

Appendix A

Bandgap Montecarlo Simulations

A statistical analysis has been performed with the reference Bandgap voltage circuit presented in Fig. 2.12. Two different supply voltages has been used, 1.4 and 1.2 V and 15 different integrated circuits has been tested.

The experimental results are compared with the expected theoretical values obtained by simulation with the statistical available models, fast (FFA), slow (SSA) and standard or typical (STD/TTY) of the technology.

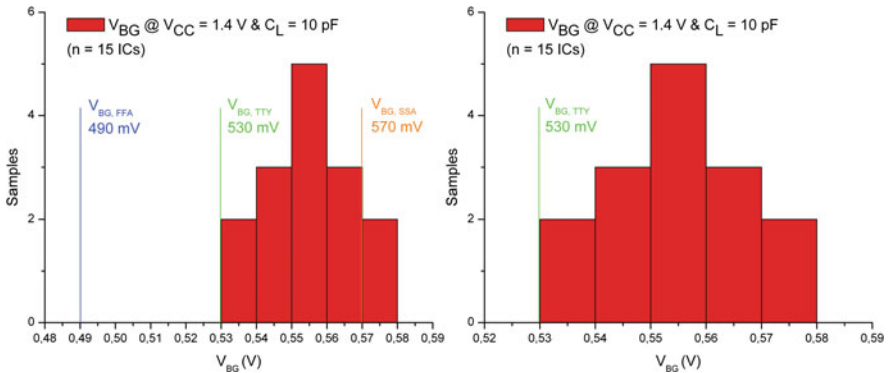


Fig. A.1 Experimental Bandgap voltage at 1.4 V. *Left* image shows the obtained values and the theoretical values and on the *right*, there is plotted in detail the experimental voltages

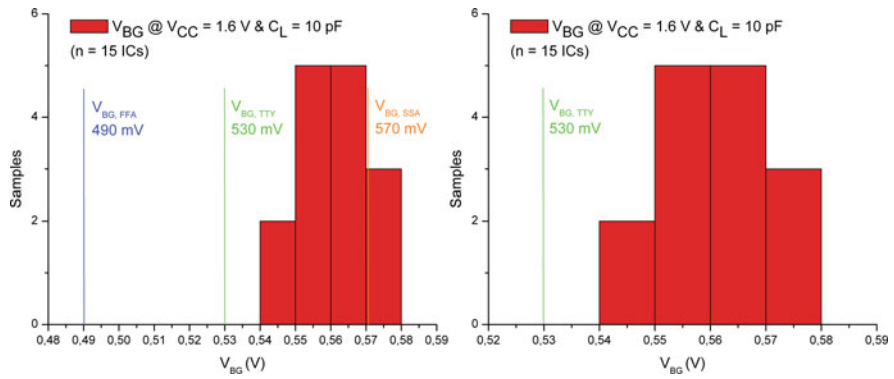


Fig. A.2 Experimental Bandgap voltage at 1.6 V. *Left* image shows the obtained values and the theoretical values and on the *right*, there is plotted in detail the experimental voltages

Appendix B

CMOS 130 nm Technology (HCMOS9)

The STMicroelectronics CMOS 130 nm technology provided by the CMP service (Multi-Project Circuits) is used to design and manufacture the IC's in this work. A brief description of the process specifications is done here. All the information can be found on-line at the official web page of CMP service, <http://cmp.imag.fr/products/ic/?p=STHCMOS9>.

- Gate length: 0.13 μm (drawn), 130 nm (effective).
- Triple well.
- Power supply of 1.2 V.
- 2.5 V power supply option is also available.
- Multiple V_t transistor offering (Ultra low leakage, High speed).
- Threshold voltages (for 3 families above):
 $V_{TN} = 570/500/380 \text{ mV}$,
 $V_{TP} = 590/480/390 \text{ mV}$.
- I_{sat} (for 3 families above):
 $TN @ 1.2 \text{ V}: 410/535/680 \text{ uA/mic}$;
 $TP @ 1.2 \text{ V}: 170/240/320 \text{ uA/mic}$
- 6 metal layers in standard.
- Up to 8 metal layers in option.
- Low k inter-level dielectric.
- MIM capacitances.

Appendix C

CH Instruments CH 1232A Potentiostat

The CH 1232A is a commercial handheld potentiostat/biopotentiostat from CH Instruments. It is a part of the CHI 1200A series. Its main specifications are detailed below and can also be found on-line at the web page of CH Instruments, <http://www.chinstruments.com/chi1200.html>.

- Maximum potential range: ± 2.4 V.
- Compliance voltage: ± 7.5 V.
- Current range: ± 2 mA.
- Reference electrode input impedance: 1×10^{12} Ω .
- Sensitivity scale: 1×10^{-9} – 0.001 A/V in 7 ranges.
- Input bias current: < 100 pA.
- Current measurement resolution: < 5 pA.
- Data acquisition: 16 bit @ 10 kHz.
- CV and LSV scan rate: 0.000001–10 V/s.
- Low pass filter for current measurements.
- Maximum data length: 128–4096 k selectable.
- Power: UPS port of a PC.
- Chassis dimension: 7'' (W) \times 4.5'' (D) \times 1'' (H).
19.05 cm (W) \times 11.43 cm (D) \times 2.54 cm (H).

CV = Cyclic Voltammetry

LSV = Linear Sweep Voltammetry