

560V Input, No-Opto Isolated Flyback Converter

Design Note 559

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Introduction

In traditional isolated high voltage flyback converters, tight regulation is achieved using opto-couplers to transfer regulation information from the secondary-side reference circuitry to the primary side. The problem is that opto-couplers add significant complexity to isolated designs: there is propagation delay, aging, and gain variation, all of which complicate power supply loop compensation and can reduce reliability. Moreover, during start-up, either a bleeder resistor or high voltage start-up circuit is required to initially power up the IC. Unless an additional high voltage MOSFET is added to the start-up components, the bleeder resistor is a source of unwelcome power loss.

The **LT[®]8315** is a high voltage flyback converter with an integrated 630V/300mA switch. The LT8315 eliminates the need for an opto-coupler, complicated secondary-side reference circuitry, additional start-up components, and an external high voltage MOSFET.

Performance and Simplicity

The LT8315 integrates a 630V MOSFET and control circuitry inside a thermally enhanced 20-pin TSSOP package with four pins removed for high voltage spacing. By sampling the isolated output voltage from the third winding, no opto-coupler is required

for regulation. The output voltage is programmed with two external resistors and a third optional temperature compensation resistor. Boundary mode operation helps to achieve excellent load regulation. Because the output voltage is sensed when the secondary current is almost zero, no external load compensating resistors and capacitors are needed. As a result, the LT8315 solution has a low component count, greatly simplifying the design of an isolated flyback converter.

Figure 1 shows the complete schematic of a flyback converter with a wide input range from 20V to 450V. It has a 12V output and maintains tight regulation with a load current from 5mA to over 440mA. The output current capability increases with input voltage, the output current could reach 440mA when the input voltage exceeds 250V. This flyback converter has 85% peak efficiency. Even with no opto-coupler, load and line regulation remain tight, as shown in Figure 2.

Internal Depletion MOSFET for Start-Up

The LT8315 features an internal depletion mode MOSFET, which has a negative threshold voltage and is normally on. At start-up, this MOSFET charges the INTV_{CC} capacitor to 12V so that the LT8315 has

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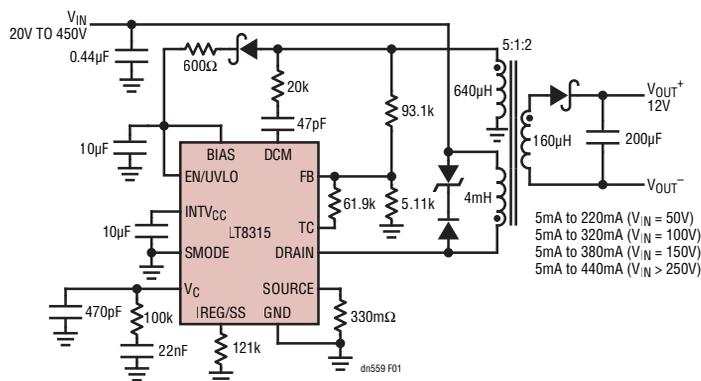


Figure 1. A Complete 12V Isolated Flyback Converter for a Wide Input from 20V to 450V

