

IMX144CQJ

Diagonal 9.33 mm (Type 1/1.7) Approx. 12.40M-Effective Pixel High-Speed, High-Sensitivity Back-Illuminated CMOS Image Sensor for Consumer Digital Still Cameras and Camcorders



As the opportunities for shooting stills and video increase, users are demanding more from their compact digital still cameras and camcorders in terms of high-picture quality and high performance. Sony has responded to this demand by commercializing the IMX144CQJ, a Type 1/1.7 approx. 12.40M-effective pixel back-illuminated CMOS image sensor ideal for high quality compact digital still cameras and camcorders.

- Diagonal 9.33 mm (Type 1/1.7) approx. 12.40M-effective pixels (4072H × 3046V)
- Pixel size: 1.85 μm unit pixel
- Supports 12.40M-pixel imaging at approx. 35 frame/s
- Back-illuminated CMOS image sensor featuring high sensitivity, high dynamic range and low noise
- Provides 4K video mode (4096H × 2160V, 60 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.

Vast Improvement in Picture Quality

Compared to the current products, a Type 1/2.3 back-illuminated image sensor, the IMX144CQJ is a Type 1/1.7 back-illuminated image sensor that provides higher sensitivity, higher dynamic range and lower noise. Larger pixel size for improved sensor characteristics and full use of Sony's unique fine pixel processing technology mean that the new image sensor has 1.3 times the sensitivity

and 1.9 times the saturation signal level of the current Sony product, IMX078CQK (1.55 μm unit pixel, Type 1/2.3, approx. 12.40M-effective pixels, see the New Products section in CX-NEWS, Volume 63). (See table 2.) Dark signal characteristics equivalent to the current Sony products ensure high picture quality from dark to bright areas. (See photograph 1.)

This image sensor possesses characteristics ideal for high-quality compact digital still cameras and camcorders where high picture quality is essential.

Greater Optical Design Freedom

Larger pixel size combined with better light collecting characteristics have vastly increased incident light angle characteristics (see figure 1) and yielded more favorable f-number dependence over the current Type 1/2.3 back-illuminated image sensors.

Thanks to these improvements, the new image sensor offers greater optical design freedom and can cope with brighter lenses and high power zoom lenses.

4K and Many Other Shooting Modes

Sony's unique high-speed scanning technology has allowed us to build a variety of drive modes. (See table 3.) The Type 1/1.9, approx. 9.03M-pixel (approx. 17:9) sensor enables high-definition and high-speed video recording of 4K 60 frame/s makes this

consumer image sensor capable of the next-generation 4K format. Also, the image sensor comes not only with full HD at 60 frame/s (mode 1) but is capable of slow-motion shooting with HD at 240 frame/s (mode 4) and has plenty of other video functions.

High Speed and Low Power Consumption

While the image sensor ensures high picture quality and high speed, the structure of the column-parallel A/D conversion circuit was reconfigured to reduce power consumption by about 34% compared to the current Sony products. (Mode 1: full HD 60 frame/s mode, see table 2.)

In addition to increasing the number of images that can be shot, these achievements have added value by greater versatility and low-power design.

V O I C E

In the general trend towards ever higher pixel counts and fine pixel processing, our goal behind the development of the IMX144CQJ was to also design in "excellent picture quality in a compact size." Large pixel size and taking cutting-edge back-illuminated and fine pixel processing technology to the next level have significantly improved picture quality. We strongly recommend that you look into Sony's high-speed and high-sensitivity imaging technologies for your next camera.

Photograph 1 12.40M pixels Sample Image (ISO 80 equivalent)



Figure 1 Incident Light Angle Characteristics

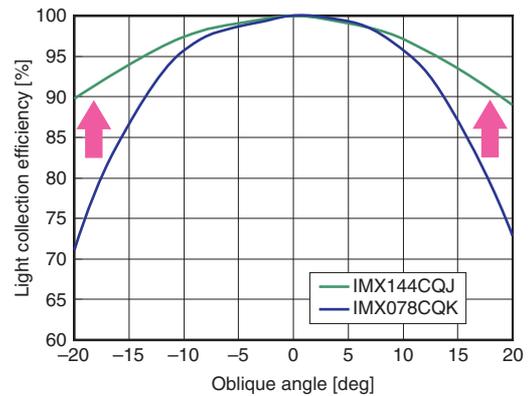


Table 1 Device Structure

Item	IMX144CQJ	
Image size	Diagonal 9.33 mm (Type 1/1.7) aspect ratio 4:3 Diagonal 8.61 mm (Type 1/1.9) aspect ratio approx. 17:9 Diagonal 4.94 mm (Type 1/3.6) aspect ratio 16:9	
Fabrication process	Back-illuminated CMOS image sensor	
Output format	Digital 10-bit/12-bit 10 ch Sub-LVDS, 576 Mbps serial output	
Total number of pixels	4168H × 3062V, Approx. 12.76M	
Number of effective pixels	4072H × 3046V, Approx. 12.40M	
Number of active pixels	4024H × 3036V, Approx. 12.22M	
Unit cell size	1.85 μm (H) × 1.85 μm (V)	
Optical blacks	Horizontal	Front: 48 pixels, rear: 0 pixels
	Vertical	Front: 16 pixels, rear: 0 pixels
Power supply specifications	Analog	2.9 V
	Digital	1.2 V
	I/O	1.8 V
PGA	27 dB	
Input clock frequency	72 MHz	

Table 2 Image Sensor Characteristics

Item	IMX144CQJ		Remarks
	Characteristic values	Compared to IMX078CQK	
Sensitivity (F5.6)	1202 digits (Typ.)	1.34	1/30 s accumulation, G signal
Saturation signal	3679 digits (Min.)	1.89	Ta = 60°C
Power consumption	351 mW	0.66	Mode 1 (Full HD at 60 frame/s)

Table 3 Readout Modes

Drive mode	Operation using Type 1/1.7, approx. 12.40M pixels (4:3)			Operation using Type 1/1.9, approx. 9.03M pixels (approx. 17:9)		
	Number of recommended recording pixels	Frame rate [frame/s]	Number of A/D conversion bits [bit]	Number of recommended recording pixels	Frame rate [frame/s]	Number of A/D conversion bits [bit]
All-pixel scan (12 bits)	4000H × 3000V, 12.00M pixels	35	12	4096H × 2160V, Approx. 8.85M pixels	48	12
All-pixel scan (10 bits)	4000H × 3000V, 12.00M pixels	40	10	4096H × 2160V, Approx. 8.85M pixels	60	10
Mode 1 *1 *2	2000H × 1126V, Approx. 2.25M pixels	60	10	2048H × 1080V, Approx. 2.21M pixels	60	10
Mode 2 *1 *2	1332H × 998V, Approx. 1.33M pixels	60	10	1364H × 720V, Approx. 0.98M pixels	60	10
Mode 3 *1	1332H × 1000V, Approx. 1.33M pixels	120	10	1364H × 720V, Approx. 0.98M pixels	120	10
Mode 4	2000H × 750V, Approx. 1.50M pixels	240	10	—	—	—
Mode 5 *1 *2	1332H × 332V, Approx. 0.44M pixels	240	10	1364H × 240V, Approx. 0.33M pixels	240	10
Mode 6 *1 *2	1332H × 174V, Approx. 0.23M pixels	480	10	1364H × 124V, Approx. 0.17M pixels	720	10

*1: With horizontal addition

*2: With vertical addition

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