

ICX667/ICX677 Series

Diagonal 7.791 mm (Type 1/2.3) 12.19M-Effective Pixel High-Resolution Consumer Digital Still Camera CCDs Support 720p Moving Picture Imaging



In addition to the existing needs for even higher resolution in the consumer compact digital still camera market, there are now increasing needs for improved high ISO sensitivity and wider dynamic range.

Sony has now developed unique new fine pixel technologies and, while increasing the pixel count using the industry's smallest unit pixel (1.55 μm pitch), has improved the pixel characteristics and moving image performance. That is, Sony has overcome conflicting technological issues to develop the ICX667/ICX677 series CCD products.

These devices achieve high-definition television (720p) imaging while maintaining image quality.

- Diagonal 7.791 mm (Type 1/2.3) 12.19M effective pixels
- Pixel size: 1.55 μm unit pixel
- Six-field readout
- Horizontal divided into thirds output
- Horizontal 3-phase drive (ICX677 Series: horizontal 2-phase drive)

The Industry's Smallest Pixel Size Achieved

By taking advantage of their unique fine pixel fabrication technologies, Sony has succeeded in developing the ICX667/ICX677 series of diagonal 7.791 mm (Type 1/2.3) 12.19M-effective pixel CCDs. In creating even finer pixels than the existing 1.68 μm unit pixel, Sony maximized the photodiode area and significantly improved device performance without incurring tradeoffs between sensitivity characteristics, saturation signal (dynamic range), and smear characteristics. As a result, these new products achieve equal

or better basic characteristics than the current ICX665/ICX675 diagonal 7.705 mm (Type 1/2.3) 10.17M-effective pixel CCDs.

The Industry's Highest Level of Characteristics Achieved

The ICX667/ICX677 series adopts a new optical condensing structure to increase the condensing efficiency per unit area by 14% over current structures. (See figure 1.) As a result, despite the unit pixel size being reduced by 15% from the current Sony ICX665/ICX675 series products, these new devices achieve the industry's highest G sensitivity of 180 mV. (See table 2.) Furthermore, the vertical register smear component admixture has been improved by 7 dB to achieve a smear level of -86.5 dB in frame readout mode. (See figure 1 and table 2.)

HDTV Moving Picture Imaging Achieved

The ICX667/ICX677 series adopts a new electrode structure to reduce the pixel internal

wiring resistance as much as possible to resolve the problem of vertical clock pulse transmission delay. (See figure 2.) This makes high-speed charge transfers possible, and in addition to the 4/12-line readout mode, which is the current VGA 30 frame/s moving picture imaging mode, these new devices also include a 4/6-line readout 720-line output mode that can acquire 720p 30 frame/s video from a single channel output at a 38 MHz drive frequency. (See table 2.)

V O I C E

Through a continuous process of trial and error, the project members worked together to evolve Sony's fine pixel fabrication technologies even further. We also adopted a new electrode structure to make HDTV imaging possible. I strongly recommend that you look into using the ICX667/ICX677 series devices to respond to market needs in the consumer digital still camera area.

Figure 1 Sensitivity and Smear Improvements Due to the New Condensing Structure

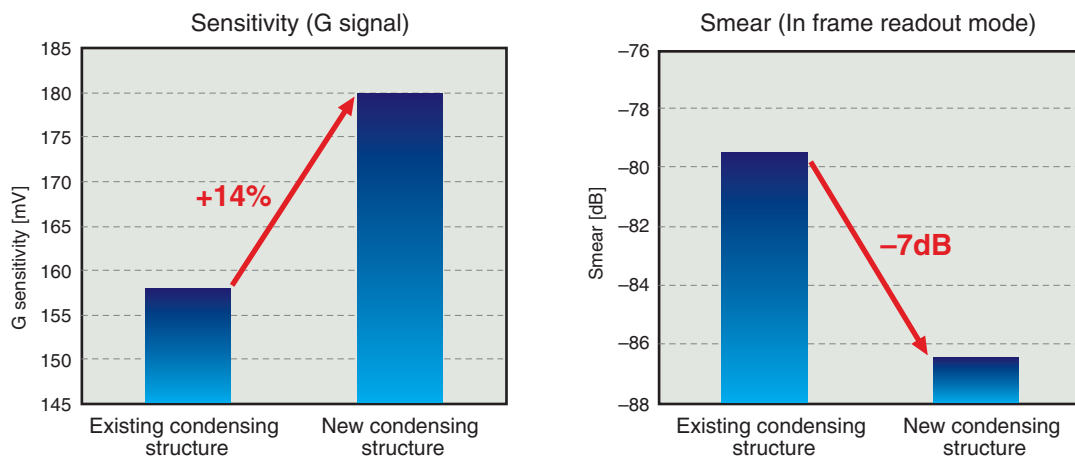


Figure 2 Vertical Transfer Clock Waveforms

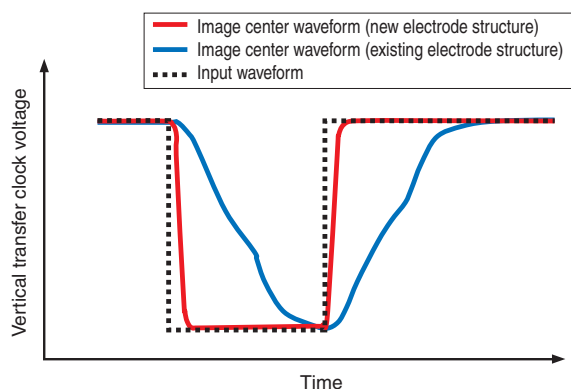


Table 1 Device Structure

Item	ICX667 Series	ICX677 Series
Image size	Diagonal 7.791 mm (Type 1/2.3)	←
Transfer method	Frame readout interline transfer method	←
Readout method	Vertical	6-field readout
	Horizontal	3-phase drive, divided into thirds
Total number of pixels	Approx. 12.39M (4077H × 3038V)	←
Number of effective pixels	Approx. 12.19M (4032H × 3024V)	←
Number of active pixels	Approx. 12.12M (4024H × 3012V)	←
Number of recommended recording pixels (Aspect ratio: 4:3)	Approx. 12.00M (4000H × 3000V)	←
Unit cell size	1.55μm (H) × 1.55μm (V)	←
Horizontal drive frequency	38MHz	←
Package	SQW: 38-pin QFN (Ceramic) SQP: 40-pin QFN (Ceramic)	SQW: 38-pin QFN (Ceramic)

Table 2 Image Sensor Characteristics

Item	ICX667 Series	ICX677 Series	Remarks
Sensitivity (G signal)	180 mV (Typ.)	←	3200K, 706 cd/m ² , 1/30 s accumulation, F5.6
Saturation signal	Frame readout mode	←	480 mV (Min.) Ta = 60°C, per pixel
Smear	Frame readout mode	←	-86.5 dB (Typ.) None when a mechanical shutter is used, V/10 method, F5.6
Frame rate	Frame readout mode	←	2.038 frame/s Number of output lines: 3024 lines
	Frame readout mode *1	←	5.728 frame/s Number of output lines: 3024 lines
	4/6-line readout mode *1	←	22.23 frame/s Number of output lines: 1008 lines
	6/12-line readout mode *1	←	30 frame/s Number of output lines: 504 lines
	4/12-line readout mode *1	←	30 frame/s Number of output lines: 504 lines
	4/24-line readout mode *1	←	60 frame/s Number of output lines: 252 lines
	4/6-line readout 720-line output mode *1	←	30 frame/s Number of output lines: 722 lines

*1 With horizontal addition

Note: These devices were designed for use in consumer digital still cameras and may not be appropriate for other applications. Contact your Sony representative for consultation when considering these products for use in other applications.