Solar Inverter on Glass – DC to DC Converter

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Background

Solar energy is the earth's most abundant energy resource. Despite the fact that solar energy supplied 0.85% of worldwide energy needs in 2013, global incentives are driving the solar energy development exponentially, allowing for a far higher solar energy contribution in the near future. Most of the solar technologies available today either offer high efficiency at a high cost, or low efficiency at a low cost. Micro-inverters are now being used rather than less efficient centralized inverters. Photovoltaic systems can further be made more affordable by implementing Zinc Oxide (ZnO) transistors and Thin Film Transistor Technology (TFT) to make solar PV systems more attractive to consumers and the renewable energy of choice.

Goal

Design a low cost and less complex DC to DC converter circuit by:
- Using TFT technology with ZnO Transistors
- Implementing MPPT Algorithm to achieve maximum DC output

Technology

- TFT technology with ZnO Transistors
- MPPT Algorithm

Results

- The full circuit has several parts, including Solar Simulator, Two-stage Converter, Current Sensor and Pulse Width Modulator.
- Use the Pulse Width Modulation (PWM), change the duty cycle of clock signal which control the TFTs, we are able to modulation the output voltage level.

Challenges

- Use the specific devices from Lab
- Trade off design principle: less complex and more reliable function
- Limitation from Microelectronic Processing

Application

Visibly transparent photovoltaic devices can open photovoltaic applications in many areas, such as building-integrated photovoltaic or integrated photovoltaic chargers for portable electronics.

References