Pre-amp

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design

- **The first stage comp design**

  - **Comp design**
  - **Preamp design**
  - **Autozero eliminate os**

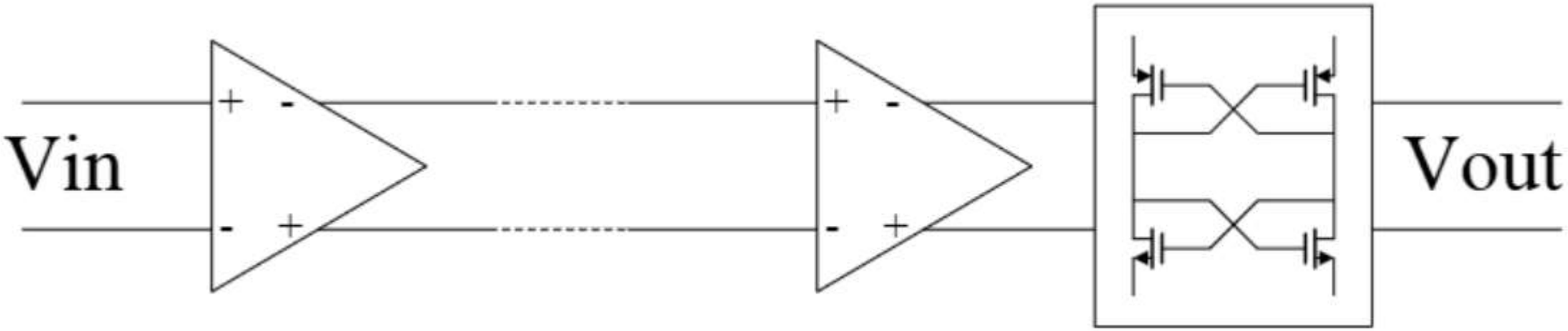
design

- **The first stage comp choice, and spec analysis.**
- **current≤50uA，speed≥800MHZ, offset（3σ）≤4mv，input reference noise （3σ） ≤1mv, common mode voltage=0.9V**

Architecture

- **architecture——preamp+strongarm latch**

Decrease os of strongarm latch
Introduce os of preamp

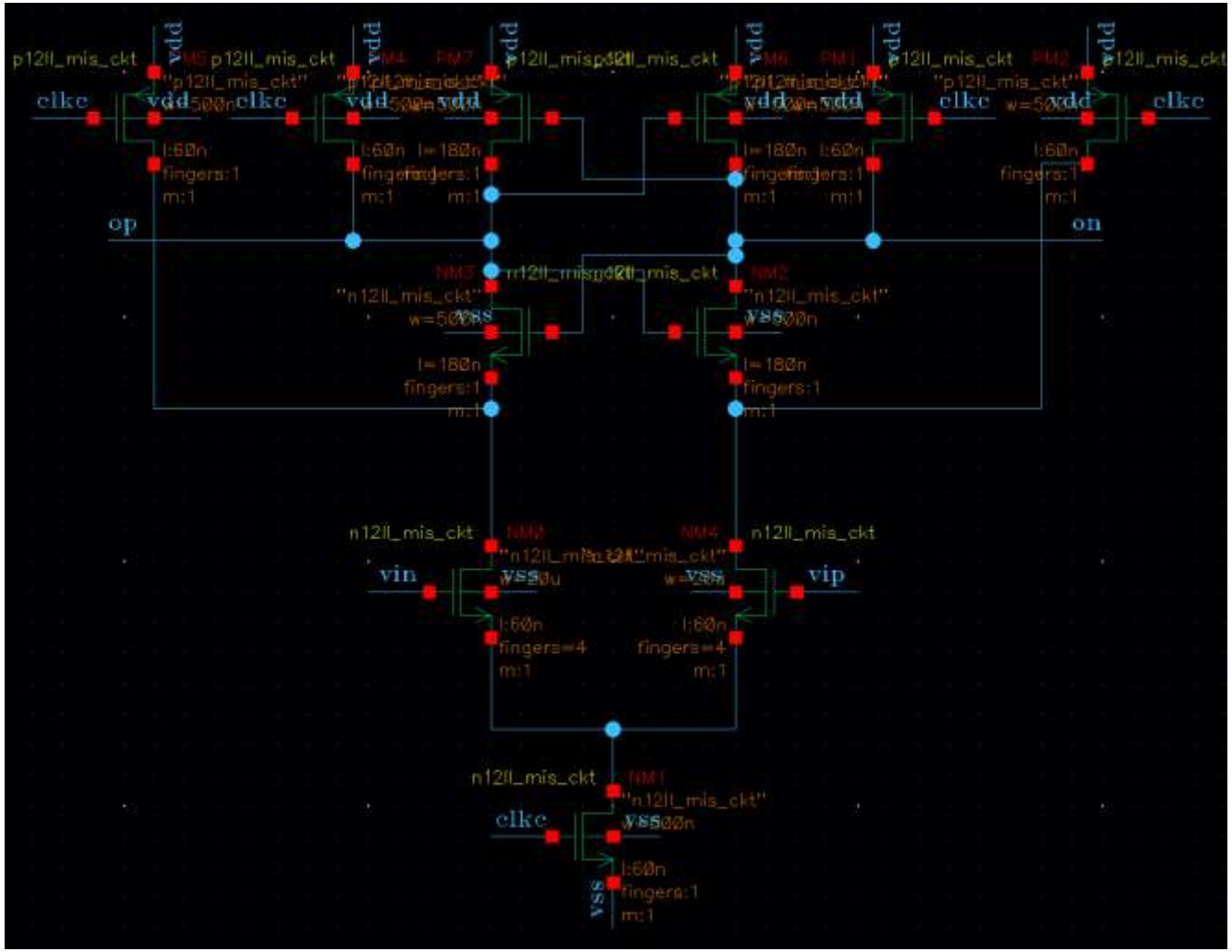


Strongarm latch design

- **Strongarm latch os≈4.735mv（σ）**
- **Strongarm latch cycle=2.5ns**
- **Strongarm latch current=14.5uA**

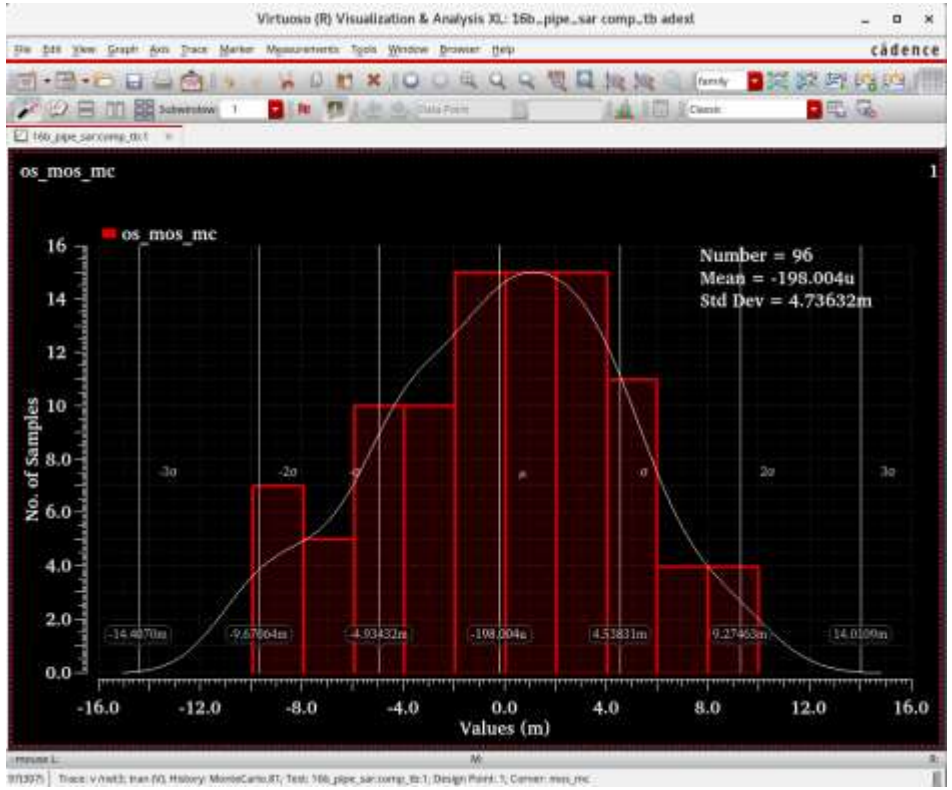
Strongarm latch design

- **Circuits implementation**



第一级比较器的设计

- **Stimuilate result**



Strongarm latch offset mentor carlo

3σ=28.2m

Preamp design

- **Strongarm latch os≈4.76mv（σ）**

→ Preamp gain=5

- **Strongarm latch cycle=2.5ns**

→ Preamp f-3db>1Ghz

- **Strongarm latch current=14.5uA**

→ Preamp current<35.5uA

design

- **The first stage comp design**

  - Comp design
  - **Preamp design**
  - **Autozero eliminate os**

Preamp design

Preamp gain=5

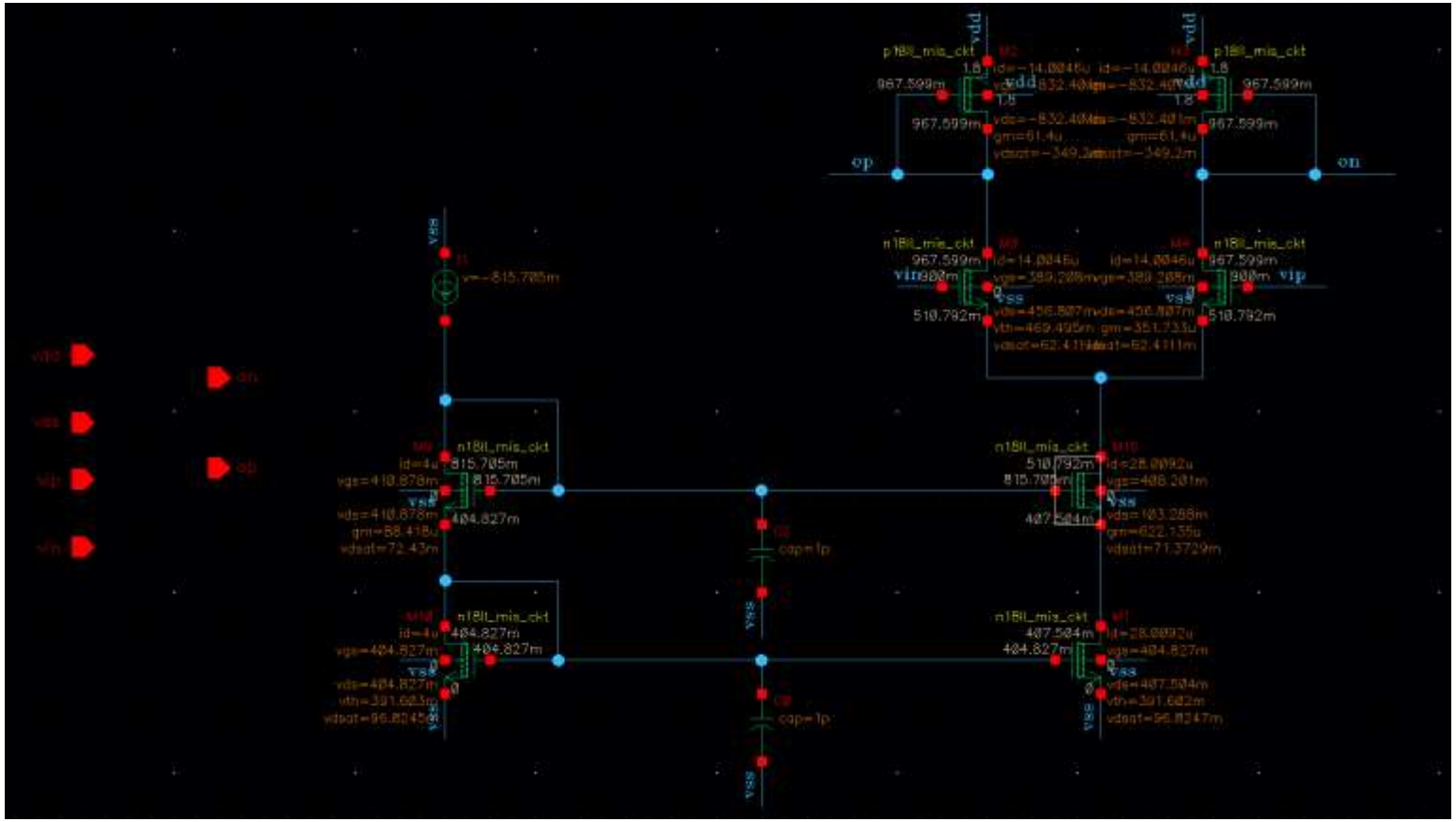
Preamp f-3db>1Ghz

Preamp current<24.5uA

- architecture： fully different amp connecting diodes

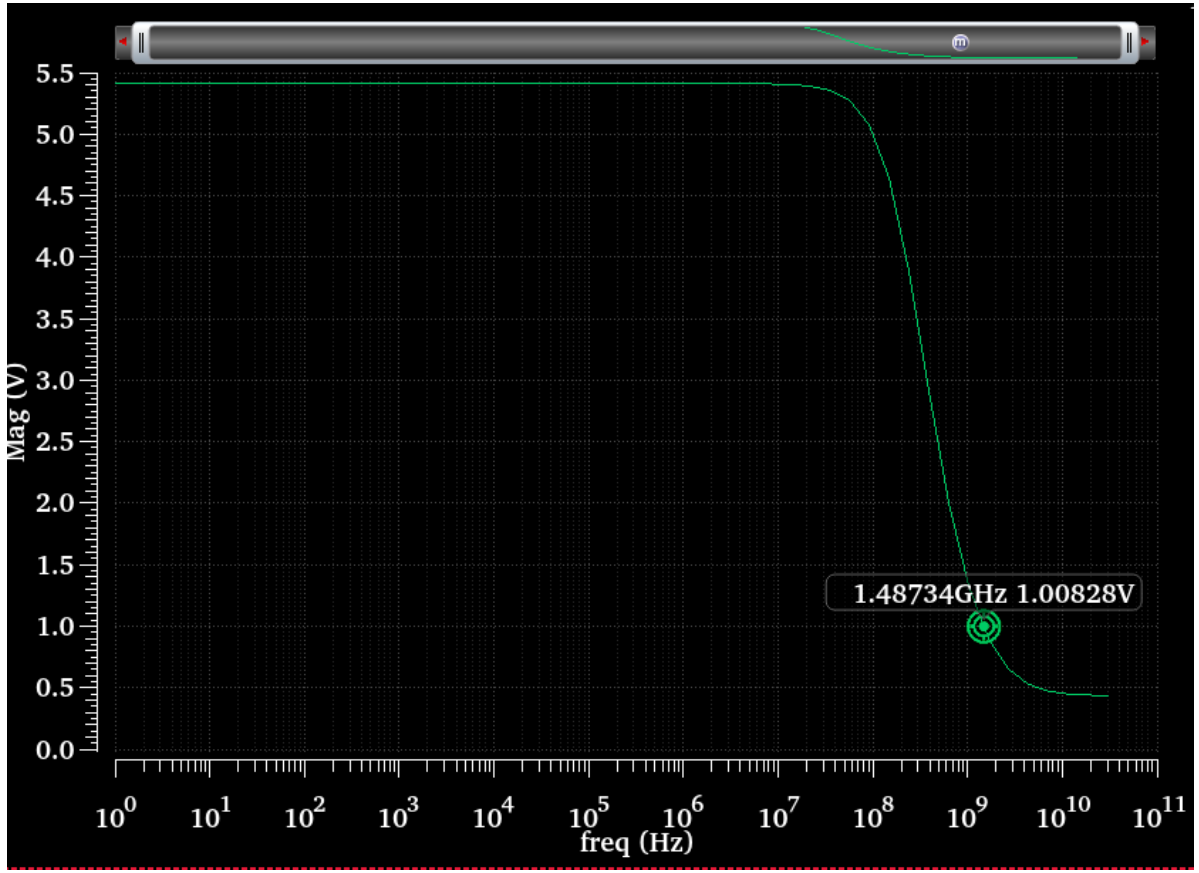
Preamp design

- **Circuit implementation**



第一级比较器的设计

- 仿真结果



Preamp gain=5.4　　f-3db=1.5GGhz

第一级比较器的设计

- 利用oos技术消除preamp的offset

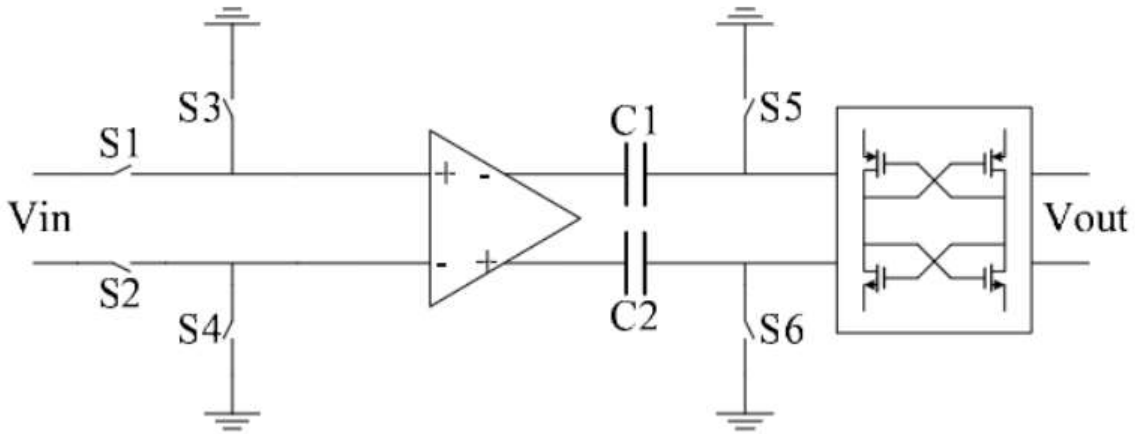


图 4.7　失调校准方法之 OOS

Offset 采样阶段：S3-5闭合，S1-2断开
Offset 消除阶段：S3-5断开，S1-2闭合

$$\Delta V_{OS} = \frac{\Delta Q}{A_0 C} + \frac{V_{OSL}}{A_0}$$

design

- **The first stage comp design**

  - Comp design
  - Preamp design
  - **Autozero eliminate os**

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- **Offset capacitor**

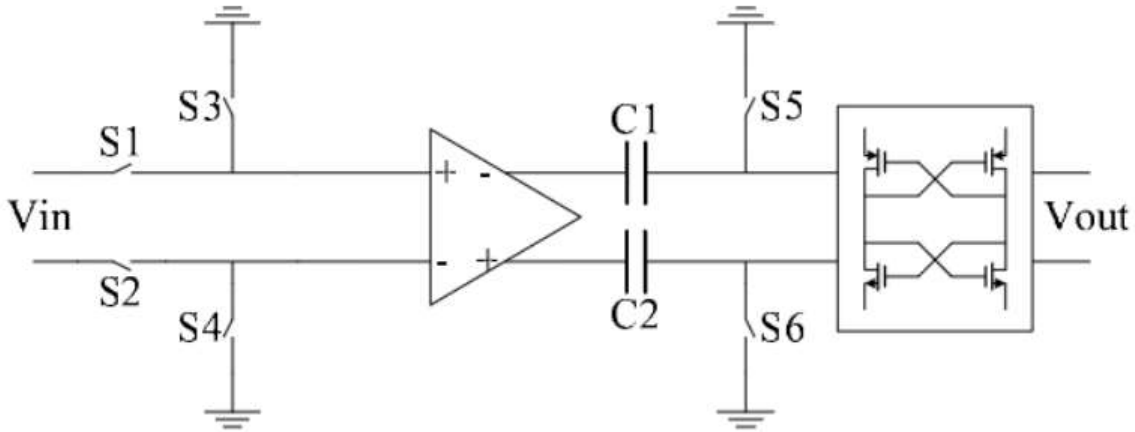

图 4.7　失调校准方法之 OOS

Add 2KT/C

C⩾21f

Referred input $\frac{\sqrt{\frac{2KT}{C}}}{6.3}$ <0.1mv

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- **Offset capacitor**

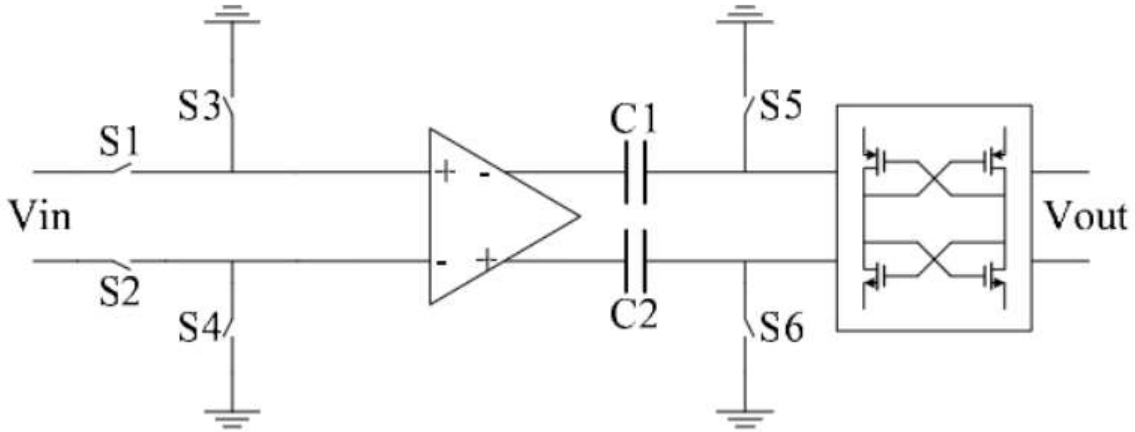

图 4.7　失调校准方法之 OOS

在offset 采样阶段，同时也是信号采样的阶段，采样阶段30ns，负载为存储offset电容，折中考虑速度和精度和功耗取offset电容为120f

Considering speed, resolution and power, the offset c =120f

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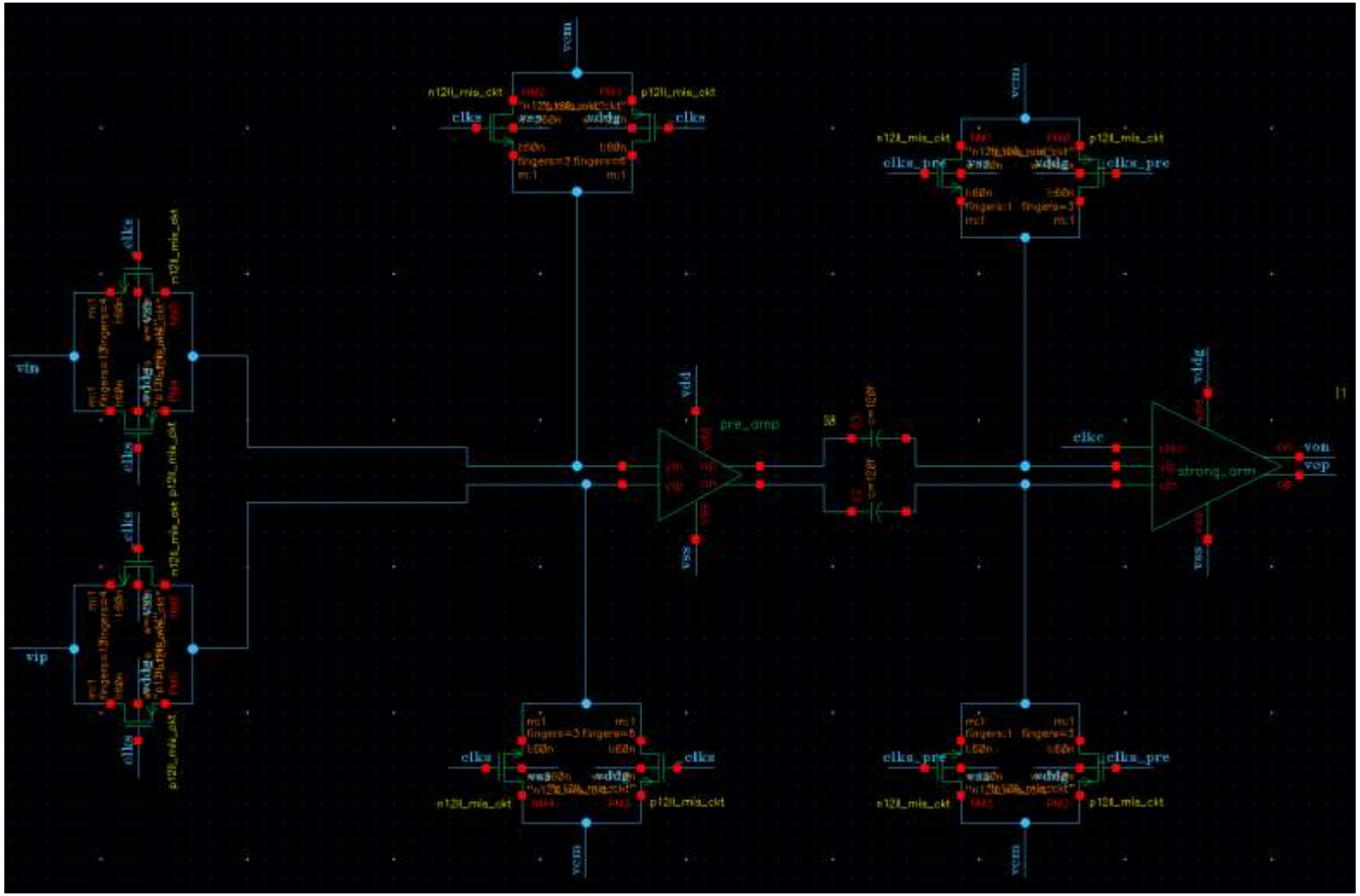
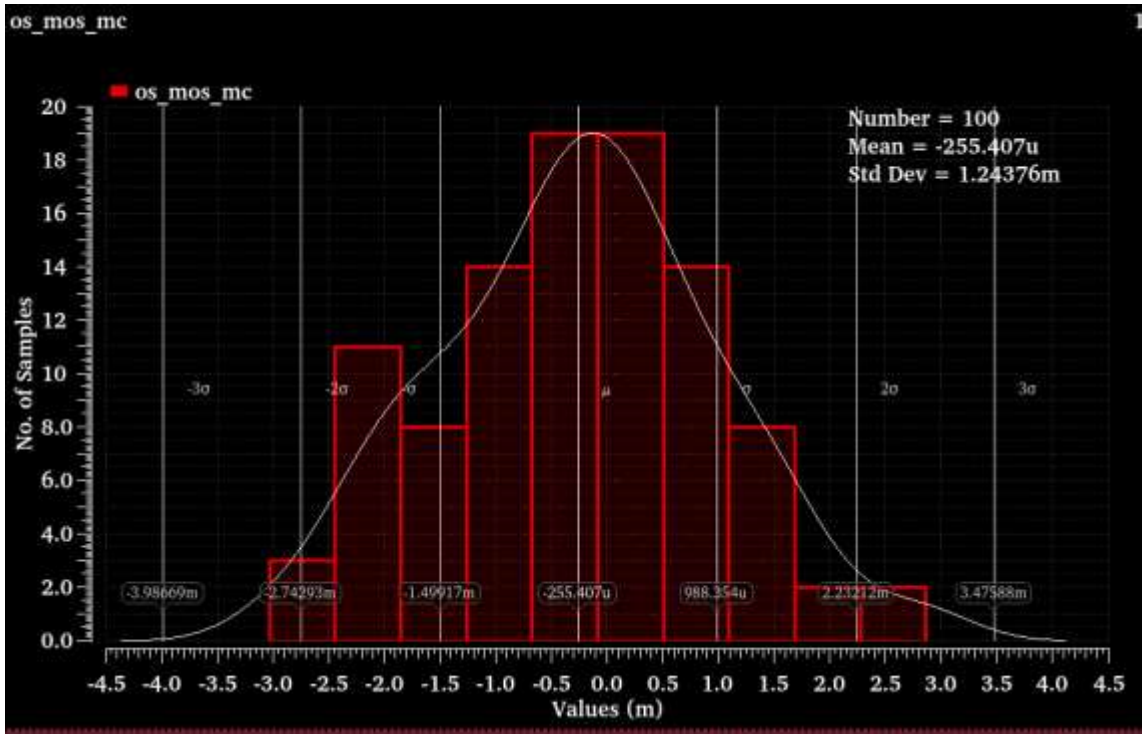
- **Circuits implementation**



Comp design

- **Stimulation result**



offset=3.72mv（3σ）

input reference noise=600uv（3σ）

Total current=40.26uA

Thanks for attention