

# Double-Input Triple-Output Non-Isolated DC-DC Converter Based on Coupled-Inductor with High Stepped-Up Output Voltages

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## Abstract

This paper introduces a new non-isolated double-input triple-output (DITO) high voltage gain DC-DC converter with a wide range of applications, including hybrid voltage source systems, solar home appliances, dc bus power distribution systems, and electrical vehicles (EV). The proposed DITO converter interfaces two hybrid voltage sources to supply three different output loads with varying voltage and power levels. Compared to conventional converters of the same type, the proposed DITO converter offers several advantages, including operation for all duty cycles, integration of hybrid energy sources to transfer power to multiple loads, high voltage conversion ratio for all three output ports, a higher ratio of total voltage gain to total components number, common grounded input and output DC ports, simultaneous DC voltage regulation of three output ports by tuning separate controlling parameters of duty cycles, an additional turn ratio of coupled inductors to increase the voltage gain of output ports, and medium voltage stress on switches. The proposed DITO converter utilizes a new single-switch single-coupled-inductor DC-DC structure, which is analyzed and verified through a prototype implementation for 25V and 30V input voltages and 210V, 330V, and 400V output voltages with a total power of 480W. The experimental results confirm the simulation results and theoretical analysis.

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