

## Efficiency Optimization of Supercapacitor Assisted Low Dropout (SCALDO) Regulators

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### Abstract

This study was primarily focused on presenting a novel method to enhance the efficiency of Supercapacitor Assisted Low Dropout (SCALDO) regulators. The main objective was to study SCALDO regulators under a specifically controlled condition where supply voltage is less than twice of the required minimum voltage for Low Dropout (LDO) regulators. Furthermore, design modifications to the switching controlling algorithm were performed to optimize number of capacitors with respect to the supply voltage in order to enhance the efficiency of SCALDO regulators. It was theoretically proven that the efficiency decline can be successfully reduced by varying the number of capacitors connected, according to the supply voltage and the minimum input voltages. The theoretical efficiency calculated for the proposed SCALDO technique falls within 81.5% - 88% range, which is well above the previously reported values. This was verified experimentally with the prototype developed using 2.7 V, 10 F supercapacitors, 5-3.3 V LDO.