

# Step-up DC to DC Converter Based on Polarization Switching in Ferroelectric Capacitors

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DC to DC converters are important to provide various voltages to a variety of circuit blocks from a reference voltage. Most of the DC-DC converters use inductor-based converters but fabricating on-chip inductors for these converters is very difficult. Therefore, there is a need to develop capacitor-based converters, since capacitors can be integrated on-chip for medium current converters. Most of the work reported in this area uses linear capacitors. Recently, there is significant interest to use non-linear ferroelectric capacitors for these applications. Ferroelectric capacitors fabricated from thin films such as lead zirconate titanate (PZT) and strontium bismuth tantalate (SBT) have high dielectric constant and therefore offer higher capacitance density and can be integrated on the chip. In addition, these capacitors offer switching current due to polarization reversal and hence improve output current of the converters. In this paper, we will be presenting the results of step-up and step-down DC-DC converters based on non-linear ferroelectric capacitors and compare their performance with linear capacitors. The performance of the converters is studied in terms of a) output voltage for a variety of input voltage b) switching frequency and c) output load.