Hybride Voltage Generator

Maximilian Hofer, Albert Missoni, Christoph Böhm, Robert Kolm

The hybrid voltage reference is a voltage reference circuit which is able to generate high accuracy in a highly efficient way.

Basic Idea

The analog voltage of an accurate voltage reference is stored in an analog buffer.

If the chip is in a low power mode the bandgap can be switched off but the voltage reference is still available.

Realization

The BGP produces an accurate voltage reference. A comparator is comparing this accurate voltage reference with a low power CMOS voltage reference. A digital logic is calibrating the CMOS voltage reference online in a way that there is the same output (or ratio) as at the BGP output.

At the low power mode the BGP and the comparator can be switched off and the CMOS voltage reference is not calibrated anymore. Due to the drift from time to time a re-calibration gets necessary to keep the accuracy.

Online Calibration

If the BGP is calibrated, the comparator can be used in a way that the offset is compensated. The comparator has to be used for both: calibration of the band gap and updating the CMOS voltage generator.

The bandgap shows a systematic comparator-offset of 20mV after the calibration phase (other error sources are not included).

State Diagram

Offset from the comparator