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Intellectual Property Status:

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Transformer-less Photovoltaic Inverter

AzTE Case # M12-228P

Background

Current inverters for solar power systems are prone to failure and the leading cause of malfunction in solar systems. It is desirable to use transformer-less topologies that are more reliable and longer lasting. Using inverters that do not contain transformers results in higher efficiencies, significantly lower size, weight, cost, and complexity. Many transformer-less inverters face the problem of large capacitive ground currents impeding the flow of electrons through the system. Another common problem affecting current PV inverters is their use of notoriously unreliable electrolytic capacitors.

Invention Description

This invention overcomes the large ground capacitance issue through a new orientation and application of existing technologies. The improved topology uses a half-bridge system coupled with a buck boost application resulting in ground capacitance being rendered negligible. Eliminating the ground capacitance improves the efficiency of the inverter by up to 2% over other transformer-less inverters. This invention also allows for the elimination of large electrolytic capacitors. These electrolytic capacitors have posed huge reliability issues in PV inverters. As a result of the new configuration, as well as the elimination of electrolytic capacitors, this technology creates a more efficient inverter that is smaller, much more reliable, and weighs and costs less than conventional technologies.

Potential Applications

- **Solar panels** - Residential
- **Solar panels** - Commercial
- **Mico-inverters**
- **Wind and Hydroelectric inverters**

Benefits and Advantages

- **Increased efficiency** - at least 2% increase in efficiency over existing transformer-less inverters
- **Decreased size and weight** - due to eliminating components
- **Lower cost and complexity**
- **Elimination of capacitive ground currents**
- **Improved reliability and longer lifespan** - due to the elimination of electrolytic capacitors