

# **New Conceptual High Efficiency Sinewave PV Power Conditioner and Its Extended Bidirectional Topology**

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## **Abstract:**

In recent years, the latest feasible development for high efficiency, high power density, cost effective solar photovoltaic generation system for residential and DC power grid applications has attracted global environmental interest. Practical cost effective requirements of higher efficiency, reduced physical size and weight for small scale stand-alone or utility interactive sinewave power conditioners, has resulted in the development of a new concept power conditioner based on a unique power electronic circuit controller.

This presentation is of a new concept circuit topology with a high efficiency single-phase sinewave PV power conditioner with a compact intermediate film capacitor DC link stage. It consists of a time-sharing partial sinewave absolute pulse width modulated boost converter with an auxiliary bypass diode in the first power stage and a time-sharing partial sinewave pulse width modulated polarity changing full-bridge inverter in the second power stage utilizing a dual mode pulse pattern control scheme. This unique operating principle using two power processing stages with a time-sharing dual mode sinewave modulation scheme is described in a design example. The operating principle of this novel single-phase sinewave power conditioner for a solar photovoltaic generation system is presented through experimental results together with its control processing scheme. Additionally, the extended bidirectional power delivered from this proposed unidirectional power conditioner is described for battery/electric double layer capacitor (EDLC) charging and discharging applications.