²
Saturation signal	Min. 822 mV	T _a = 60 °C

Table 3 Drive Modes

Drive mode	Number of effective pixels	ADC	Frame rate	I/F
All-pixel mode	1368H × 1049V Approx. 1.43M	10 bits	*60/30 frame/s	CMOS parallel outputs (SDR/DDR) Low-voltage LVDS serial output (1 or 2 ports)
		12 bits	30 frame/s	
HD720p	1312H × 733V Approx. 960K	10 bits	*60/30 frame/s	
		12 bits	30 frame/s	
Mode 1	684H × 524V Approx. 350K	10 bits	60/30 frame/s	
Window cropping mode (VGA)	728H × 505V Approx. 360K	10 bits	*120/60 frame/s	
		12 bits	60 frame/s	

*: These frame rates are supported in DDR mode for the CMOS parallel output and in 2-port mode for the low-voltage LVDS serial output interface.