

# **ANALYSIS, DESIGN AND IMPLEMENTATION OF ZERO-CURRENT-SWITCHING RESONANT CONVERTER DC-DC BUCK CONVERTER**

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## **ABSTRACT**

This paper presents a Buck type circuit structure, the designing of ZCS resonant Buck converter and analysis of the working principles involved. The designed buck converter uses ZCS technique and the function is realized so that the power form is converted from 12V DC to 5V DC (1A). A detailed analysis of zero current switching buck converters is performed and a mathematical analysis of the mode of operation is also presented. In order to reduce the switching losses in associated with conventional converters; resonant inductor and resonant capacitor (LC resonant circuit) is applied which helps to turn on-off the switch at zero current. The dc-dc buck converter receives the energy from the input source, when the switch is turned-on. If the switch is turned-off the LC resonant circuit pumps the energy by ensuring that the current does not come to zero. During the hardware implementation  $T_{on}$ ,  $T_{off}$ , duty cycle & operating frequency values were determined and thoroughly tuned through the NE555 IC circuit. As a result of this various waveforms across capacitors, inductors and load resistor were observed. A simulation study was carried out and the effectiveness of the designed converter is verified by PSpice simulation results.

**KEYWORDS:** Dc-Dc Buck, ZCS, Resonant Converter, MOSFET, Timer, Simulation