

IMX032CQR

Diagonal 7.63 mm (Type 1/2.3) 9.29M-Effective Pixel High-Speed, High-Resolution CMOS Sensor for Consumer Digital Still Cameras



Both high-resolution still imaging and video imaging are now required as standard functions in digital still cameras.

Thus there is now an increasing interest in CMOS sensors, which are capable of innovative performance such as high-speed continuous still imaging and high-speed video imaging.

Sony has now developed the IMX032CQR 9.29M-pixel CMOS sensor, which provides both high-resolution and high picture quality and is capable of both high-speed continuous still imaging and high-speed video imaging.

- Diagonal 7.63 mm (Type 1/2.3) 9.29M effective pixels (3528H × 2632V)
- Pixel size: 1.75 μm unit pixel
- 12-bit column-parallel A/D conversion
- Supports 9.29M-pixel imaging at 30 frame/s
- High-speed output interface: high-speed data rate of 480 MHz
- Dual power supply drive (Analog: 2.7 V, Digital: 1.8 V)

Exmor™

*: "Exmor" is a trademark of Sony Corporation. "Exmor" is a version of Sony's high performance CMOS sensor with high-speed processing, low noise and low power dissipation by using column-parallel A/D conversion.

The IMX032CQR captures high-resolution, high picture quality 9.29M-pixel still images at 30 frame/s. It also supports both high-definition and high-speed video imaging and thus can capture a wide range of images, from everyday scenes to brief instants too short for the eye to see. Furthermore, it can capture all these images with superb picture quality. It provides a wide variety of readout modes to implement these imaging operations.

High-Speed Performance: 9.29M Pixels at 30 Frame/s

The IMX032CQR adopts column-parallel A/D conversion to achieve high-speed performance. Also, the high-speed output interface transmits 12-bit serial data at the high speed of 480 Mbps and can output 8

pixels worth of data at the same time.

These techniques allow the IMX032CQR to read out 9.29M-pixel images at 30 frame/s, 8.30M-pixel images at 40 frame/s, and, if truly high speeds are desired, 100K-pixel images at 1000 frame/s.

Sensor Unit Pixel Achieves both Higher Pixel Counts and Higher Picture Quality

To achieve an even higher pixel count, Sony developed a 1.75 μm unit pixel CMOS sensor. When reducing the size of the pixel, we introduced several condensing efficiency improving technologies and achieved a sensitivity of 2300e- (typical).

Sony introduced new process technologies that reduce noise. These technologies suppress both random noise and fixed pattern noise and the sensor captures high signal-to-noise ratio images. The analog CDS and digital CDS circuits built into each column are another feature of column-parallel A/D conversion. The reduction of pixel noise and the differences between individual analog circuits is another indispensable element for achieving high picture quality. The adoption of these technologies made it possible to achieve signal-to-noise ratios as good or better than those of CCD with the same unit pixel size. (See figure 1.)

A Variety of Readout Modes to Respond to a Variety of Needs

The IMX032CQR allows the user to select from a variety of drive modes to match the actual usage, such as high-resolution still, high-definition video, or high-speed video

imaging. (See table 3.)

The IMX032CQR allows either 9.29M pixels or 8.30M pixels to be selected as the readout area. In addition to a mode that supports 12-bit data output at 20 frame/s for both the 9.29M-pixel and 8.30M-pixel resolutions, there is also a mode that allows continuous imaging at 30 frame/s with 10-bit data output. The IMX032CQR also provides a horizontal and vertical 2/2-line addition readout mode that supports 1440 × 1080 high-definition recording.

Additionally, the IMX032CQR also provides modes that are mainly designed to support high-speed imaging. It achieves 240 frame/s in vertical 2/7 elimination mode and up to 1000 frame/s in vertical 2/15 elimination mode. Thus the IMX032CQR can isolate instants that previously could not be captured.

Sony hopes that you will be able to experience a new photographic world made possible by Sony high-speed CMOS sensors, which achieve both superb picture quality and high-speed performance at the same time.

VOICE

What sort of things would you photograph if there were a digital camera that were capable of both high-resolution and high-speed imaging? I'd like to photograph my daughter, who is constantly moving around with her small baby steps. I hope that you will create a high-resolution/high-speed camera that never misses a photographic opportunity.

Photograph 1 Sample Image at 9.29M Pixels (ISO 100 equivalent)



Table 1 Device Structure

Item	IMX032CQR	
Image size	Diagonal 7.63 mm (Type 1/2.3)	
Format	4:3	
Fabrication process	1-poly 4-metal 0.14 μm CMOS	
Output format	Digital, 10/12 bits, 8 channels, Sub-LVDS, 480 Mbps per channel (Max.) serial output	
Total number of pixels	Approx. 10.29M (3632H × 2832V)	
Number of effective pixels	Approx. 9.29M (3528H × 2632V)	
Number of active pixels	Approx. 9.15M (3480H × 2628V)	
Unit cell size	1.75 μm (H) × 1.75 μm (V)	
Optical black	Horizontal	Front: 48 pixels, rear: 0 pixels
	Vertical	Front: 4 pixels, rear: 0 pixels
Power supply specifications	Analog	2.7 V
	Digital	1.8 V
	I/O	1.8 V
PGA	+18 dB (Max.)	
Input clock frequency	60 MHz	

Figure 1 Signal-to-Noise Ratio by ISO Sensitivity (Y signal)

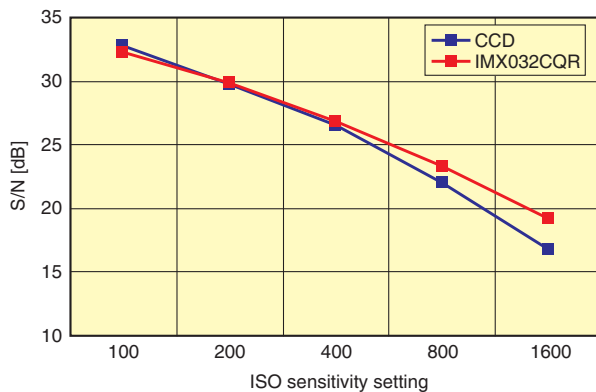


Table 2 Image Sensor Characteristics

Item	IMX032CQR	Remarks
Sensitivity (F5.6)	1140 digit (Typ.) 2300e- (Typ.)	3200K, 706 cd/m ² , 1/30 s accumulation, G signal
Saturation signal	2488 digit (Min.) 5000e- (Min.)	Ta = 60°C

Table 3 Readout Modes

Number of effective pixels	Drive mode	Number of recommended recording pixels	Frame rate (frame/s)	Output data rate [I/F] (MHz)	Number of A/D conversion bits (bit)	Remarks
Type 1/2.3 Approx. 9.29M pixels	All-pixel scan	Approx 8.96M pixels (3456H × 2592V)	30	480 [240 MHz (DDR)]	10	High picture quality video imaging
			20	480 [240 MHz (DDR)]	12	High-resolution still imaging
	Horizontal/vertical 2/2-line addition readout	Approx. 2.24M pixels (1728H × 1296V)	60	240 [120 MHz (DDR)]	10	
	Horizontal/vertical 3/3-line addition readout	Approx. 1.00M pixels (1152H × 864V)	60	240 [120 MHz (DDR)]	10	
	Vertical 1/3 elimination	Approx. 1.00M pixels (1152H × 864V)	120	240 [120 MHz (DDR)]	10	
	Vertical 2/7 elimination	Approx. 430K pixels (1152H × 370V)	240	240 [120 MHz (DDR)]	9	
	Vertical 2/15 elimination	Approx. 200K pixels (1152H × 170V)	420	240 [120 MHz (DDR)]	9	
	Vertical 2/15 elimination, cropping 1	Approx. 130K pixels (1152H × 110V)	840	240 [120 MHz (DDR)]	9	
Vertical 2/15 elimination, cropping 2	Approx. 100K pixels (1152H × 90V)	1000	240 [120 MHz (DDR)]	9		
Type 1/2.5 Approx. 8.30M pixels	All-pixel scan	Approx. 7.99M pixels (3264H × 2448V)	40	480 [240 MHz (DDR)]	10	High picture quality video imaging
			20	480 [240 MHz (DDR)]	12	High-resolution still imaging
	Horizontal/vertical 2/2-line addition readout	Approx. 2.00M pixels (1632H × 1224V)	60	240 [120 MHz (DDR)]	10	
	Horizontal/vertical 3/3-line addition readout	Approx. 890K pixels (1088H × 816V)	60	240 [120 MHz (DDR)]	10	
	Vertical 1/3 elimination	Approx. 890K pixels (1088H × 816V)	120	240 [120 MHz (DDR)]	10	
	Vertical 2/7 elimination	Approx. 380K pixels (1088H × 348V)	240	240 [120 MHz (DDR)]	9	
Vertical 2/15 elimination	Approx. 180K pixels (1088H × 162V)	420	240 [120 MHz (DDR)]	9		

Note: This device was designed for use in consumer digital still cameras and may not be appropriate for other applications. Contact your Sony representative for consultation when considering this product for use in other applications.