

## 高能效宽电压工作标准单元库分析与优化

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**摘要:** 研究了剔除大扇入逻辑门对于高电源电压下的电路指标的影响, 证实这一方法对电路在高电压下的性能和功耗没有明显的负面影响, 主要影响是在一定程度上增大电路的面积. 分别对 32 nm 标准单元库中的异步置位复位 D 触发器单元和电平移位器单元进行了电路优化, 使得它们在低电压下的延时分别减少了 14.6% 和 19.9%, 解决了电源电压降至近阈值时性能恶化过于严重的问题.

**关键词:** 能量效率; 近阈值; 宽电压工作; 大扇入逻辑门; D 触发器; 电平移位器

## Analysis and Optimization of High-Efficiency Standard Cells

### Operating With in Wide-Range Supply Voltage

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**Abstract:** In this paper, we study the influence of ‘Eliminating big fan-in logic gates’ method, and finally prove that circuit synthesized with this method behaves little performance deterioration or energy increase, its main effect is increasing circuit area in some cases. We also optimize the structure of D flip-flop with asynchronous set and reset, and voltage up level shifter, which reduces their transition delay for 14.6% and 19.9% when operated at low source voltage, respectively. Thus our work solve the problem which is induced by the performance deterioration of near-threshold operating.

**Key words:** energy efficiency; near threshold; wide-range operating; big fan-in logic gate; D flip-flop; lever shifter

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