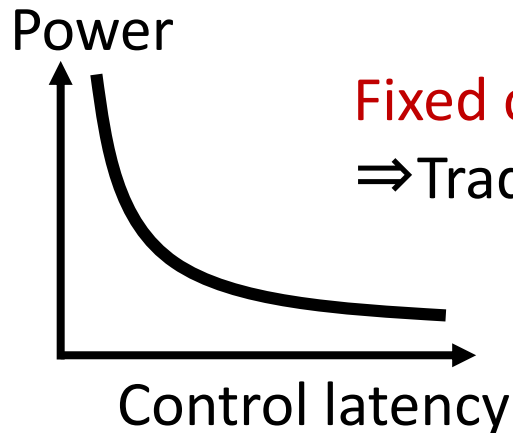
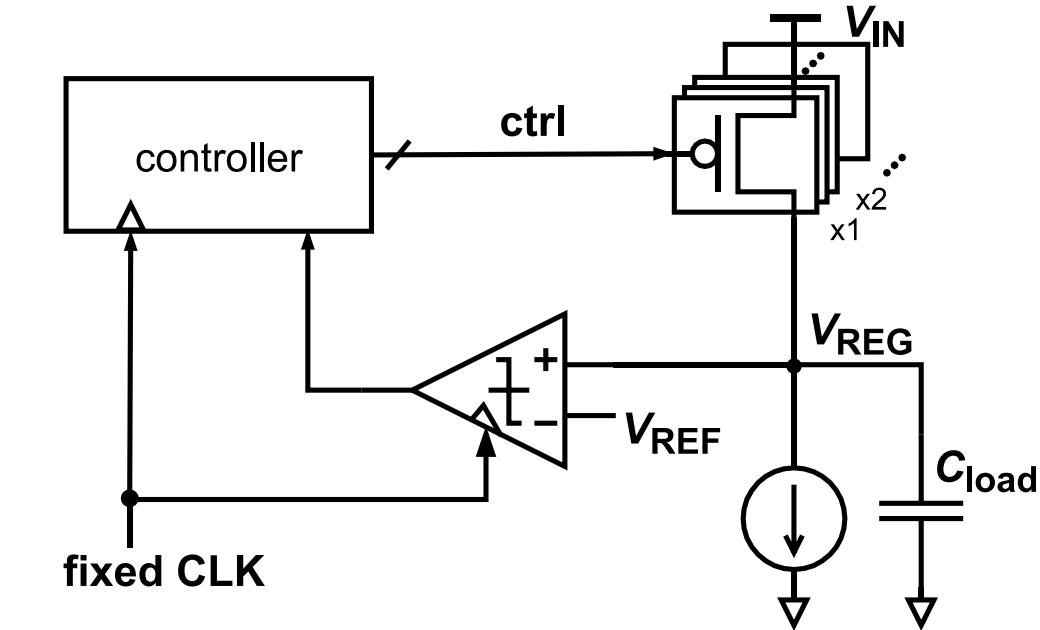


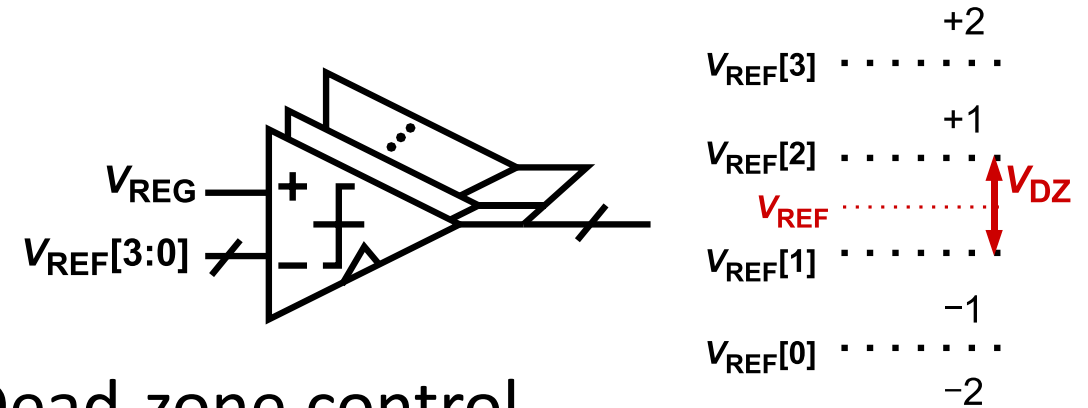
A fully synchronous digital LDO with built-in adaptive frequency modulation and implicit dead-zone control

Shun Yamaguchi, Mahfuzul Islam, Takashi Hisakado, and Osami Wada

Kyoto University



Fixed clock frequency
⇒ Trade-off relationship

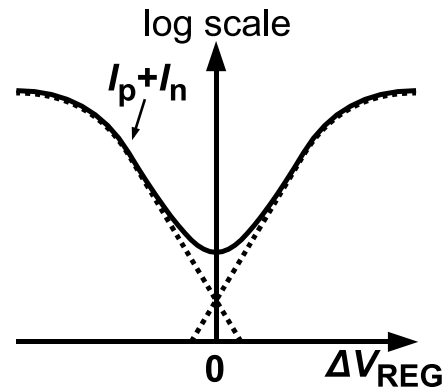
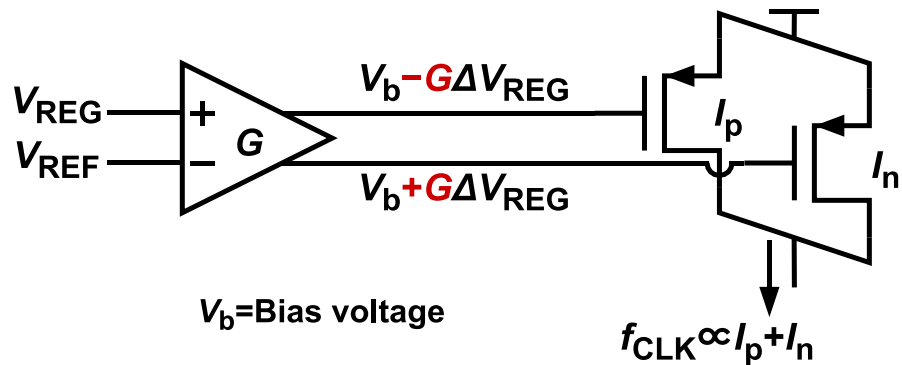
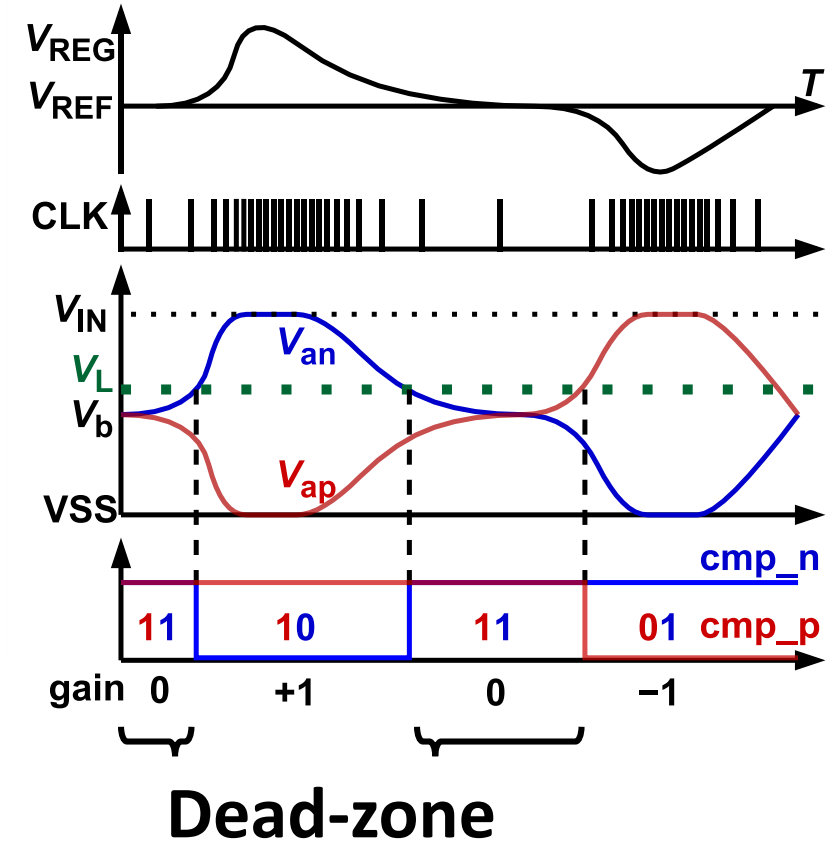
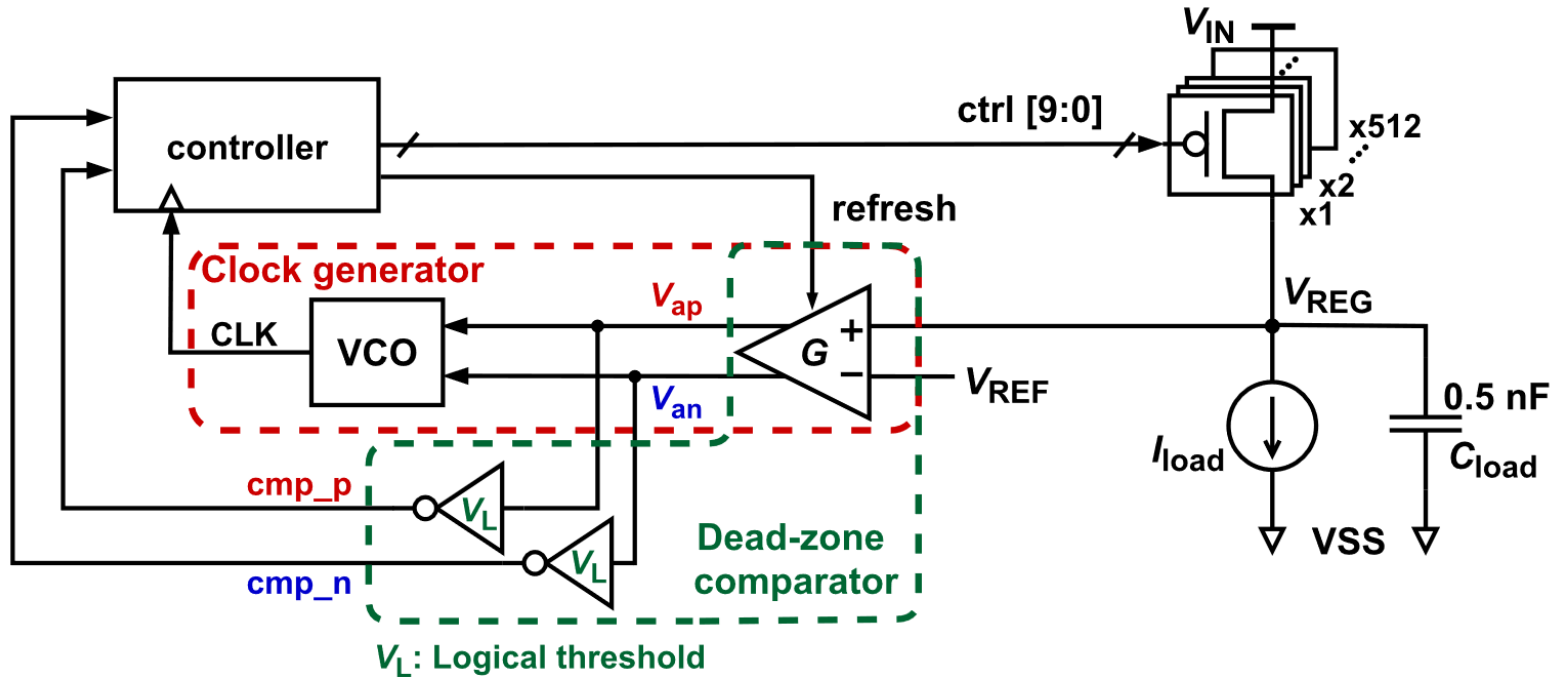


Dead-zone control

- 😊 No output ripple
- ☹️ Multiple comparator & reference

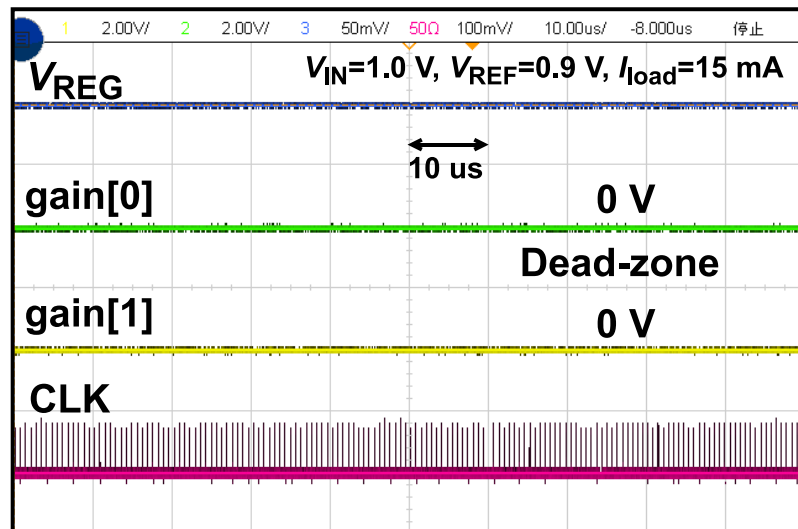
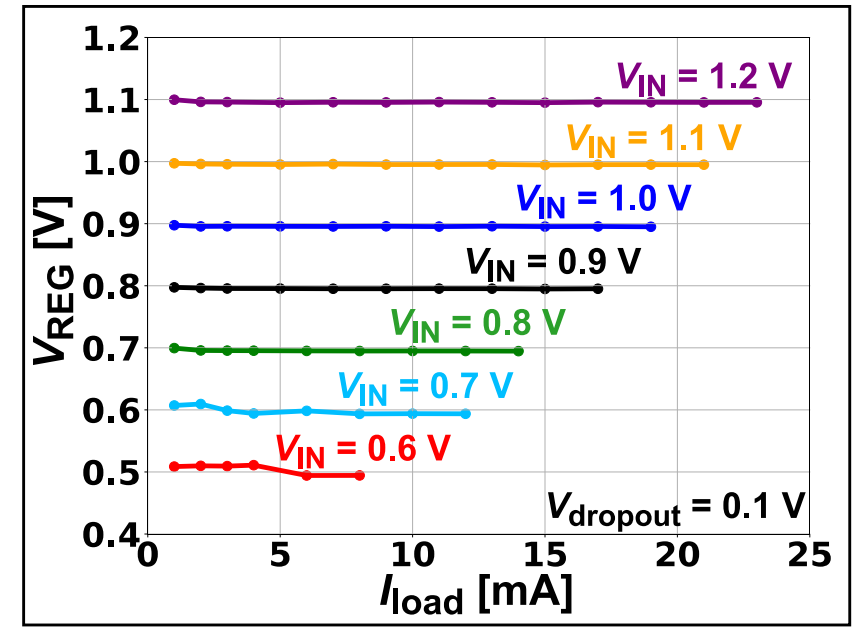
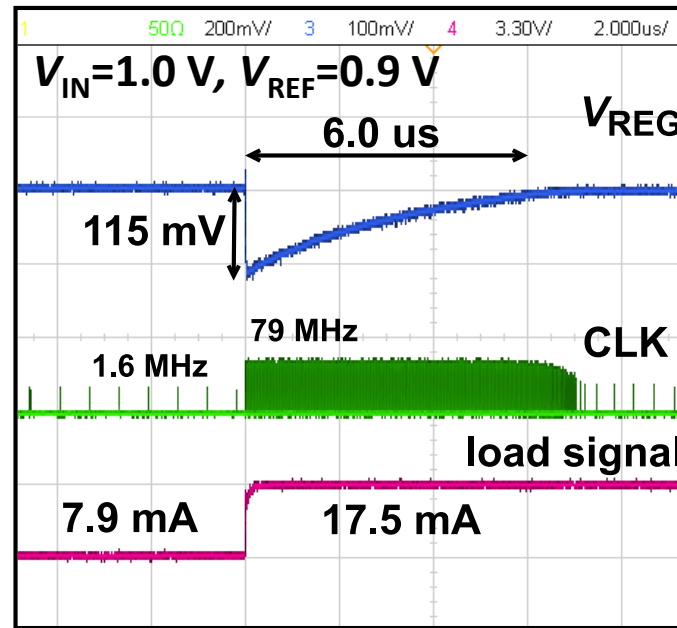
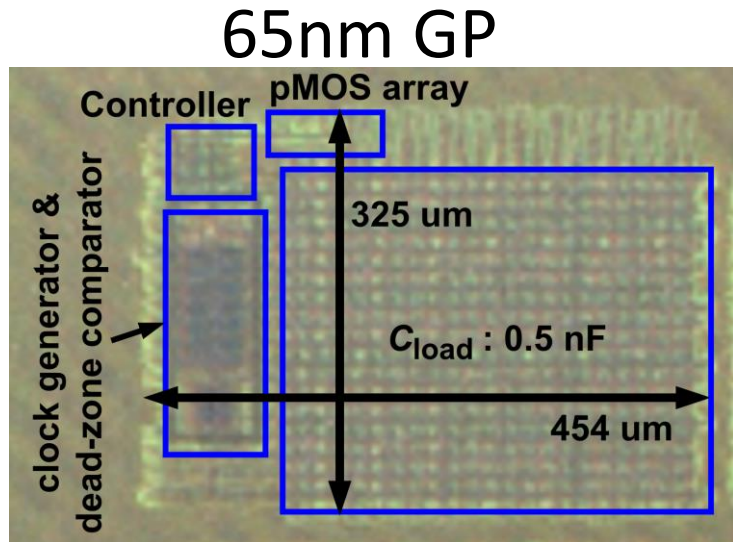
- **Wide frequency modulation**
- **Dead-zone control using only V_{REF}**

Proposed LDO design



Wide modulation using MOSFETs' current

Measurement results



gain[1:0]
00 (0) :Dead-zone
01 (+1)
11 (-1)

