

Switched Capacitor Integrated (2n+1)-Level Step-up Single-Phase Inverter

This project presents a novel switched capacitor (SC) based (2n+1)-level single-phase inverter with a reduced number of components and input DC voltage supply.

The initiative of this paper is to propose an alternative multilevel inverter with voltage-boosting capability and generation of (2n+1) voltage levels, where $n \geq 2$ is the number of switching cells.

The proposed inverter consists of three parts, a DC-DC converter at the front end to boost the input source voltage followed by an SC cell to synthesize different voltage levels, and a 2-level H-bridge voltage source inverter (VSI) at the end to invert the DC to AC waveform.

The operating principle is based on a variable DC-link voltage generation, which is shared by H-bridge at the output inverter stage. The variable DC-link is generated by a multi-cell arrangement of DC-switched capacitor cells, where several DC-cells at the DC-link can increase the number of voltage levels generated at the AC side, without proportionally increasing the number of active and passive devices. Moreover, the charging of capacitors is realized through a quasi-resonant current path that allows low current stress soft charging.

Components used:

- ✓ Regulated Power supply.
- ✓ PIC Microcontroller.
- ✓ Rechargeable battery.
- ✓ Boost converter.
- ✓ H-bridge inverter.
- ✓ Capacitor network.
- ✓ LED indicators.

Software's used:

1. PIC-C compiler for Embedded C programming.
2. PIC kit 2 programmer for dumping code into Micro controller.
3. Express SCH for Circuit design.

Block Diagram:

Block diagram



