ISX005 ISX006

Diagonal 3.6 mm (Type 1/5) 3M-Pixel and Diagonal 4.5 mm (Type 1/4) 5M-Pixel CMOS Image Sensor SOC Devices Include High-Performance Image-Processing Engine and Camera System Functions

The ISX005 and ISX006 that Sony has now developed are system on chip (SOC) image sensors
that provide both a 1.4 μm unit pixel CMOS image sensor and camera system functionality on the same chip.
These devices provide a wide range of camera system functions
and a Sony-developed compact yet high-performance image-processing engine on a single chip.
Thus they can contribute to further miniaturization and thinner forms in cellular phones that includes camera functionality.

■ High-performance image-processing engine

■ AWB, AE, and AF camera system functions

■ High-definition video functions (1080 30p and 720 60p)

■ Parallel and MIPI interfaces

■ Scalado's SpeedTags™ technology

Exmor™

*: "Exmor" is a trademark of Sony Corporation. "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-Performance Image-Processing Engine

The ISX005 and ISX006 that Sony has now developed include a Sony-developed compact yet high-performance image-processing engine. This processor can take maximum advantage of the picture quality produced by Sony CMOS image sensors and generates low-noise high-resolution image data.

AWB, AE, and AF Camera System Functions

These devices provide auto white balance (AWB) and auto exposure (AE) functions and create clear images with optimal color reproduction and minimum noise for a variety of light sources and lighting conditions. Since they also provide an autofocus (AF) function, they can implement camera systems that provide high-performance 3A (AWB, AE, and AF) functionality.

High-Definition video Functions (1080 30p and 720 60p)

The ISX005 supports 1280 × 720p at 30 frame/s, and the ISX006 supports 1920 × 1080p at 30 frame/s and 1280 × 720p at 60 frame/s high-definition video modes. Both products also support high frame rate video modes up to 120 frame/s.

Parallel and MIPI Interfaces

These devices include a parallel interface that supports a wide variety of output formats and can be directly connected to most cellular phone application processors. They also include a CSI-2 (Camera Serial Interface) as stipulated by the Mobile Industry Processor Interface (MIPI) Alliance. This interface is expected to become the standard interface for application processors and supports high-speed data transfers.

Scalado's SpeedTags™ Technology

Scalado AB is a Swedish company that specializes in image software development for cellular phones. The Scalado "SpeedTags" technology achieves unprecedented JPEG performance as well as faster image browsing in the photo album. This technology can improve the efficiency of image capture and image editing with cellular phone cameras. It can also contribute to speeding up our customers' product development schedules, including both hardware and software development.

We expect that the software included in digital products will become even more critical to achieving improved picture quality and performance in those products. Scalado's "SpeedTags" is a technology that can significantly increase the value of Sony's image sensors.

* Scalado AB web site: http://www.scalado.com "SpeedTags" is a registered trademark of Scalado AB.

VOICE

As a result of everyone, from design through manufacturing, inspection, evaluation, and sales, exerting tremendous effort, we were able to develop the ISX005 and ISX006 at the same time and complete them as products in a short time. These devices integrate competitive, high-performance camera system functions in a single chip. I strongly recommend you consider these devices for your next product.
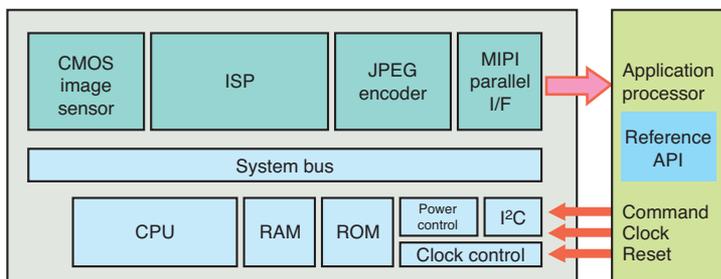
Figure 1 **Block Diagram**

Figure 2 **Sample Images – Signal-Processing Functions**

CMOS Image Sensor Output (Raw image)

CMOS Image Sensor SOC Output
(Post signal-processing image)

Table 1 **ISX005 and ISX006 Characteristics**

Item		ISX005	ISX006
Device structure	Image size	Diagonal 3.6 mm (Type 1/5)	Diagonal 4.5 mm (Type 1/4)
	Number of effective pixels	Approx 3.19M pixels (2064H × 1544V)	Approx 5.11M pixels (2608H × 1960V)
	Number of recording pixels	Approx 3.15M pixels (2048H × 1536V)	Approx 5.04M pixels (2592H × 1944V)
Signal-processing circuits	Auto control functions	Auto exposure (AE) control, autofocus (AF) control, auto white balance (AWB) control	
	Picture quality adjustment functions	Sharpening, noise reduction, color adjustment, gamma correction, brightness adjustment, contrast adjustment, special effects	
	Image output formats	JPEG (4:2:2), Y/Cb/Cr, YUV, RGB, RAW, and JPEG + YUV (thumbnail)	
I/O interfaces	Image output	Parallel 8 bits, 10 bits/ MIPI 2 lanes	
	Communication and control signals	I²C fast mode (@400 kHz), interrupt outputs	
Input clock frequencies		12, 13, 13.5, 14.4, 18, 19.2, 24, 26, 27 MHz	
Maximum data output frequencies		Parallel : 108 MHz@YCbCr (3M) output 54 MHz@YCbCr (XGA) / JPEG (3M) output MIPI : 864 Mbps@YCbCr (3M) 15 frame/s (2 lanes) 864 Mbps@JPEG (3M) 15 frame/s (2 lanes)	Parallel : 108 MHz@YCbCr (2M) output 54 MHz@YCbCr (SVGA) / JPEG (5M) output MIPI : 1296 Mbps@YCbCr (5M) 14.3 frame/s (2 lanes) 864 Mbps@JPEG (5M) 15 frame/s (2 lanes)
Controller		ARM7 [*1]	
External interfaces		I²C 2 ch、GPIO 2 ch	I²C 2 ch、GPIO 5 ch、PWM
Number of pins		88 pins	114 pins
Power supply voltages	Voltages	Digital: 1.2 V, Analog: 2.7 V, I/F: 1.8 V to 3.0 V	
	Power consumption	190 mW 3M JPEG@15 frame/s 190 mW VGA YUV@30 frame/s	308 mW 5M JPEG@15 frame/s 310 mW WVGA YUV@30 frame/s

[*1] "ARM" is a registered trademark of ARM Limited.

Table 2 **Features of the Scalado "SpeedTags" Technology**

Item	Feature
Image processing	High-speed Instant Full Resolution
Photo taking	Instant Zoom/Pan & Burst-Mode Image Capture
Memory	Less Memory Required
CPU load	Less Work for CPU

* Using the leading-edge technology provided by Scalado AB allows cameras to assure that the image seen by the user and the image captured by the camera match (no shutter lag).

Figure 3 **Graphic Showing the Scalado "SpeedTags" Technology Output**