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Abstract

This paper proposes a high-performance transformer less single-stage high step-up ac–dc matrix converter using a Cockcroft–Walton (CW) voltage multiplier. Employing an eight unidirectional-switch to form four bi-directional switch matrix converters between the ac source and CW circuit, the proposed converter provides high quality of line conditions, adjustable output voltage, and low output ripple. The matrix converter is operated with two independent frequencies. One of which is associated with power factor correction (PFC) control, and the other is used to set the output frequency of the matrix converter. Moreover, the relationship among the latter frequency, line frequency, and output ripple will be discussed. A commercial

control IC associating with a pre-programmed complex programmable logic device is built as the system controller. The operation principle, control strategy, and design considerations of the proposed and modified converter are all detailed in this paper. The simulation results demonstrate the high performance of the proposed and modified converter and the validity for high step-up ac–dc applications.

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