

ABSTRACT

Analog Applications of Interface-Trap Charge Pumps.

Kenton Todd Veeder, B.S.,
The University of Idaho, Moscow

Slow or weak phenomena must be constantly dealt with if electronics are to interface with the real world. This is no easy task for integrated circuit designers. Many individual solutions have been created to deal with each specific slow or weak phenomenon. The purpose of this thesis is to introduce a well known process engineering tool, called interface-trap charge pumping, as a novel analog and mixed signal integrated solution for the world of slow or weak signals.

This thesis covers history, device physics, and design constraints of the interfacetrapped charge pump (ITCP). A novel ITCP continuous-time current source is described and a summary of several possible applications is presented. An extensive literature search, physical derivations, black-box modeling, integrated circuit design, laboratory testing, and data analysis have all been carried out for this project. The results of this work demonstrate an exciting new technique that may be able to outperform existing methods of electronically dealing with slow or weak phenomena.