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Full-frame camera sensors: a tough technology

Posted by [Stephen Shankland](#)

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Update: I added a tidbit about Nikon not manufacturing its own sensors.

Steve Hoffenberg, a camera analyst at Lyra Research, had a ready response to news that [Nikon now has an SLR, the D3, whose sensor matches the full size of a frame of 35mm film](#): "I think it's about time."

Indeed, Canon has a five-year head start in the market and, unlike Nikon, has spread the technology down from professional-level models to the enthusiast category. But it's not simple to add full-frame sensors alongside the more common SLRs with smaller sensors.

One big reason is processor expense. It's hard to generalize, because different sensors can be built with different processes and sold by different manufacturers, but one thing is clear: bigger sensors cost a lot more.

"The larger die (chips) are much more expensive, roughly in the ratio of their area," said Semico Research analyst Morry Marshall. Doing the math, Nikon's full-frame FX sensors, at roughly 36x24mm imaging area, have more than twice the surface area of a 24x16mm DX sensor. On top of that, "The larger the die, the more likely you are to have a defect."

Canon and Nikon full-frame sensors, both manufactured with complementary metal oxide semiconductor (CMOS) processes, are gigantic by the standards of the chip manufacturing industry. Canon can fit only 20 sensors onto a circular silicon wafer, and the manufacturing cost is roughly the same as a wafer that can produce many more smaller sensors.

Canon makes its own full-frame sensors, but it's not clear who exactly manufactures Nikon's. The company doesn't make its own sensors, Hoffenberg said, but Nikon wouldn't say who its partner is.

"The sensor for the D3 is an original Nikon-designed sensor, but manufacturing information beyond that is unavailable at this point," a company representative said.

Being late to the full-frame party is not without consequence. The switch to digital is almost complete for most of the SLR market, and lenses purchased in recent years for DX cameras work in a limited way on Nikon's FX-based D3. So moving up to a full frame is not a simple choice for many Nikon users.

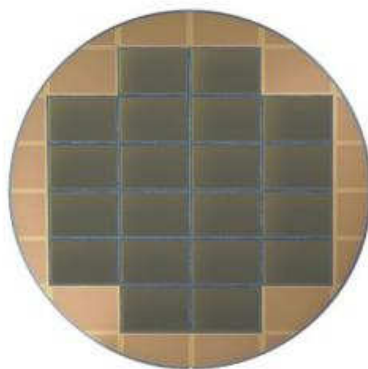
"In the formative days of digital, pro- and semi-pro photographers were demanding full-frame digitals because it would have enabled them to make the transition to digital using the expensive collections of 35mm lenses they had built up," said [one CNET reader](#). "35mm full-frame compatibility is yesterday's issue, too late to serve the original need, though such cameras will serve as a poor man's 'medium format.'"

Canon fans didn't have to wait as long for full-frame support. The company started in 2002, with the EOS-1Ds, and its newly announced EOS-1Ds Mark III is the company's third-generation full-frame professional camera. Its full-frame EOS 5D is aimed to appeal to serious amateurs.

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A silicon chip wafer from Canon can fit only 20 full-frame sensors, and there's lots of wasted real estate.
(Credit: Canon)

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I'm skeptical, but it's an interesting idea and heaps of buzzwords are involved.



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