

AN IMPROVED ZERO VOLTAGE TRANSITION SYNCHRONOUS BUCK CONVERTER FOR PORTABLE APPLICATION

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Abstract

A novel active auxiliary circuit that allow the power switch in the pulse width modulated synchronous buck converter to operate with zero-voltage switching is proposed in this paper. The proposed zero-voltage transition (ZVT) PWM synchronous buck converter, is designed to operate at low output voltage and high efficiency typically required for portable systems. To make the DC-DC converter efficient at lower voltage, synchronous converter is an obvious choice because of lower conduction loss in the diode. The main feature of the auxiliary circuit is that the auxiliary switch can operate with zero-current switching turn-on and turn-off without increasing the peak current stresses of the main switch. Additionally, the resonant auxiliary circuit designed is also devoid of the switching losses. An analytical study of the proposed converter with the auxiliary circuit is presented in detail, and general guidelines for the design and implementation are given. The analyses have been verified with simulation and experimental results. The suggested procedure ensures an efficient converter.

Keywords: Zero voltage transition, Zero voltage switching, Zero current switching, active auxiliary circuit, resonant circuit

Subject: Switch-Mode Power Supply