

A Bipolar SEPIC Converter with Wide Output Voltage Range

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In order to pursue a perfect inverter, a new inverter technology is designed based on SEPIC converter that can efficiently generate pure sinusoidal waveforms and operate in a wide range of loading conditions. The groundbreaking design of the new inverter is that, for the first time, the number of high-frequency switching-transistors is reduced to one. By changing the switching frequency and duty cycle for the switch, the voltage-level of the output signal will be continuously controlled to produce a nearly pure sinusoidal waveform, and the voltage-level can reach infinity without using any switch map in theory. In order to achieve the DC to AC conversion, inverting the polarity and the boost operation for the output voltage are the two main problems in the process of achieving this goal.

To proof the possibility of the new inverter technology, a research for a bipolar SEPIC converter is firstly proposed in order to achieve the voltage polarity inversion and the boost operation. The research basically use a diode to regulate the current direction that goes through the load. By changing the direction of the diode, the polarity of the output voltage can be inversed. For the boost operation, a simulation setup in Simulink and some actual tests have been used to find out the sizes for each elements in the circuit that can boost the output voltage of the converter to 110V at a specific frequency and duty cycle of the only switch. The result of the research had showed that this converter not only had the capability to provide a very wide output voltage ranges and power levels, but also can generate output voltage and power levels for positive and negative polarities.

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