

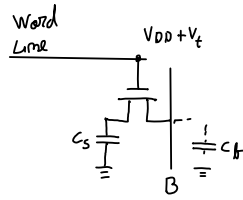
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$$C_S = 30 \text{ fF}$$

$$C_B = 1,5 \text{ pF}$$

$$V_{DD} = 3.3 \text{ V}$$

$$V_t = 1 \text{ V}$$



$$V_{CS} = \begin{cases} 0 \text{ V} & \text{if } \uparrow \\ V_{DD} & \text{if } \downarrow \end{cases}$$

$$C_S V_{CS} + C_B \frac{V_{DD}}{2} = (C_S + C_B) \left(\frac{V_{DD}}{2} + \Delta V \right) \Leftrightarrow$$

$$\Leftrightarrow \Delta V = \frac{C_S}{C_S + C_B} V_{CS} - \underbrace{\frac{C_B}{C_S + C_B} \frac{V_{DD}}{2} - \frac{V_{DD}}{2}}_{-\frac{C_S}{C_S + C_B} \frac{V_{DD}}{2}} \Leftrightarrow$$

$$\Leftrightarrow \Delta V = \underbrace{\frac{C_S}{C_S + C_B}}_{\approx \frac{C_S}{C_B}} \left(V_{CS} - \frac{V_{DD}}{2} \right) \Rightarrow \begin{cases} -\frac{C_S}{C_B} \frac{V_{DD}}{2} = -33 \text{ mV} & \text{if } \downarrow \\ \frac{C_S}{C_B} \frac{V_{DD}}{2} = 33 \text{ mV} & \text{if } \uparrow \end{cases}$$

$$2 \quad \alpha) \quad A = 64 \times (1024)^2 \times 2 \mu\text{m}^2 \approx 134.2 \text{ mm}^2$$

$$l = \sqrt{A} = 11.6 \text{ mm}$$

$$b) \quad A' = 1.3 \text{ A} = 174.5 \text{ mm}^2$$

$$l' = \sqrt{A'} = 13.2 \text{ mm}$$