P87

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Bias Temperature Instability Detection of Integrated Circuit

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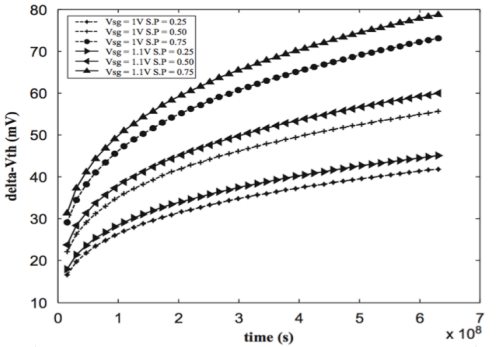
Point of this work

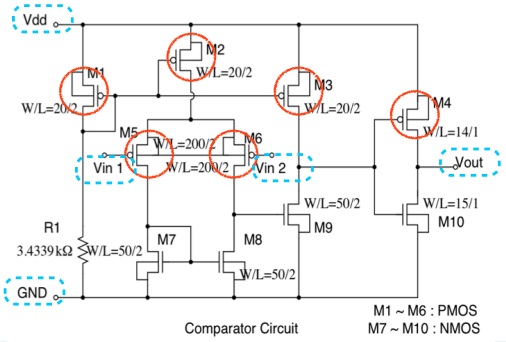
- Shift in V_{th} due to BTI
- I_D therefore, g_m decrement
- Slew rate degradation
- Degradation detection Using Time Transient Comparator Circuit

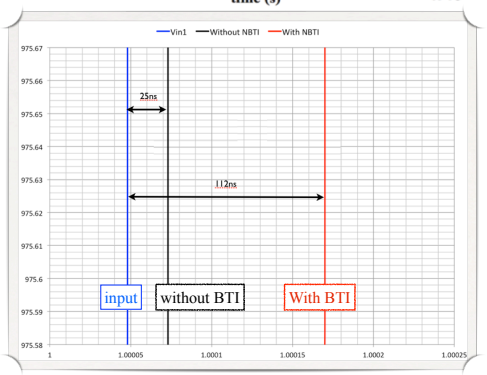
V_{th} shift due to Bias Temperature Instability (BTI) degradation

$$\Delta V_{th} \propto \exp(\beta V_G) \exp\left(-\frac{E_a}{KT}\right)$$



Slew rate degradation of comparator due to V_{th} shift (BTI)





Conventional comparator produces approximately 4 times slew rate degradation compare to its fresh state; Simulation condition: 90nm process, temp. 27°C, time: 10 years