Design of Comparator with 6.25mV Resolution for 5-bit 100MS/s ADC in 65nm CMOS Process

An, jungmo

Adviser: Prof. Junyoung Song
Outline

Introduction
Schematic and Pre-layout Sim. Results
Layout and Post-layout Sim. Results
Conclusions
Outline

Introduction

Schematic and Pre-layout Sim. Results

Layout and Post-layout Sim. Results

Conclusions
What is comparator?

Comparator

analog signal

Vincm

digital signal
Outline

Introduction

Schematic and Pre-layout Sim. Results

- Design target
- Comparator architecture
- Schematic
- Sim. Results

Layout and Post-layout Sim. Results

Conclusions
### Design Target

**Target Application**
- 5-bit 100MS/s Flash ADC

### Design Specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
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<tr>
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<td>Power Consumption</td>
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<td>Supply Voltage</td>
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Resolution and Offset

Resolution

100mV

Time

100mV
Comparator architecture

VDD

RESET

Latch

Evaluation

Current source

VDD

RESET

CLK

VSS

VIN

VREFN

VREFP

VIP

VOUTP

VOUTN

CLK

VSS

VSS

VSS
Schematic

(W/L) Ratio
M1 : 3um/1um
M2 : 8um/1um
M3 : 8um/1um
M4 : 2um/1um
M5 : 2um/1um
M6 : 3um/1um
Pre-layout Sim Results

Overall Operation

Evaluation Phase

Reset Phase

Comp. output

Clock
Outline

Introduction

Schematic and Pre-layout Sim. Results

Layout and Post-layout Sim. Results
  • Post-layout architecture
  • Sim. Results

Conclusions
Post-layout architecture

63.15\,\mu m

11.7\,\mu m
## Summary of Simulation Results

<table>
<thead>
<tr>
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<th>Spec.</th>
<th>Pre-layout Sim. Results</th>
<th>Post-layout Sim. Results</th>
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Outline

Introduction

Schematic and Pre-layout Sim. Results

Layout and Post-layout Sim. Results

Conclusions
Conclusions

Design of Comparator

- Comparator with 6.25mV resolution and 100MHz operating frequency is designed for 5-bit Flash ADC in 65nm process
- It consumes 87.6uW at 100MHz operation
- Active area of the design is 63.13um x 11.74um

Reference Paper

## Pre-layout Sim Results

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## Pre-layout Sim Results

### Resolution

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## Post-layout Sim Results

### Offset

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<td>VDD</td>
<td>1.2</td>
<td>V</td>
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## Post-layout Sim Results

### Resolution

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