

**Proposed title: Three-Level Neutral-Point-Clamped Quasi-Z-Source Inverter  
as a New Solution for Renewable Energy Application**

The current world energy consumption based on renewable energy sources grows up rapidly. The new converters allowing rise up the power density and improve general efficiency of renewable energy applications are more than actual nowadays. The key features of such converters which are extremely valuable for practical implementation are high-quality output voltage, low-rated power losses and continuous input current mode availability. This work describes the new three-level neutral-point-clamped quasi-z-source inverter. Using results of continuous current mode analysis as well as efficiency and voltage quality comparative evaluations, the new modulation technique for this converter was proposed. This modulation technique uses special modified shoot-through mode in output inverter stage to realize the adjustment of boost factor for maximum power point tracking. The control system was built on FPGA, that allows to implement plenty evaluation and control functions in one chip. All proposed solutions were verified by different simulations in PSCAD and MATLAB Simulink. The experimental prototype was built and the results of experimental investigations in laboratory conditions are presented. The elaborated converter has successfully passed through experimental testing under real conditions with photovoltaic panels array.