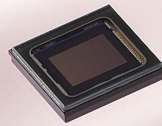


# IMX078CQK

## Diagonal 7.81 mm (Type 1/2.3) 12.40M-Effective Pixel High-Speed, High-Sensitivity Back-Illuminated CMOS Image Sensor for Consumer Digital Still Cameras



In 2009, Sony led the industry by introducing technology that incorporated "Exmor R" to the digital still camera market. Now, Sony is releasing the IMX078CQK back-illuminated 12.40M-effective pixel CMOS image sensor that takes further advantage of that technology. The IMX078CQK achieves still imaging with both high sensitivity and high resolution as well as full HD video imaging. Furthermore, it will expand the possibilities for expressive imaging provided by digital still cameras.

- Diagonal 7.81 mm (Type 1/2.3) 12.40M-effective pixels (4072H × 3044V)
- Pixel size: 1.55 μm unit pixel
- Supports 12.40M-pixel imaging at 42 frame/s
- Back-illuminated CMOS image sensor that achieves both higher pixel counts and higher sensitivity
- Achieves full HD video imaging: 1920H × 1080V pixels at 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.

#### High-Speed Performance: 12.40M Pixels at 42 Frame/s

In the IMX078CQK, to achieve faster performance, Sony adopted column-parallel A/D conversion method and incorporated a 576 Mbps LVDS high-speed output interface. As a result, the IMX078CQK achieves the high frame rate of 42 frame/s in all-pixel

scan mode, despite being a 12.40M-effective pixel CMOS image sensor. It is also capable of producing full HD video (1920H × 1080V pixels at 60 frame/s).

#### Back-Illuminated CMOS Image Sensor that Achieves both Higher Pixel Counts and Higher Sensitivity

To achieve the higher resolution of 12.40M effective pixels, the IMX078CQK adopts a 1.55 μm unit pixel. In conjunction with this reduced pixel size, Sony optimized both the back-illuminated structure and the pixel structure itself, and achieved a sensitivity of 1437 digits (typical). (See table 2.) Furthermore, this device achieves a saturation signal of 3089 digits (minimum) and, in terms of numbers of electrons converted per unit area, achieves an increase of about 10% over current Sony products.

#### Full HD Video (1920H × 1080V Pixels at 60 Frame/s) and Readout Modes that Respond to a Variety of Needs

Users can select from a wide range of drive modes according to the application, for example high-resolution still imaging or high-speed video capture. (See table 3.) Due to achieving both higher pixel counts and higher speed, full HD video (1920H × 1080V pixels at 60 frame/s) is now possible, and this device achieves about 2.3 times more detailed imaging at ordinary HD (720p) resolution. The IMX078CQK provides two modes for full HD video: mode 1 which strives for picture

quality, and mode 9 which suppresses power consumption. It also provides modes that support high-speed imaging: mode 4 (240 frame/s) and mode 7 (1000 frame/s).

#### Improved Color Reproducibility

For the IMX078CQK, Sony developed technology that improves the sensor's light collecting efficiency. This technology improves the mixed-color characteristics and, for example, at a wavelength of 550 nm, the red and blue signal levels are improved by about 5 points compared to current Sony products at F2.8. (See figure 1.) As a result, color reproducibility is improved for a wide range of lens rays.

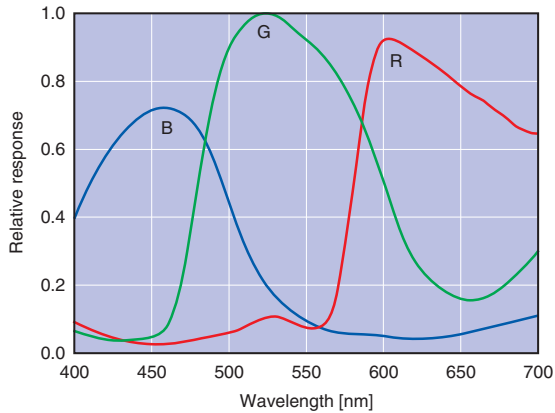
#### V O I C E

We pushed forward with the development of this product with the idea of making it possible to create digital cameras that could produce detailed and beautiful images in a wide range of scenes, such as nighttime and interior scenes, and that furthermore can easily capture full HD video.

We strongly recommend that you look into Sony's high-speed and high-sensitivity imaging technologies for your next camera.

**Figure 1 Spectral Sensitivity Characteristics**

Excludes lens characteristics and light source characteristics



**Table 1 Device Structure**

Item	IMX078CQK	
Image size	Diagonal 7.81 mm (Type 1/2.3)	
Format	4:3	
Fabrication process	1-poly 4-metal 0.14 μm 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 × 3060V, Approx. 12.75M	
Number of effective pixels	4072H × 3044V, Approx. 12.40M	
Number of active pixels	4024H × 3036V, Approx. 12.22M	
Unit cell size	1.55 μm (H) × 1.55 μm (V)	
Optical blacks	Horizontal	Front: 48 pixels, rear: 0 pixels
	Vertical	Front: 16 pixels, rear: 0 pixels
Power supply specifications	Analog	2.7 V
	Digital	1.8 V
	I/O	1.8 V
PGA	24 dB	
Input clock frequency	72 MHz	

**Table 2 Image Sensor Characteristics**

Item	IMX078CQK	Remarks
Sensitivity (F5.6)	1437 digits (Typ.)	1/30 s accumulation, G signal
Saturation signal	3089 digits (Min.)	Ta = 60 °C

**Table 3 Readout Modes**

Drive mode	Number of recommended recording pixels	Output data rate at 576 MHz	
		Frame rate [frame/s]	Number of A/D conversion bits [bit]
All-pixel scan (12 bits)	4000H × 3000V, 12.00M pixels	20	12
All-pixel scan (10 bits)	4000H × 3000V, 12.00M pixels	42	10
Mode 1 (16:9 cropping)	2000H × 1126V, Approx. 2.25M pixels	60	10
Mode 2	1332H × 998V, Approx. 1.33M pixels	60	9
Mode 3 *1	1332H × 1000V, Approx. 1.33M pixels	120	10
Mode 4 *1	1332H × 332V, Approx. 0.44M pixels	240	9
Mode 5 *1	1332H × 174V, Approx. 0.23M pixels	480	9
Mode 6 *1, cropping type 1	1332H × 94V, Approx. 0.13M pixels	800	9
Mode 7 *1, cropping type 1	1332H × 74V, Approx. 0.10M pixels	1000	9
Mode 8 *1	1332H × 600V, Approx. 0.80M pixels	200	10
Mode 9 *2 (16:9 cropping)	2000H × 1126V, Approx. 2.25M pixels	60	10

\*1: With horizontal addition

\*2: With vertical addition

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.