Soft-Switching Dual-Flyback DC–DC Converter With Improved Efficiency and Reduced Output Ripple Current

Introduction:

The advantages of galvanic isolation, design simplicity, and a simple control technique, a flyback converter are the most popular topology for dc–dc and ac–dc converters. However, there are some drawbacks such as voltage spike ringing on a switch at turn-off state (because of the resonance between the transformer leakage inductance and the parasitic output capacitance of the switch) and hard switching loss at turn-on state.

Eventually, the switch voltage stress becomes as high as the sum of the input voltage, the reflected output voltage, and the voltage spike on the switch.

Existing system:

Two-switch pulse-width-modulated (PWM) flyback converters are introduced. By using two clamping diodes, switch voltage is clamped to input voltage and leakage inductance energy is recycled to input source. In addition, to achieve zero-voltage-switching (ZVS) turn-on of the switch, an additional lossless snubber circuit is adopted. Another solution for recycling the leakage inductance energy is using an active snubber circuit. In, a half-bridge flyback converter is presented for satisfying both switch voltage clamping and ZVS operation.

In, an adaptive snubber circuit is introduced to extend the parasitic output capacitance of the switch, and the Converter is operated in the critical conduction mode (CRM) for near-ZVS operation. The operation in CRM minimizes the turn on
switching loss of the switch because the mosfet turn-on occurs exactly in the valley of the drain–source voltage oscillation between a transformer inductor and a parasitic output capacitor of the switch. Nevertheless, there is a small switching loss in the switch since it is not a full-ZVS operation.

**Dis-advantages:**

- Conduction loss.
- Low efficiency.

**Proposed system:**

A soft-switching dual flyback dc–dc converter with a inductor–capacitor–diode (LCD) snubber. improved efficiency and reduced output ripple current is proposed with However, for the proposed converter ,the leakage inductance energy is directly stored in an input source and a dc-bus capacitor. Then, this energy is reprocessed by a dual-flyback dc–dc module. Since there is only one conduction path, the conduction loss in the reprocessed leakage inductance energy is minimized. When transferring the input power on primary side to secondary side, the input power energy is equally divided between two coupled inductors and transferred to the load because both the coupled inductors are designed to be equal.

Hence, the RMS loss in each coupled inductor is reduced. In addition, by turning the self-driven SR OFF after a short delay, a main switch is turned ON under the ZVS condition as a result of the differential current via the two coupled inductors. The output ripple current is also lower than that of the conventional flyback dc–dc converter, because of the continuous current in the secondary side.
Advantages:
- The reprocessed transformer leakage inductance energy was maximized because there was only one snubber current path.
- The high efficiency and reduced output ripple current conditions.

Applications:
- ZVS applications.
- Power conversion applications.

Block Diagram:

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Dc input → Dual Flyback DC-DC converter → Load

12VDC

Gate driver circuit

5VDC

Buffer circuit

Microcontroller circuit
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