

Synchronous Rectifier Spike Reduction During Continuous Conduction Mode Operation of a Power Converter

Summary of the Idea

An active switch Q_{AUX} is used to reduce the voltage spike on a synchronous rectifier (SR) Q_{SR} which may occur during continuous conduction mode (CCM) operation of a power converter. The use of the active switch Q_{AUX} also provides zero voltage switching (ZVS) for the turn-on of the primary switch Q_1 and reduce primary side switching losses.

Description

Flyback power converters experience a voltage spike on the synchronous rectifier Q_{SR} during CCM operation. The voltage spike is challenging to snub as well as very lossy. An active switch Q_{AUX} is used to reduce the voltage spike and also used to provide ZVS for the turn-on of the primary switch Q_1 .

The active switch Q_{AUX} is turned ON briefly prior to turning on primary switch Q_1 . When active switch

Q_{AUX} is turned ON, the voltage on the output winding node FWD rises to the voltage of capacitor C_{AUX} .

As shown in FIG. 1, the capacitor C_{AUX} is coupled across the output winding node FWD and the output voltage V_O .

As shown in FIG. 2, the capacitor C_{AUX} is coupled across the output winding node FWD and output return GND.

With the greater voltage on output winding node FWD, the output capacitance C_{OSS} of primary switch Q_1 discharges. As such, the primary switch Q_1 can be turned ON once the voltage across the primary switch Q_1 is near zero to facilitate ZVS. The gate drive signals of the auxiliary switch Q_{AUX} and the primary switch Q_1 can be briefly overlapped once the primary switch Q_1 is turned on.

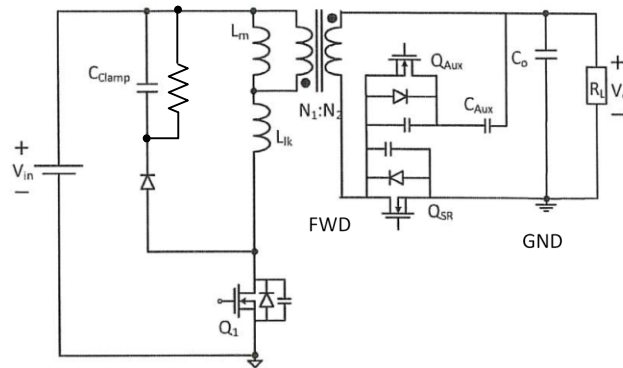


FIG. 1 illustrates the capacitor C_{AUX} coupled between switch Q_{AUX} and output voltage V_O .

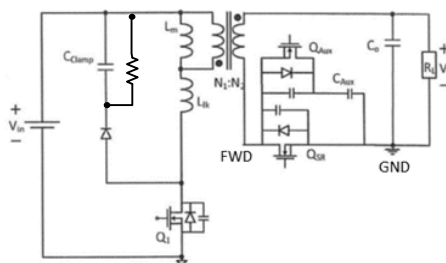


FIG. 2 illustrates the capacitor C_{AUX} coupled between switch Q_{AUX} and output return GND.