MPS's Isolated Medium- and High-Power Power Supply Products

Development Trends in Power Products

Our lives are undergoing tremendous changes amidst the emergence of carbon neutrality, 5G, artificial intelligence (AI), and big data. The advent of the 5G era has transformed the design concepts of many power supply products, in that it has significantly increased the demand for medium- and high-power power supplies.

Due to the increase in data traffic, communication frequency, and transmission power, 5G base stations are relying on more and more power supplies. In addition, 5G has a shorter transmission distance when compared to 4G, which means that we need more 5G base stations to provide the same coverage.

When paired with the need for additional base stations, the growing power demands of 5G mean that power products need to provide a higher power density, more compact packaging, and smarter control strategies. To guarantee safe operation, these products must also meet more stringent requirements to obtain security certifications. Meanwhile, the goal for carbon neutrality calls for constant innovation in numerous applications, such as charging piles, electric vehicles, photovoltaic and wind power generation, and servers.

MPS's Isolated Power Supply Products

In view of these shifting design concepts for power supply products, MPS has launched a series of chips for medium- and high-power applications, aiming to provide the industry with efficient, simple, and reliable choices.

Figure 1 shows a complete power conversion solution for a 3kW application with an input voltage (V_{IN}) range between $85V_{AC}$ and $265V_{AC}$, an output voltage (V_{OUT}) of 48V, and a totem-pole PFC. This solution uses products such as the MP18831, an isolated gate driver; the MPF32010, a PFC controller; and the MCS1802, an isolated current sensor. The collaborative design of these devices enables the solution to achieve a power density of $2.14W/cm^3$ with an overall conversion efficiency of 96%.

Figure 1: MPS Solution for 3kW Power-Level Isolated Power Supply

The MP18831: Isolated Gate Driver

The MP18831 is an isolated half-bridge gate driver with up to 4A peak current capability. This device uses MPS's proprietary high-voltage capacitive isolation technology to provide up to a 5kV isolation withstand voltage and 100kV/μs common-mode transient immunity (CMTI). It also features a 30V output power supply and a transmission delay as short as 50ns. The MP18831 can drive various types of power switching devices with a short propagation delay and low pulse-width distortion. It is available in a narrow-body or wide-body SOIC-16 package (SOIC-16NB or SOIC-16WB, respectively), or an LGA-13 (5mmx5mm) package.

Figure 2 shows the typical application circuit of the MP18831.

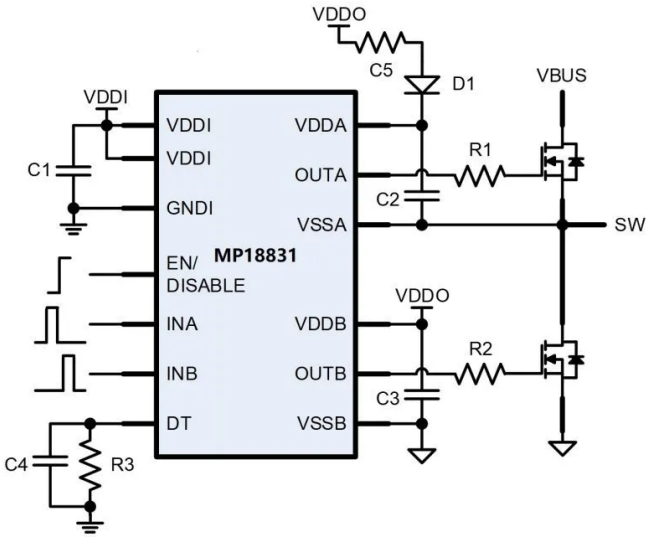

Figure 2: MP18831 Typical Application Circuit

The MPF32010: PFC/LLC Controller

In terms of integrated controllers, the MPF32010 is a PFC totem-pole digital controller for AC/DC power conversion. The totem-pole topology uses active switching tubes to replace diode rectifiers in a dual-boost topology. This configuration increases overall efficiency. Moreover, the MPF32010 integrates the entire control loop and allows the user to fine-tune totem-pole operation through a user-friendly graphic user interface (GUI). This flexibility simplifies the totem-pole design. In addition, the X can be controlled an configured through an RS-485 bus. Robust protections include overload protection, over-current protection (OCP), over-voltage protection (OVP), and over-temperature protection (OTP).

Figure 3 shows the MPF32010's integrated control loop.

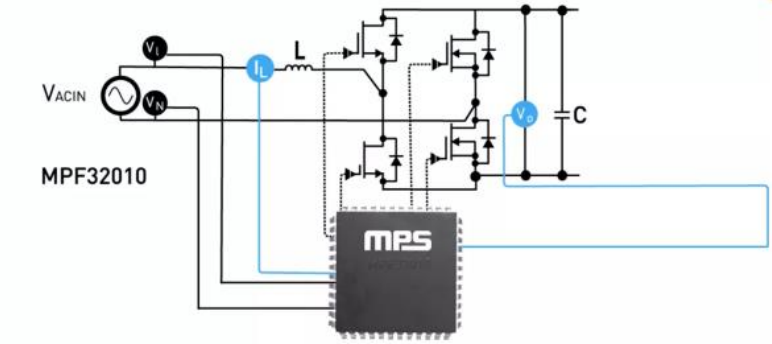

Figure 3: MPF32010 Integrates Entire Control Loop

Other Isolated Power Supply Modules

MPS has also introduced separate isolated power supply modules, including the MID1W0505A-2. The MID1W0505A-2 is a semi-modulated, isolated DC/DC converter that supports input voltages between 4.5V and 5.5V, and up to 1W of output power (P_{OUT}) across a -40°C to +125°C operating temperature range, with excellent load and linear regulation.

The MIDW0505A-3 is another isolated DC/DC converter that supports a $3kV_{DC}$ isolation voltage and integrates power MOSFETs, transformers, and feedback circuit onto a single chip. Compared to traditional isolated power modules, the MIDW0505A-3 provides a more compact solution and reliable operating performance.

Figure 4 shows the typical circuit of these power supply modules.

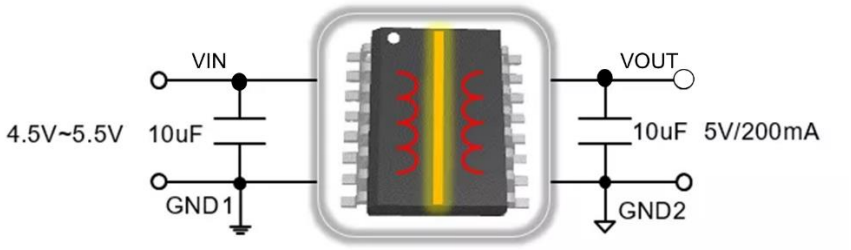

Figure 4: MID1W0505A Typical Circuit

Conclusion

MPS continues to launch reliable and efficient products for medium- and high-power power supply applications. This article introduced a variety of devices, such as a totem-pole PFC controller, isolated power supply module, and an isolated current sensor. The broad selection of MPS products helps power designers advance power supply solutions with improved performance and response, in addition to smaller size, lower cost, and shorter development cycle.