

Abstract Submitted
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On Power dissipation in information processing ROMAN OSTROUMOV, KANG L WANG, Device Research Laboratory, and MARCO Focus Center on Functional Engineered Nano Architectonics - FENA, University of California at Los Angeles — We consider power dissipation during simple switching in the informationally irreversible architecture. First, we investigate two limit cases of sudden and infinitesimal slow switching and then we derive solution for the general problem of the arbitrary speed switching in the two level system. The energy dissipation during errorless switching has a minimum of $kT\ln(2)$ and increases linearly with a switching speed. Both charge-position and spin degrees of freedom behave similarly in this model with the only difference being the relaxation times. We show that for a relaxation time of 1ps, power dissipation due to the finite switching speed at the operational frequencies of around 35GHz will become comparable to the $kT\ln(2)$ and total power dissipation per switch will become $\sim 2kT\ln(2)$.

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