

PowerSMART™ Design Tool Improves Design Flexibility and Reduces Design Time

The design tool enables the user to program the controller and optimize its performance

Designing a modern SMPS that balances key metrics such as cost and size, while meeting the design's requirements and engineering schedule can be a challenging task, even for experienced power supply design engineers. Although achieving the basic characteristics of the power supply may be relatively straightforward, there are many inherent aspects of the design that are both complex and time consuming.

By David New, Director, Product Marketing, Powervation

The use of digital control ICs for the control of power supplies is one technology that is helping designers. Coupled with an intuitive GUI-based design tool, digital control ICs are able to help to reduce design complexity, and allow greater design flexibility, while helping to reduce design time.

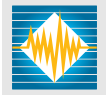
Most existing power supplies are still based on analog technology. However, new digital power management solutions are emerging from companies such as Powervation. Powervation has developed a unique architecture for single and multi-phase DC/DC converters; this system-on-chip (SoC) solutions consist of an ultra-lean proprietary dual core processor (DSP and RISC), both RAM and non-volatile memory (NVM), power conversion blocks, SMBus serial interface to support the use of PMBus™ commands, ADC and DAC, and timing sources. This mixed-signal digital power management controller, with its on-board processing power and memory, combines power management and mixed-signal functions, and is able to store and run computational algorithms in firmware. The architecture also allows the digital controllers to be extremely flexible in their configuration, and for users to easily store (in memory) a large number of parameters used in the design of switch mode power supplies – thus maximizing configuration flexibility while eliminating external components.

To unlock the power and flexibility of this architecture, Powervation has developed a graphical user interface (GUI) based design tool called PowerSMART™, the Setup, Monitor, And Reporting Tool for the design of digital power converters. Users of PowerSMART quickly realize the advantages over traditional solutions based on analog controllers and external programming components. As programming of Powervation's controllers is managed via a digital interface (over the SMBus lines), the controller is not "pin limited" and does not require the use of external programming components. From the user's point of view, more features are accessible, they no longer need to add/change external programming components during the design phase, and with PowerSMART's GUI-environment, coding, calculations, and design tool specific training are eliminated.



The PowerSMART tool allows users to communicate with and configure the Powervation digital power control ICs (e.g., PV3012) from PC & MAC platforms using a standard USB connection. The design tool enables the user to program the controller and optimize its performance, while carefully monitoring key power supply status parameters. Users may use the tool to make simple point-and-click or numeric entry changes to parameters and quickly configure/power-up the power supply. Additionally, users may take advantage of its advanced settings to access more than 60 parameters (including switching frequency, phase add/drop transition points, VOUT level, and protection and fault limits) and finely tune the features to their specific needs within the GUI environment, with precision and flexibility beyond that of hardware programmed analog-based solutions.

The GUI-based design tool can connect and control multiple devices in a system concurrently (addressing support for up to 112 devices). For a single device used in a single- or dual-phase converter, users will utilize the Single Mode feature of the design tool. The PowerS-



MART design software also provides a System Mode feature where multiple Powervation devices can be used in parallel to control a multi-phase converter (e.g., 6 phases), and multiple Powervation devices can be used within a common platform to provide power management for multiple rails and the sequencing of these rails.

The framing of the GUI display provides status and fault indicators that are available to the user at all times. The main PowerSMART display page has been designed to provide a heads-up view of VOUT, VIN, and IOU against a time axis, so that users may view these key parameters the way engineers typically see them displayed on today's popular digital oscilloscopes. Additionally, the Monitoring indicator box on the main page summarizes, numerically, the current telemetry information for temperature (IC and external sensors), current, and voltages, giving the user easy access to this data for both design and debugging activities.



During the design stage, the GUI-environment allows users to easily select and program the desired parameters, while helping users fully utilize the capabilities of our digital controllers without coding or training. From engineers that desire to use the tool's automatic setup, to users that need advanced optimization and access to dozens of parameters, the software supports a wide range of users. Additionally, Powervation's control ICs, such as the recently-launched PV3012, are equipped with Powervation's Single Pin CONFIG™ technology that provides the user access to eight configuration tables, or profiles, within the IC's non-volatile memory. Each of the eight configuration tables can be configured within the tool, and allows the user access to more than 60 parameters (e.g., VOUT settings, switching frequency, slew rate, VOUT tracking, protection feature set-points, master/slave, etc.) that may be used when designing a power supply. Using the device's on-board configuration profiles allows a single controller to be used in up to eight converters, and eliminates the need to configure the part through PMBus or via multiple external programming components. The PowerSMART tool provides users flexible access to this feature, and many more, in a simple and intuitive environment, that has been designed to be usable for engineers new to digital power, as well as those already well on their way.

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