



MPS's Fully Integrated Power Modules Boost Cloud Computing

In recent years, the artificial intelligence (AI) and big data industries have rapidly innovated and developed 5G communication technologies, Internet of Everything (IoE), and the intelligent world. For cloud computing applications in particular, the demand for quick data processing across datacenters and private servers has reached unprecedented heights. To meet future demands for these applications, major manufacturers have introduced hardware acceleration systems based on graphics processing units (GPUs), field programmable logic gate arrays (FPGAs), and application-specific integrated circuits (ASICs).

The requirements for computing acceleration chips are constantly increasing, and designers must create hardware for integrated power products that provide fast responses, high efficiency, and excellent scalability. To address the pain points of cloud computing, MPS provides comprehensive power solutions focused on high-current, multi-output applications. [MPS power modules](#) also meet four major development trends: agility, efficiency, integration, and scalability.

MPS's unique constant-on-time (COT) and multi-phase constant-on-time (MCOT) control methods can achieve agile response under large dynamic loads. Agile response greatly reduces the number of output capacitors, which lowers BOM cost. Figure 1 shows four [MPM3695-100](#) devices operating in parallel to provide a 12V input, 0.75V output, 0A to 250A load, and large dynamic switching at 100A/μs. This device provides ultra-fast transient response and achieves a ±3% output voltage offset. The quick response resolves the tradeoff between input voltage accuracy and the large dynamic current that results from load switching calculations.

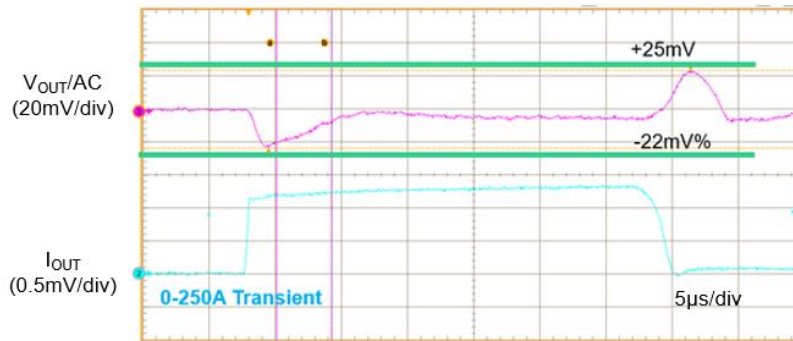


Figure 1: The MPM3695-100's Agile Response under Large Dynamic Loads

MPS's monolithic, multi-output designs can be combined with advanced packaging technology to create highly integrated, compact solutions to reduce any system's footprint and cost. With the widespread use of artificial intelligence, hardware acceleration chips continue to integrate more functional components, such as high bandwidth memory (HBM), analog-to-digital converters (ADCs), and acceleration engines. However, additional integration poses new challenges, since different components may have different input power, voltage, and current requirements. Using multiple discrete power supply chips or modules significantly increases the PCB area, which complicates an already complex design.

To meet these challenges, MPS has introduced a variety of multi-output power modules that act as fully integrated modules with advanced packaging technology. Figure 2 shows the [MPM82504](#), the industry's first four-way power supply module. This device is a 25A power supply module that can be paralleled with multiple MPM82504 modules to provide up to 800A of output current.

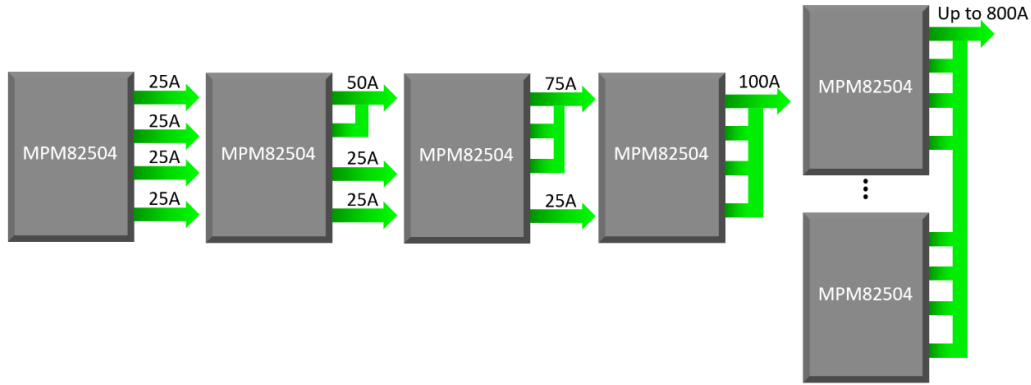


Figure 2: The MPM82504 Provides Flexible Output Combinations

To cover a broader range of applications, MPS has a variety of fully integrated, multi-output power modules, including dual-output and quad-output products. Figure 3 shows specifications for certain output modules, including the dual-output MPM3690 series: the [MPM3690-20A](#), [MPM3690-30B](#), [MPM3690-20B](#), [MPM3690-30A](#), [MPM3690-50A](#), and [MPM3690-50B](#). Quad-output options include the [MPM81204](#) and [MPM54304](#). The MPM3690 series features three output specifications and dual EN/PG pins for timing control. The MPM81204 features dual 12A and dual 5A outputs with high-speed dynamic response and simple external components, which makes it well-suited for use in 5G signal transceivers. The MPM54304 is the first power module with a digital power management function, and it was awarded "Power Management/Voltage Converter of the Year" at the 2019 Double Summits organized by AspenCore. The [MPM54504](#) is another high-performance module from this series, and is a four-way 5A power module with excellent load and line regulation across a wide input range.

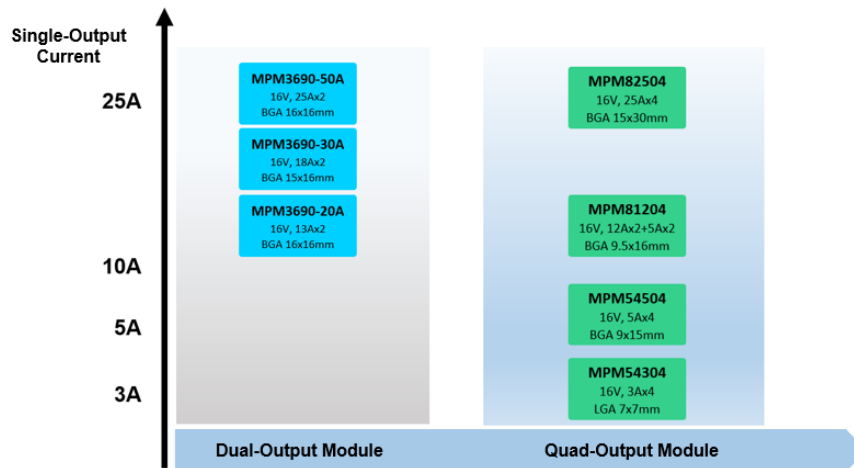


Figure 3: MPS Multiple Output Power Module Specifications

Paralleling multiple power supply modules provides scalability. A single-module solution may not meet the current demands for accelerated chips, so paralleling modules allows designers to quickly meet various manufacturer demands. Acceleration hardware manufacturers are often forced to redesign power solutions based on the supply currents and voltage rails of individual acceleration chips, which increases time-to-market and overall cost. To eliminate this issue and accelerate hardware design, MPS introduced a variety of scalable power modules that use multiple parallel outputs to enable the output current.

A notable example is the aforementioned [MPM3695-100](#), which supports a wide range of system requirements. As a single module, the device can provide 100A of output current; with two modules in parallel, it can provide 200A, and is scalable up to eight times for a total 800A of output current. Figure 4 shows the application when eight MPM3695-100 devices work together.

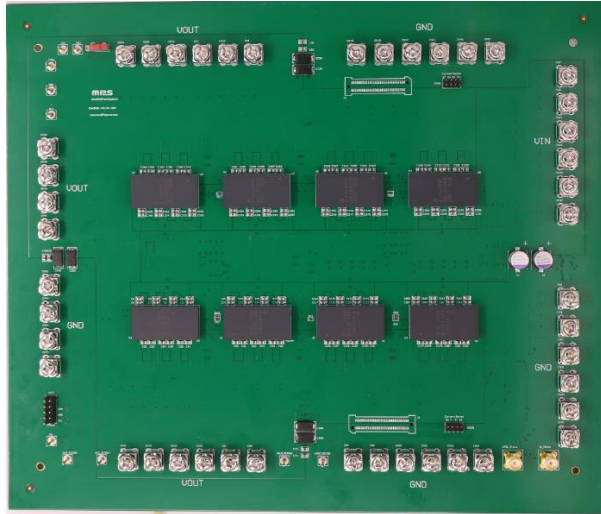


Figure 4: Eight MPM3695-100 Modules in Parallel Deliver 800A

[MPS power modules](#) present unique advantages that help designers develop highly integrated, scalable, and efficient solutions. As a world-leading semiconductor supplier, MPS fulfills the specific requirements of cloud computing hardware acceleration to create power module solutions capable of handling all voltage and current ranges in power supply systems.