

CBRDFA4-100 Ideal Applications Low Profile Power Bridge Rectifier

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Introduction

The Central Semiconductor CBRDFA4-100 features the most groundbreaking technology in any discrete rectifier. This full-wave bridge rectifier utilizes Central's low profile surface-mount BR DFN-A package, which both saves space and offers remarkable thermal efficiency. Bridge rectifiers are lower cost and lighter in weight as compared to center-tapped full-wave rectifiers, and despite these benefits, do not sacrifice performance. Additionally, a diode bridge minimizes the ripple voltage that results from rectification compared to a less expensive half-wave rectifier, resulting in increased energy efficiency. With a forward voltage of 1V or less, Central's CBRDFA4-100 wastes less power than competitors' devices, and the 1000V, 4A rating makes it ideal for high power circuits.

Low Profile Power Supply

Switched-mode power supplies have largely replaced older linear power supplies due to their lower profile and lighter weight. These advantages are derived from the implementation of a transformer (a requirement of any power supply). In linear power supplies, the transformer steps down the voltage directly from the mains (60Hz in the US), which requires a heavy iron core. Switched-mode power supplies, however, take advantage of pulse-width modulation (PWM) to create a much higher frequency AC signal (typically above 20kHz), and voltage can be stepped down with a much smaller, lighter weight transformer. Central's CBRDFA4-100 provides the initial rectification before the signal is passed through the PWM-controlled power MOSFET. The optocoupler provides feedback to the PWM controller, adjusting the duty cycle (and therefore the output voltage) as needed to produce a constant voltage at the load.

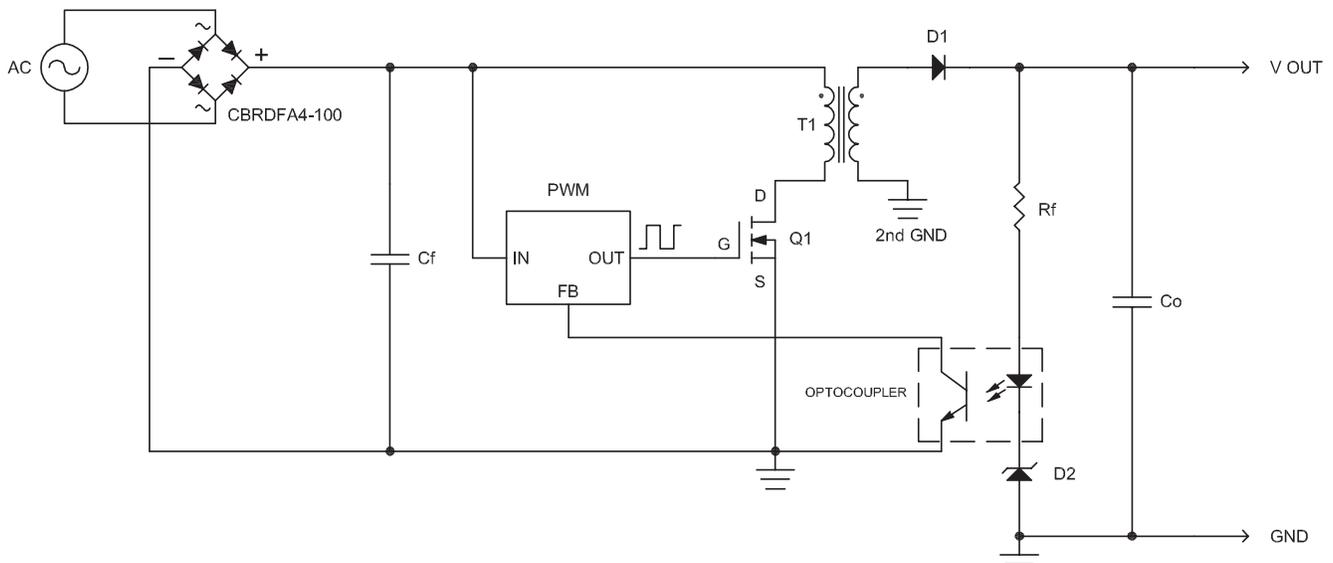


Figure 1:
Low Profile Switched-Mode Power Supply



Fast Charger

The fast charger of a smartphone must be capable of delivering a high current (~3A) while remaining at a relatively low voltage (~5V), for total power of about 15W. This gives a very similar circuit to a linear regulated power supply, except with an LM338 as a voltage regulator. Since standard USB-3 only supports up to 2.5W, one of several fast charging protocols must be implemented in the cable, such as USB Power Delivery (USB-PD), which supports up to 100W. An LED is included as a power indicator, though this is not always required. Central's CBRDFA4-100 is able to handle the high current requirements of a fast charger, supporting current up to 4A.

Lithium-ion batteries used in smartphones have a two-phase charging cycle. The first phase is constant current with rising voltage, followed by constant voltage with falling current. Fast charging takes advantage of the first stage, pumping as much current as possible with a relatively low voltage.

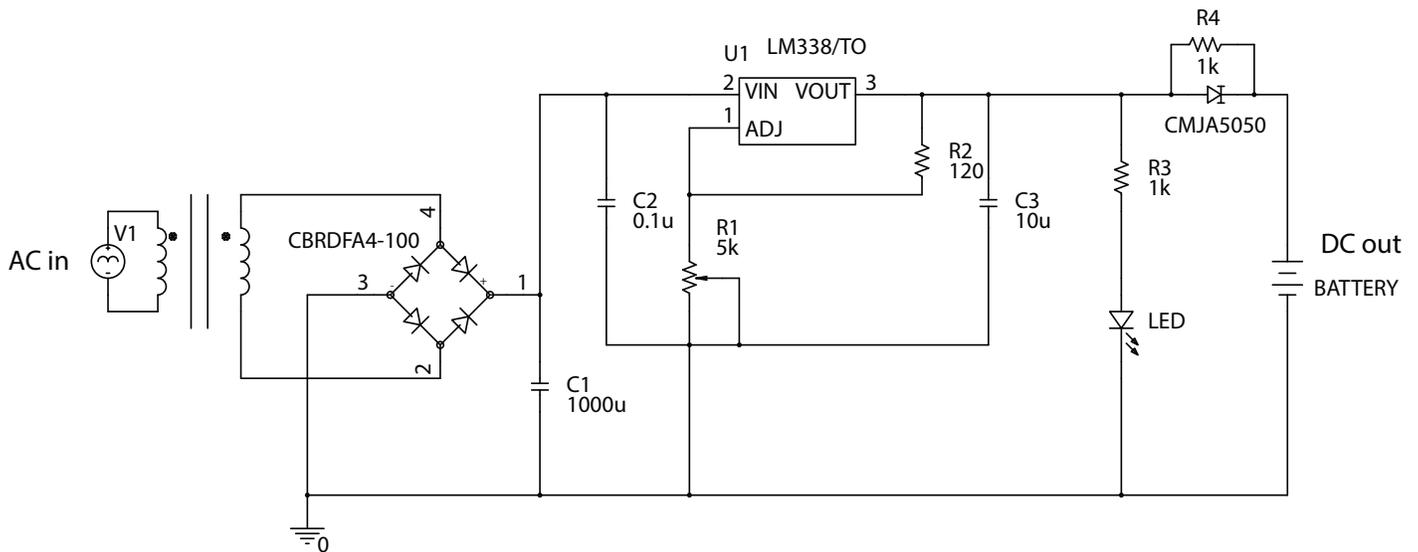


Figure 2:
Fast Charger

Conclusion

Despite the fact that the U.S. power grid carries 120V AC, nearly every electronic device relies on DC for its internal operation. This makes effective rectification paramount when interfacing between the mains power and the device in question. Central's CBRDFA4-100 provides the advantages of a full diode bridge rectifier with the convenience of a single, low profile discrete device.









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