

The Changing World of Power

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Given the recent changes in the Power IC industry, it is interesting to examine the challenges and trends that have kept all of us on our toes.

A major trend in the industry that shook up the participants and helped forge a new direction for our industry was the emergence of many new players in Asia and specifically in China. Our industry benefited greatly by having a larger group of diversified IC vendors playing in the field. The new players dominated

the low end of the market providing substantially lower prices in their local markets. The resultant falling prices drove established companies to revert or convert to the most important criteria that originally made our industry strong, providing innovation and value-added products. The natural selection process took over and the companies that could innovate, as a result of this process, are emerging better companies with better products.

Another trend that changed the industry is the emergence of energy management. With the processing power increasing in computing and mobility markets, the need for a specialized power management system became apparent. The major CPU providers had to define a sophisticated power chip-set, either integrated as part of the CPUs or as companion chips, making PMICs or PMUs common names in our industry. This became the start of a transition from power conversion to power (or energy) management and a proliferation of lower voltage rails for our industry. In the past, system designers viewed power

system requirements as a black box and relied heavily on IC vendors to address their needs through discrete components. These components, for the most part, were designed for a general market and hence did not fully address the specific needs of the customer. With PMICs and PMUs, the IC designers started thinking creatively how to increase system efficiency and provide a flexible power management solution rather than increasing components' efficiency and thus energy management. By now, almost every system requires complex power management at the system level and the system designers prefer to have ICs that are flexible in order to address the changing requirements.

As a result of the above challenges and trends many diverse solutions surfaced in the marketplace. Digital Power Management, Power Modules, Complicated PMICs that integrate every conceivable functionality, and specialized components such as PoL (Point of Loads) DrMOS come to mind among others, addressing high-voltage, high-power or low-voltage, high-power markets. These solutions require expertise beyond IC Design that includes package design, wafer process design and of course system know-how. As usual, due to diverse offerings in each of these areas, confusion and frustration took over for the customer and differentiation among the solutions became a major fruitless research project. Taking digital power as an example, there are offerings that range from integration of simple supervisory functions with PWM switching regulators to integrating a full-fledged DSP and drivers.

The challenge going forward for companies is to distinguish themselves among the diversity of products. How is this achieved? Adopting customer needs as an overriding criteria for new product develop-

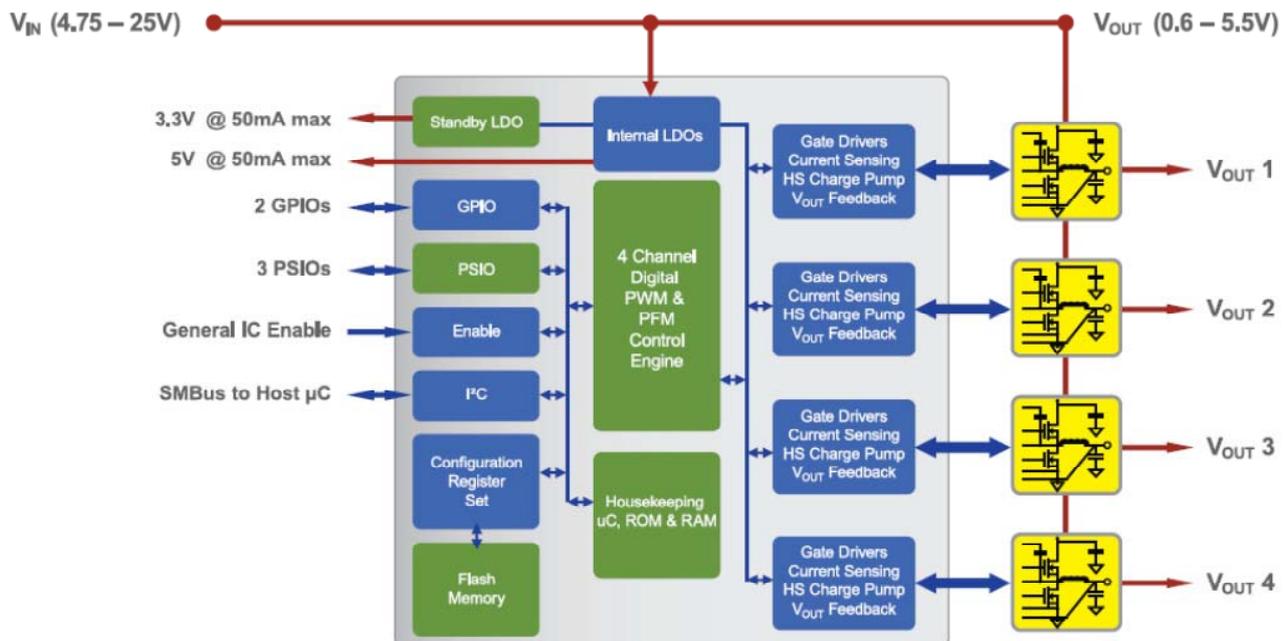


Figure 1: XRP7724, the power management block is a constant element in all designs and yet is programmable to meet a wide variety of applications

ment, allows clarity and simplicity to take over. There is no single solution that meets the requirements for everybody. There will be different solutions but all have to meet these criteria: address specific application needs, longevity beyond present generation, simple to use, and finally proper price-value point. At Exar, we have taken this to heart and have been working hard to provide solutions that add value to our customers' systems. About two years ago, Exar decided to focus its power management activities to address the three major trends: proliferation of low voltage rails, energy management, and the need for system solutions.

Exar's unique approach to energy management is summarized in our Universal PMIC, also known as Programmable Power family of products. These multi-output power system products offer a fully customizable solution through hardware and software configurations enabling local and remote monitoring and configurability, security anti-tampering, field serviceability, small board space, and upgradeability. Incorporating a proprietary control loop technology and digital interface, these products require little to no loop compensation filters and few external components as depicted in Figure 1.

Given the complex system designs and multiple issues the system designers face, many of them cannot afford to spend the necessary time on the power management design portion of the system. These designers prefer a simple-to-use solution that is confined, yet flexible to work in different versions of the system in design. The best approach for such customers is miniature modules that have the look and feel of an IC but which integrate the full PCB and external components. This is where package technology, system know-how and

power management design expertise are needed to provide a value-added solution, benefiting the customers. The newly released XRP9711 is an example of such a solution. Housed in a tiny 12x12x2.8mm LGA package, this system product has integrated MOSFETs, inductors, capacitors and resistors offering 0.6V-5.5V programmable output voltages for 2x 6A step-down outputs in addition to two additional external PWM outputs. The XRP9711 allows ultimate ease of use for designers with the flexibility and control of a universal PMIC.

On the other extreme, it is interesting that there is always a need for simple-to-use Linear Low Drop Out Regulators (LDO) in every system. No matter how many outputs we jam into PMICs, there is always a reason why we need one or more LDOs in every system due to low noise, size, or fewer external components. When ultra low input voltage, high current LDOs offer high efficiencies matching or exceeding those of switching regulators, then LDOs become much more interesting and a required item for system designers. Exar's XRP6275 offers 75mV at 2A output current, operating at ultra low voltages ranging from 1.045V to 2.5V, and is a leading product in its class and a problem solver for system designers.

As stated earlier, competition is great for the power industry. It facilitates a natural business selection process through which stronger companies surface and more advanced innovations enrich our industry. In the end, system designers will benefit by employing these innovations to offer end market solutions to better our lives.

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