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Canon Develops 52-Megapixel CMOS Image Sensor: Q&A

Q1: What are the features of the new image sensor?

A1: The image sensor features a newly developed pixel structure that is well suited to a smaller pixel size, realizing a signal-to-noise ratio equivalent to that of SLR cameras. It is our understanding that 50 megapixels is the largest number of pixels ever to be fit on a sensor with these surface dimensions (31.6mm x 23.1 mm). The sensor enables high-resolution images to be extracted from the total image captured, making it well suited for the creation of new markets, such as inspection equipment. The sensor has a 5 x 5 random block readout mode for high-speed reading.

Q2: What problems commonly arise when the pixel size is reduced? (Including such areas as circuit design, production, image quality, etc.)

A2: Generally speaking, the following difficulties are encountered: sensitivity decreases, the dynamic range decreases, and blending of colors increases. Also, because of the increase in circuit size, there is a tendency toward media delays and slower reading times. Furthermore, due to the further demands in the area of microfabrication technology, there is also a tendency for yield rates to drop. To address these issues, we have carried out the efforts mentioned in A3 below.

Q3: What have you done to address the problems that can occur when reducing the pixel size?

A3: We reassessed the structure of the pixels and adopted a new structure that, even with a smaller pixel size, maintains sensitivity, dynamic range, and low color blending. We have also made progress in the area of microfabrication. We also reassessed the circuit block, employing innovations in the area of circuit wiring and a high speed amp to secure a readout speed on par with current speeds.

Q4: How much of an improvement was realized in terms of the accumulated charge per pixel compared with conventional CMOS image sensors (taking into account the surface area of the new sensor)?

A4: Compared with an existing product of the same image size, the new sensor achieves an increase or 50 percent.

Q5: Compared with conventional CMOS image sensors, how much of an improvement in leakage to neighboring pixels was achieved?

A5: Leakage to neighboring pixels was improved by about 10 percent.

Q6: Why did you choose to make this sensor an APS-H size instead of a full-frame 35 mm size?

A6: From a production standpoint, the APS-H size made it was easier to realize the necessary miniaturization.

Q7: Is this sensor also compatible with video?
A7: While we have only incorporated limited functionality in this sensor at this stage, depending on the specifications we use, it would be possible to adapt this sensor for video.

Q8: How far has development progressed? (Is there a prototype?)
A8: We have created a prototype and have confirmed that it is capable of capturing images.

Q9: What challenges must be overcome before you will be able to mass produce this sensor?
A9: We would need to increase the yield rate for the sensors, and make necessary adjustments to match them to the characteristics of the lenses, which would be determined by the demands of whatever application the sensor would ultimately be used for.

Q10: Compared with 10- and 16-megapixel sensors, how much more expensive would it be to manufacture this 50-megapixel sensor?
A10: That would depend on the specifications and the yield rate.

Q11: In what Canon products do you intend to use this sensor?
A11: We have still yet to determine how this sensor might be used.

Q12: What applications would this sensor be suited for in areas outside of Canon's current product lineup?
A12: Possible applications for this sensor include special surveillance cameras or industrial-use inspection equipment.

Q13: What merits would this sensor offer if used in a surveillance camera?
A13: If used in surveillance cameras, the sensor would enable users to view an overall scene while also enabling detailed close-ups from any given area within that scene.

Q14: For use in surveillance cameras, what capabilities could such a sensor offer? (For example, able to read newspaper text from a distance of XX meters.)
A14: If equipped with a lens with sufficient resolving power, in principle, the sensor could would make a car's license plate number legible from a distance of 300 meters (approx. 330 yards).

Q15: Are there any plans to market this sensor to third parties?
A15: We have still yet to determine applications for this sensor. As such, that has still yet to be decided.