Implementation of New Driving Circuit for Forward Converter Synchronous Rectifier

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ABSTRACT

This thesis proposes a new method of secondary side synchronous rectifier driving circuit in a DC-DC forward converter. In variation input voltage, the proposed circuit can keep the pulse amplitude of driving voltage to prevent the Power MOSFET damaged by surge voltage. Also, it will decrease switching loss, driving loss and increase efficiency of the converter. Furthermore, comparison the variation signal of current in primary side with the reference voltage of detecting circuit, the converter will be rectified by the body diode of Power MOSFET to decrease the dissipation at light load, and prevent the surge voltage to damage Power MOSFET when input power is turned off. This paper analysis the side effect of using synchronous rectifier in secondary side, and introduces the principle of the novel synchronous rectifier driving circuit, then using simulation and achieving a 150W DC-DC converter to verify the effectiveness of proposed circuit. According to the experimental results, the proposed method can hold the driving voltage between 6VDC to 8VDC, and to improve the full load efficiency up to 1% and light load efficiency up to 28.8% when input voltage is 36VDC. In addition, the power dissipation has reduced from 7.5W to 2.1W at no load.

Keywords : Forward Converter ; Synchronous Rectifier Driving Circuit ; Detecting Circuit

Table of Contents

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