



BY PAUL RAKO, TECHNICAL EDITOR

Three killer apps and some not-so-killer

As I visited the IEEE International Microwave Symposium last month in Boston, I saw a bright future for semiconductors and electronics. For years, pundits have been bleating about the next killer application for semiconductors. Well, I see three of them coming down the pike: smartphones, LED lighting, and solid-state drives.

In smartphones, the iPhone changed everything, driving not only phone-replacement sales, but also the entire cellular infrastructure. AT&T was astonished at the amount of data that people consumed and sent with their iPhones. This phenomenon means that we need more cellular-base-station infrastructure; more data infrastructure; more touchscreens; and a massive amount of analog for cameras, flash drivers, and all the other things an advanced phone requires. In some countries, such as India, they are passing over the laptop era and jumping straight to smartphones and their cousins, netbooks.

As for LED lighting, sure, it now pays to use it only for refrigerated coolers and 30-foot-high, difficult-to-replace architectural lighting. The semiconductor companies never cease to amaze us with the progress they make, however. Take Cree, for example. It learns about and spends on gallium nitride for its LEDs, and those resources will benefit its RF- and cellular-base-station division. Soon, LEDs will appear in general lighting, and

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that debut won't be big. It won't even be huge. It will be monstrous. If they can provide the energy savings of CFLs (compact fluorescent lights), use no mercury, and have lifetimes longer than one year, it will be all good for the environment.

The third killer app is solid-state-drive technology, which will replace many hard-disk drives, including those for operating systems and anything that needs fast, reliable, low-power, or shockproof data, such as the earlier-noted smartphone. This development does not help my analog pals too much, but there will be a mind-boggling amount of purchased, processed, and sold silicon for this application. Check out a video at www.youtube.com/watch?v=96dW0Ea4Djs to see a computer with 24 Samsung solid-state disks. Sure, it may represent \$16,000 worth of disks today, but, like

LEDs and the power supplies for them, disk prices will decrease dramatically in a few years.

So there you have it, three killer apps. Let the celebration begin. In a couple of years, there will be a boom in Silicon Valley the likes of which we have never before seen. Massive amounts of silicon need massive amounts of semiconductor machinery, so Applied Materials will be doing just fine. People say that solar power will also be a big application, for which Sunpower is in a better position than Nanosolar and all the other companies making cheap printable panels using CIGS (copper-indium-gallium-selenide) semiconductors. If you are going to pay \$20,000 for someone to put panels on your roof, they had better be 22%-efficient Sunpower panels and not 11%-efficient thin-film panels. Some people claim 19.5% efficiency for CIGS, but that figure comes from data in a laboratory setting. I will believe the technology achieves that efficiency in other settings when *Consumer Reports* reports on it or it appears in the Digi-Key catalog.

As for the whole alternative-energy thing, I predict it will fizzle for five years until gasoline prices again increase to more than \$4 and carbon taxes drive electricity prices to 25 cents per kilowatt hour, about twice those in California and 3.5 times those in West Virginia. Although Google claims to have a whizz-bang solar-thermal setup, the ecology freaks won't let us build power lines to the installation, so what good is it? The same goes for wind. Solar panels on our roofs are the most practical things we have going and are additional reasons for the boom in semiconductors and the machinery that makes them. Remember: LEDs need power supplies, and solar power needs inverters. The capacitor and inductor makers will have great futures, and, fear not: There will be a huge demand for analog engineers. **EDN**

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