Charge injection (and clock feed-through)

\[ Q_{ch} = -W L C_{ox} \left( V_{DD} - V_{in} - V_{th}(V_{in}) \right) \frac{V_{gs}}{V_{gs}} \]

\[ Q_{ov} = -W C_{ov} V_{DD} \frac{V_{gs}}{C_{gd}} \]

\[ \Delta V_{c} = \frac{1}{2} Q_{ch} + Q_{ov} \]

\[ = \frac{1}{2} W L C_{ox} \left( V_{DD} - V_{in} - V_{th} \right) - W C_{ov} V_{DD} \]

Dummy Switch

\[ V_{in} \]

\[ \frac{W}{L} Q \]

\[ \frac{W}{L} V_{c} \]

\[ +V_{c} \]

\[ V_{c} \]
Comparators

- Change injection

- Low offset
- High gain
- High frequency

Multi-stage comparator
Latched comparator

- x10 gain
- offset compensated