RAKO STUDIOS

The system is the thing

Component companies can't ignore the forest just because they sell trees.

I recently had a long conversation with Dave Kress, director of technical marketing at Analog Devices. He pointed out that, more and more, ADI is involved in understanding the entire system design that faces their customers. By understanding the entire system they are able to solve design problems that span multiple chips and sub-circuits. Doug Bailey, VP of marketing at Power Integrations, points out that their customers expect help with thermal design and EMI (electro-magnetic interference) characterization, functions that were previously the domain of the systems engineer. System design expertise is vital to any company offering analog chips since analog design is all about tradeoffs.

Just today I spoke with Matt McKinney and Russ Rathweg of Texas Instruments about some of their dc-dc converter power parts. They stressed TI's dedication to understanding system design issues to better serve their customers. Matt mentioned that TI offers entire reference designs that solve the system power and analog signal path problems of customers using their DSPs or embedded microprocessors. Russ came to TI from its acquisition of Power Trends, a company that pioneered replacing power-hungry linear regulators with tiny switchers. Even though the switchers are more expensive, the high efficiency and small size have system-level benefits that justify their use.

My friends Bob Thomas and Steve Abe over at Cisco Systems confirm the importance of their vendors having system-level cognizance. "A vendor shouldn't just toss a part on our desk and walk away. They have to get to know our system and it's unique characteristics so they can add something special to our designs," says Thomas. Abe is an EE that works on firmware for Cisco's products. He describes how vendors that make chips are expected to help with the firmware that is necessary to initialize the chips in Cisco's unique designs. "The vendors have an intimate understanding of the chips, and we look to them to help us set up all the registers and variables to keep the chip working in our specific system environment," he notes.

In interviewing Maxim's John Scampini for my medical ultrasound article, he pointed out that some vendors would recommend amplifiers that would limit the SNR (signal to noise) of subsequent A to D stages. The output-referred noise of the variable-gain amplifiers was larger than the noise floor of the ADC that it fed. "Its an example of vendor's not looking at the whole receiver signal chain. It's a system."

Last year I had a long interview with Jim Williams, staff scientist at Linear Technology. We discussed the changing role of the applications engineer. One of Williams' primary observations is that the modern applications engineer is fundamentally a systems engineer.

The interest that semiconductor companies are taking in systems design is essential to continued innovation and success. Last year I visited Qspeed semiconductor. Their parts are faster than other silicon diodes and far cheaper than silicon carbide diodes. Yet the Qspeed parts are three times the cost of legacy slow-recovery silicon diodes. If Qspeed just thought of themselves as a diode company this would make selling parts into cost-sensitive applications very tough. Yet Qspeed looks past their two pins and sees the total impact of better performance. The improved turn-off of their part can reduce the specifications on the switching FET from 21 amperes to 12 amperes and yield a system cost savings.

Recently Andrew Smith, power marketing manager at Power Integrations pointed out that they look at the whole power system. They are designing controller chips that operate the PFC (power factor correction) section of the power system, as well as the primary isolated LC (inductor-capacitor) power stage used to make low-voltage system power. By making one part for both functions they can synchronize the sections in a way that improves performance and reduces cost.

A week prior I was visiting Ed Lam, vp of marketing and engineering at Advanced Analogic Technology. He too is looking at the entire system, from the wall plug to the final analog output. This might be the power path in a LCD television, ending in a class-D audio amplifier, or the charging system in a cell phone.

Lam observed that there are many tradeoffs in every electronic system. For example, if the power supply has a better regulator you may be able to save money in that class-D audio amplifier. Class-D amplifiers have notoriously poor power supply rejection ratios, so spending more in the power supply means you can spend less in the audio amplifier subsystem. Ed summed it up nicely: "The system is the thing." Indeed.

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