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CX-NEWS	Semiconductor & Component			
HOME > CX-NEWS > Back Number > CX-N	IEWS Vol.45> New Products			
New Products				
New Product_image	 High-Resolution Diagonal 7.208 mm (Type 1/2.5) 7.24M-Effective Pixel Digital Still Camera CCDs for Consumer Products Support VGA Resolution Moving Picture Imaging ICX629 Series 			
	[ICX629AQN/CQV/CQZ] The compact digital still camera market is now seeing stronger demands for higher ISO sensitivities in addition to the earlier desires for higher resolution. In particular, the market continues to demand evolution in image sensors in terms of both smaller pixels sizes and improved performance, i.e. higher sensitivity, wider dynamic range, and lower noise. To respond to these needs, Sony has further improved their unique fine fabrication technologies to develop and now release the ICX629AQN/CQV/ CQZ diagonal 7.208 mm (Type 1/2.5) 7.24M-effective pixel interline CCDs. These CCDs feature the industry's smallest unit pixel (1.86 µm) yet still achieve superb imaging qualities. These new products also include a horizontal and vertical pixel addition function that makes it possible for them to achieve 30 frame/s VGA resolution moving picture imaging.			
 ICX629 Series[ICX629AQN/CQV/CQZ] Diagonal 7.208 mm (Type 1/2.5), 7.24M Pixel size: 1.86 µm unit pixel * 5-field readout * Supports 30 frame/s VGA moving pictur Cameras with Type 1/2.5 optical size, good 6M pixels or higher are expected to becommarket. Sony has led the industry in grasping this ICX624 Series) is now releasing the high-ICX629 Series), which are based on an etechnologies. (See table 1.) Pixel Miniaturization By miniaturizing the earlier 2.03 µm unit p smallest unit pixel, Sony maximized the size the same time, Sony maximized the size 1) which determine the basis characteristics 	I effective pixels (3112H × 2328V) re imaging od high-ISO sensitivity characteristics, and a resolution of me the mainstream in the consumer digital still camera a trend, and in addition to Type 1/2.5 6M-pixel CCDs (the -performance 7M-pixel ICX629AQN/CQV/CQZ CCDs (the even further evolution of Sony's unique fine fabrication pixel to a 1.86 µm unit pixel size, which is the industry's significant increase in the pixel sount in the Type 1/2.5 CCD. zes of the photodiode and the pixel aperture area (see figure tion of the image account to achieve high performance in the			

though the pixel area was reduced by 16% compared to the 2.03 μm unit pixel, Sony was able to

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The basic charact pixel CCDs by the allowed Sony to a than the earlier pr POpen Source Ou In the ICX629 Ser heat sources in th output pin circuits generation and re earlier products. Putfer IC Sony provides the output circuits. It is noise reduction te along with the IC>	eristics were improved by about 20% on a per unit area basis ese pixel size reducing and basic characteristics improvement chieve equivalent or better sensitivity and saturation signal lev oducts. (See table 2.) utput Circuit ies, Sony has moved some of the output circuit MOSFETs, whe e CCD, outside the chip to suppress noise during dark subject have an open source structure. (See figure 2.) This reduces the duces the dark current generated from the pixels by about 10 e high-speed/low-power CXA3691EN as a buffer IC to handle s thought that in the future, the open source output circuit will chnology. We strongly recommend that you take advantage o K629 Series CCDs in your next digital still camera product.	from the 2.0 technologies vel characteri hich are the la timaging. The the CCD inter % compared the open sou become stan of the CXA36S	3 μm u s. This istics argest nus the rnal he to the irce adard a 91EN	unit e eat as a	
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Voice face	Although we needed many trial and error steps in the develo team members worked together to advance Sony's unique fi technology and we succeeded in breaking the 2.0 µm unit pi retaining high performance. I strongly recommend that you take advantage of the trend-le devices. See all articles with figures and	pment stage, ne fabricatior xel size barrio eading ICX62 d tables. DD 1	, all of n er whil 29 Seri 10 PDF	the e ies Files	
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	[Back]				

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for Consumer Products Support VGA Resolution Moving Picture Imaging

ICX629 Series [ICX629AQN/CQV/CQZ]

The compact digital still camera market is now seeing stronger demands for higher ISO sensitivities in addition to the earlier desires for higher resolution. In particular, the market continues to demand evolution in image sensors in terms of both smaller pixels sizes and improved performance, i.e. higher sensitivity, wider dynamic range, and lower noise.

To respond to these needs, Sony has further improved their unique fine fabrication technologies to develop and now release the ICX629AQN/CQV/CQZ diagonal 7.208 mm (Type 1/2.5) 7.24M-effective pixel interline CCDs. These CCDs feature the industry's smallest unit pixel (1.86 μ m) yet still achieve superb imaging qualities. These new products also include a horizontal and vertical pixel addition function that makes it possible for them to achieve 30 frame/s VGA resolution moving picture imaging.

- Diagonal 7.208 mm (Type 1/2.5), 7.24M effective pixels (3112H × 2328V)
- Pixel size: 1.86 μm unit pixel
- 5-field readout
- Supports 30 frame/s VGA moving picture imaging

Cameras with Type 1/2.5 optical size, good high-ISO sensitivity characteristics, and a resolution of 6M pixels or higher are expected to become the mainstream in the consumer digital still camera market. Sony has led the industry in grasping this trend, and in addition to Type 1/2.5 6Mpixel CCDs (the ICX624 Series) is now releasing the high-performance 7M-pixel ICX629AQN/CQV/CQZ CCDs (the ICX629 Series), which are based on an even further evolution of Sony's unique fine fabrication technologies. (See table 1.)



Although we needed many trial and error steps in the development stage, all of the team members worked together to advance Sony's unique fine fabrication technology and we succeeded in breaking the 2.0 μ m unit pixel size barrier while retaining high performance. I strongly recommend that you take advantage of the trendleading ICX629 Series devices

Pixel Miniaturization

By miniaturizing the earlier 2.03 µm unit pixel to a 1.86 µm unit pixel size, which is the industry's smallest unit pixel, Sony has achieved a significant increase in the pixel count in the Type 1/2.5 CCD. At the same time, Sony maximized the sizes of the photodiode and the pixel aperture area (see figure 1), which determine the basic characteristics of the image sensor, to achieve high performance in the sensitivity, saturation signal level (dynamic range), and smear characteristics. As a result, even though the pixel area was reduced by 16% compared to the 2.03 μm unit pixel, Sony was able to maintain the pixel aperture area and photodiode size at essentially the same level as the earlier products by, for example, reducing the size of the vertical transfer register by 16%. Sony also increased the incident light transmittance to the pixel by approximately 15% and improved the condensing efficiency by approximately 10%.

Pixel Characteristics

The basic characteristics were improved by about 20% on a per unit area basis from the 2.03 μ m unit pixel CCDs by these pixel size reducing and basic characteristics improvement technologies. This allowed Sony to achieve equivalent or better senteristics than the earlier products. (See table 2.)

Open Source Output Circuit

In the ICX629 Series, Sony has moved some of the output circuit MOSFETs, which are the largest heat sources in the CCD, outside the chip to suppress noise during dark subject imaging. Thus the output pin circuits have an open source structure. (See figure 2.) This reduces the CCD internal heat generation and reduces the dark current generated from the pixels by about 10% compared to the earlier products.

Buffer IC

Sony provides the high-speed/low-power CXA3691EN as a buffer IC to handle the open source output circuits. It is thought that in the future, the open source output circuit will become standard as a noise reduction technology. We strongly recommend that you take advantage of the CXA3691EN along with the ICX629 Series CCDs in your next digital still camera product.





Figure 1 Reducing the Pixel Size



■ Table 1 Device Structure

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Item	ICX629 Series			
Image size	Diagonal 7.208 mm (Type 1/2.5)			
Transfer method	Frame readout interline transfer metho			
Readout method	5-field readout			
Total number of pixels	Approx. 7.41M (3164H × 2342V)			
Number of effective pixels	Approx. 7.24M (3112H × 2328V)			
Number of active pixels	Approx. 7.20M (3104H × 2320V)			
Number of recommended recording pixels (Aspect ratio: 4:3)	Approx. 7.08M (3072H × 2304V)			
Unit cell size	1.86 μm (H) \times 1.86 μm (V)			
Horizontal drive frequency	33.75MHz			
Package	AQN: 28-pin SOP (Plastic) CQV: 28-pin SON (Ceramic) CQZ: 27-pin QFN (Ceramic)			

Table 2 Image Sensor Characteristics

Item		ICX629 Series	Remarks		
Sensitivity (G signal)		170 mV (Typ.)	3200K, 706 cd/m ² , 1/30 s accumulation, F5.6		
Saturation 4/10-line readout mode*1		420 mV (Min.)	Ta = 60°C, per pixel		
		200 mV (Min.)			
olgridi	4/20-line readout mode*1	200 mV (Min.)			
	Frame readout mode	–87 dB (Typ.)	None when a machanical		
Smear	4/10-line readout mode	–79 dB (Typ.)	shutter is used, V/10 method,		
	4/20-line readout mode	–73 dB (Typ.)	F5.6		
	Frame readout mode	3.33 frame/s			
Frame rate	4/10-line readout mode*1	30 frame/s	Number of output lines: 466 lines*2		
	4/20-line readout mode*1	60 frame/s	Number of output lines: 232 lines*2		

*1: With horizontal addition

*2: During the horizontal addition operation, two lines of signal are output in a single horizontal period.

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