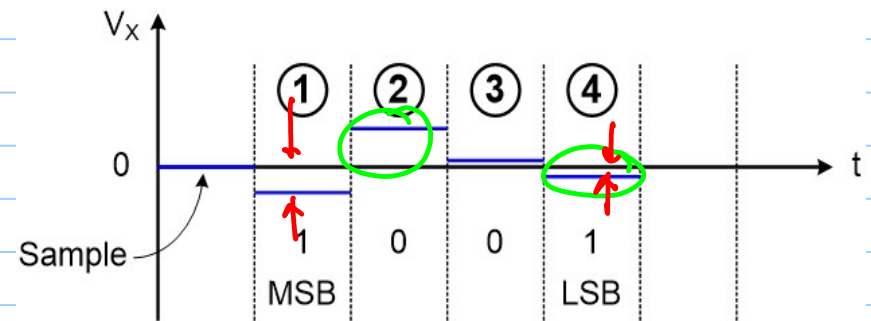
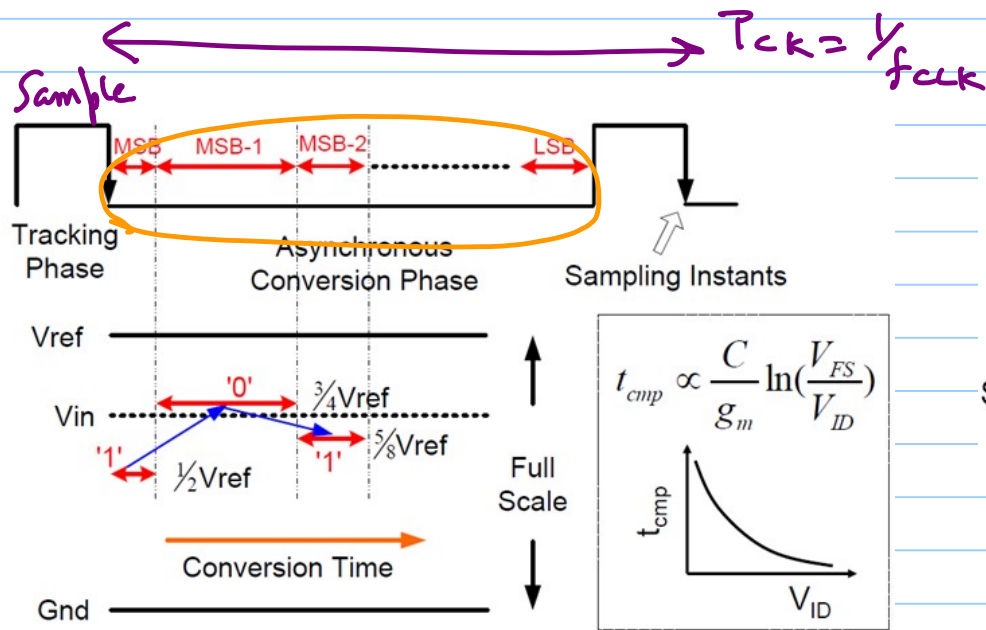


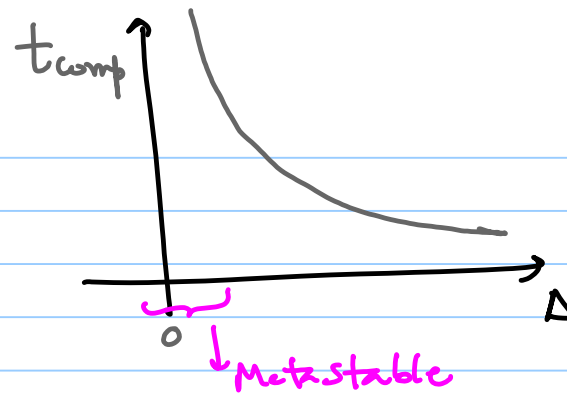
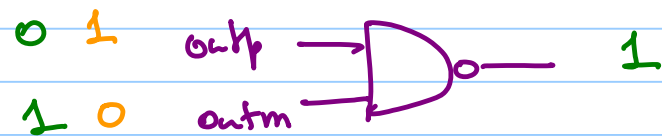
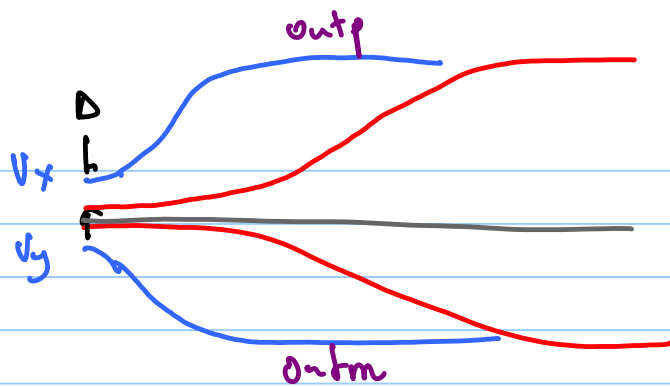
ECE 517 - Lecture 20

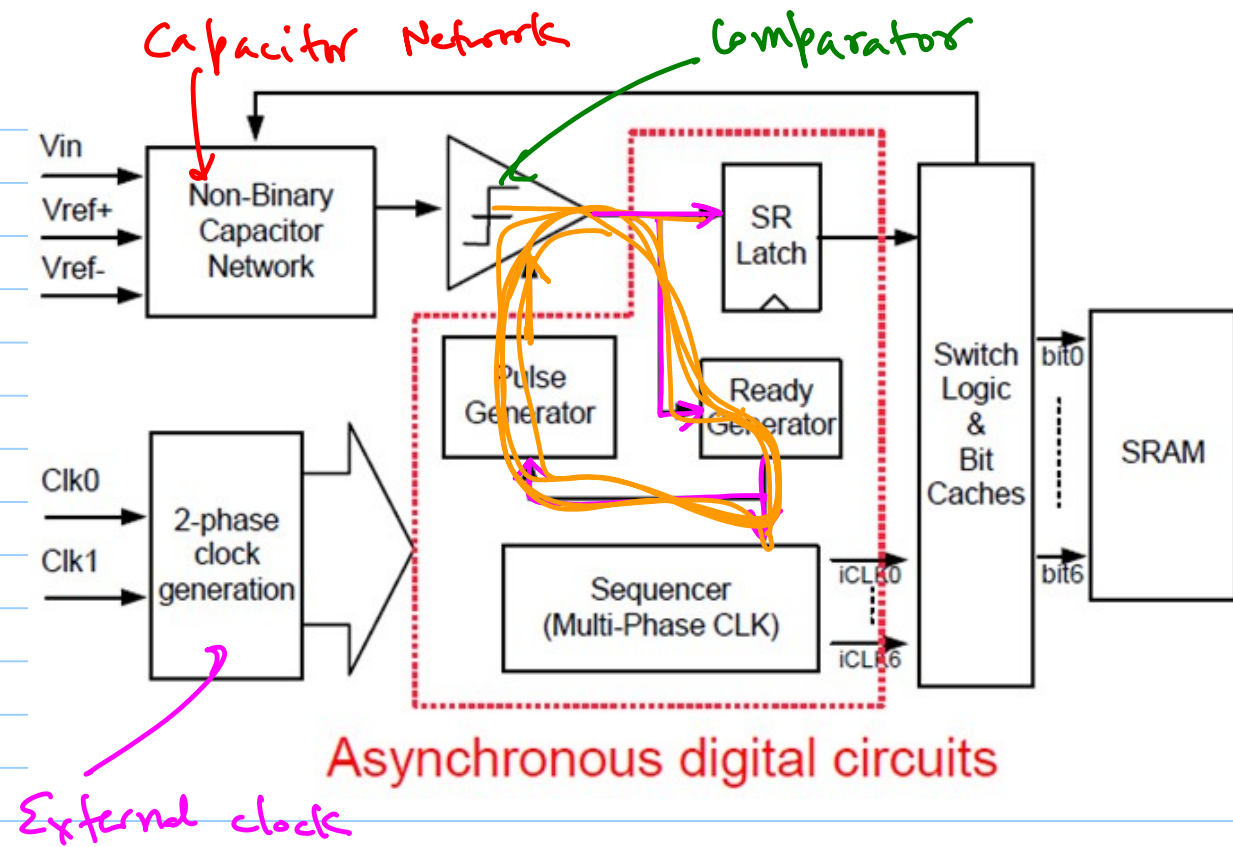
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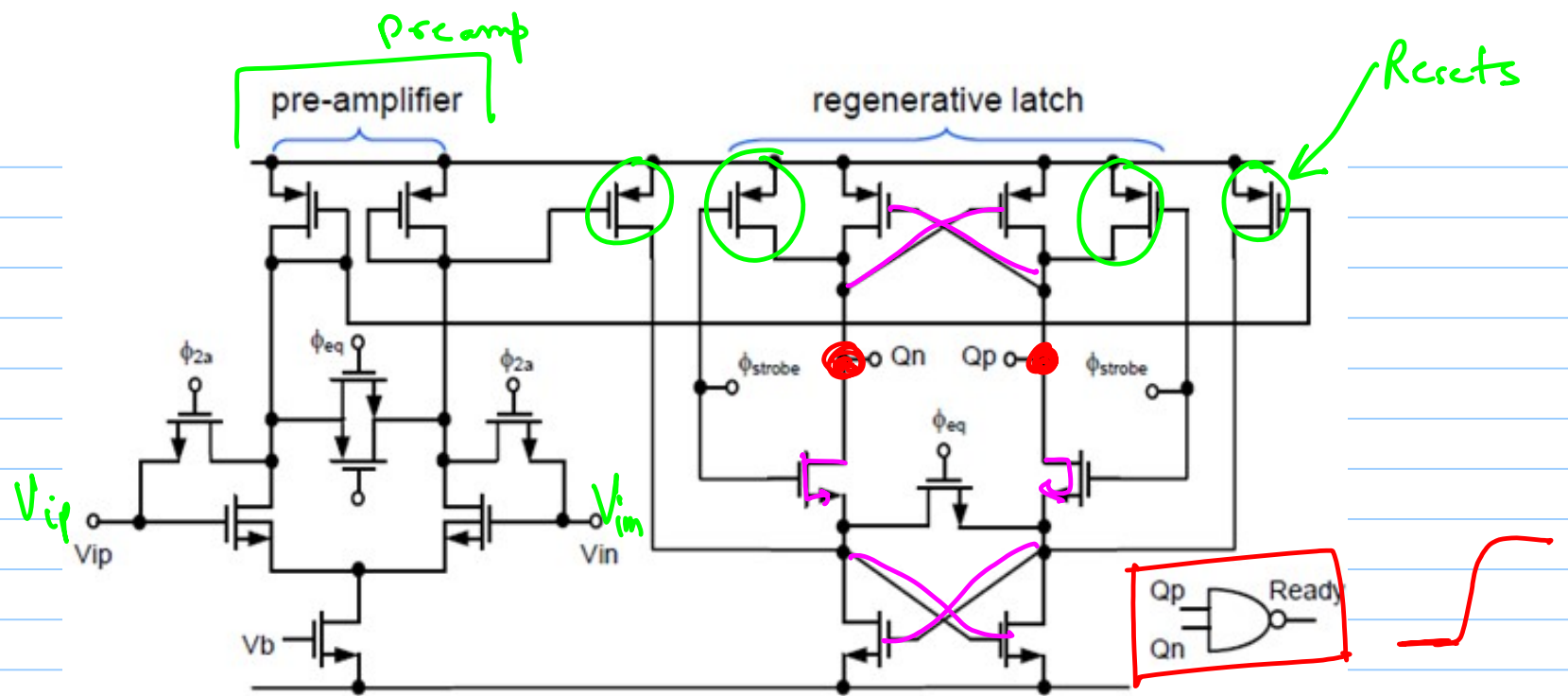
3/30/2017



Locally asynchronous
Globally synchronous (full)

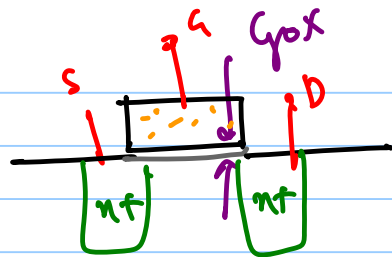






Strong Arm-type Latch



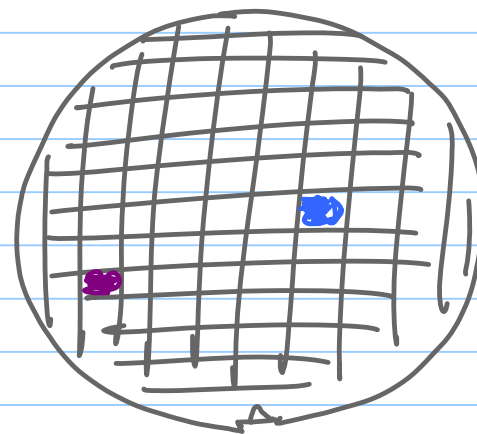
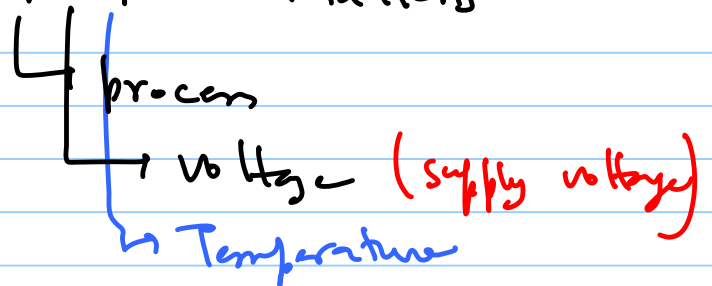


p-Si

V_{THN} , V_{THP}
NMOS PMOS

K_{Pn} K_{Pp}
 $\hookrightarrow \mu_n C_{ox}$

PVT - Variations



PMOS, NMOS

Cor

Corner Models



tt

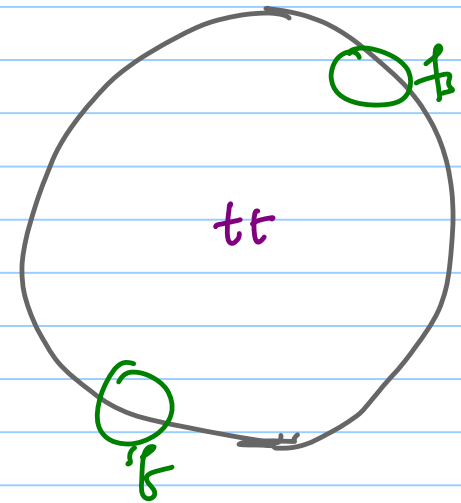
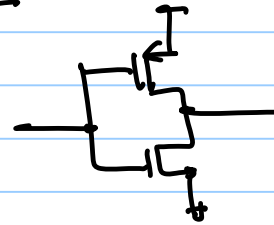
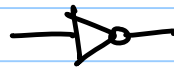
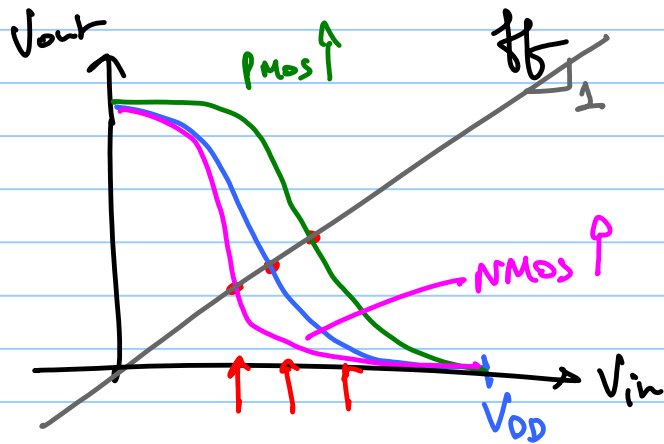
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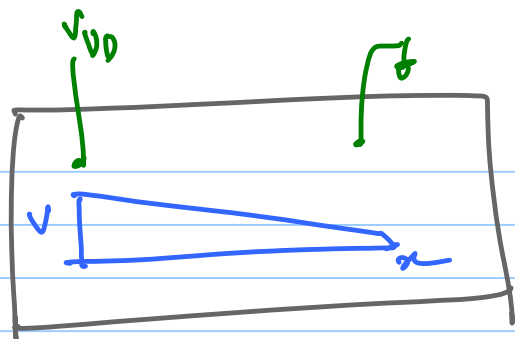
sf

ss

ff

NMOS, PMOS





Common Centroid layout

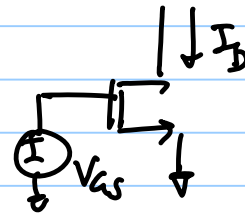
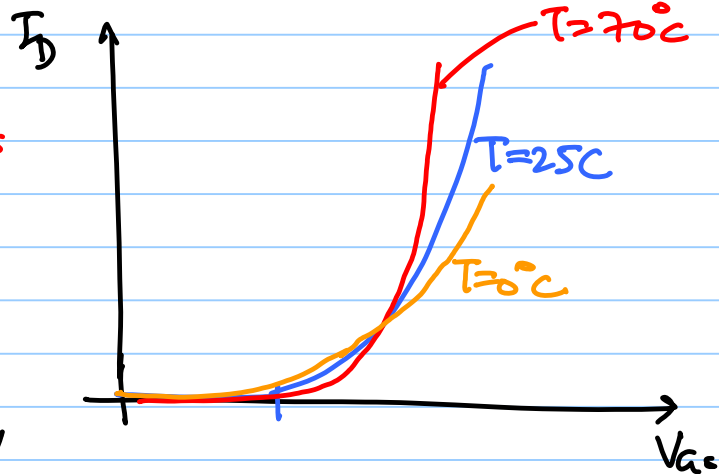


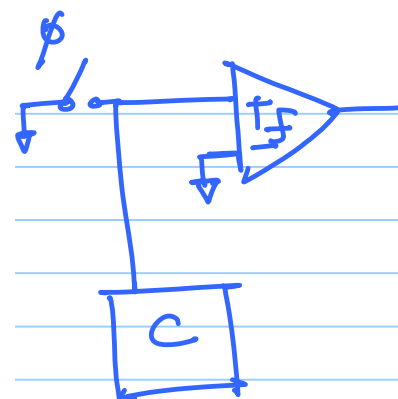
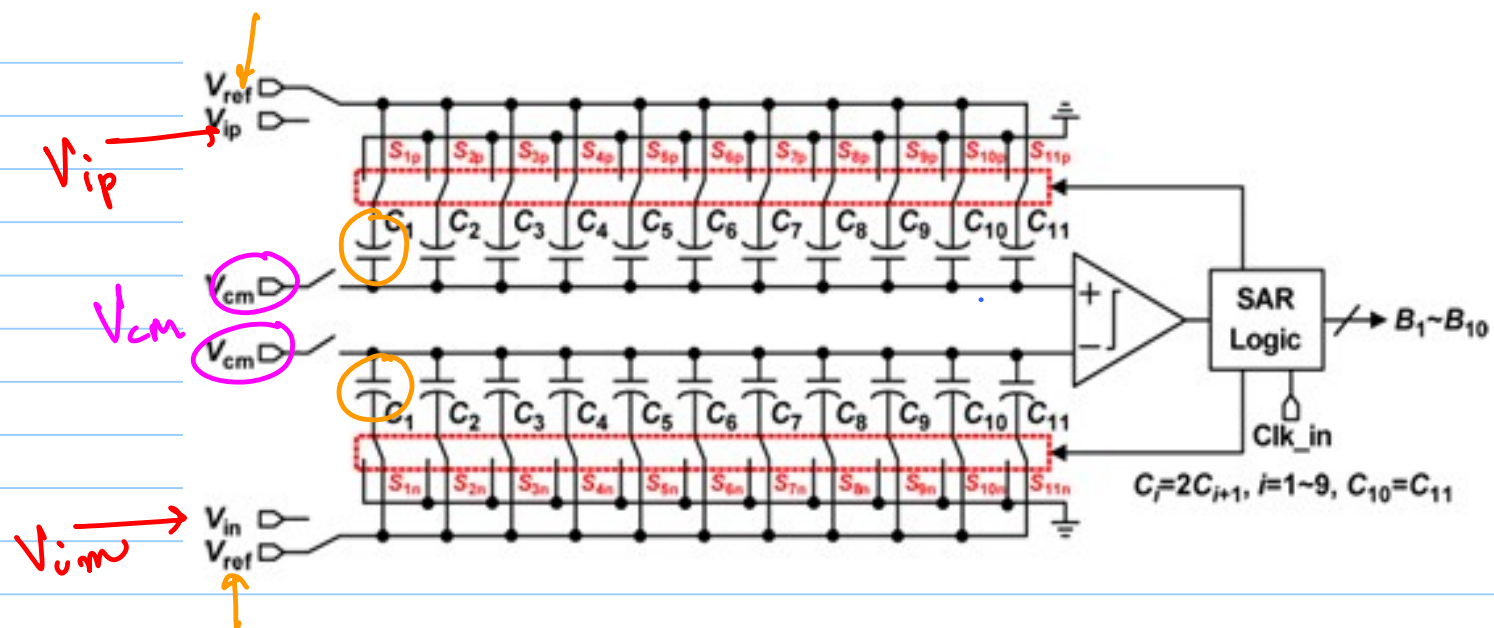
$$I_D = \frac{K P_n}{2} \frac{W}{L} (V_{GS} - V_{THN})^2$$

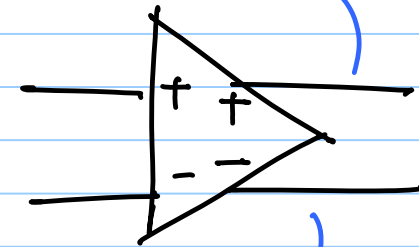
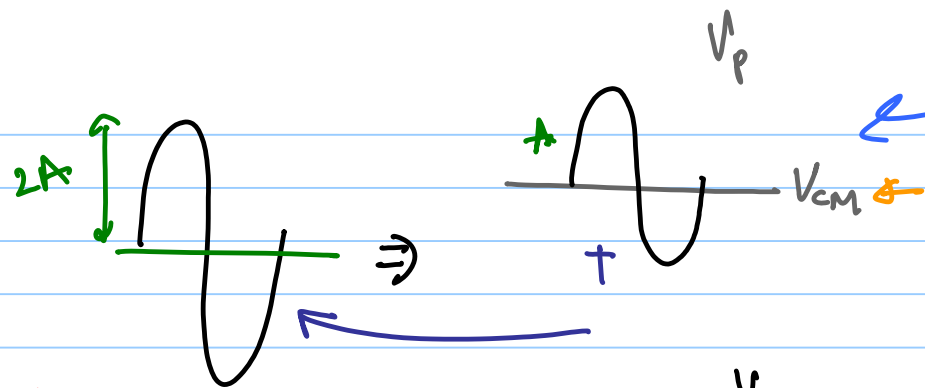
dominates for large V_{GS}

$K P_n = \mu_n C_{ox} \frac{W}{L}$
 $\mu_n \propto T^{-3/2}$

$T \uparrow \Rightarrow V_{THN} \downarrow$



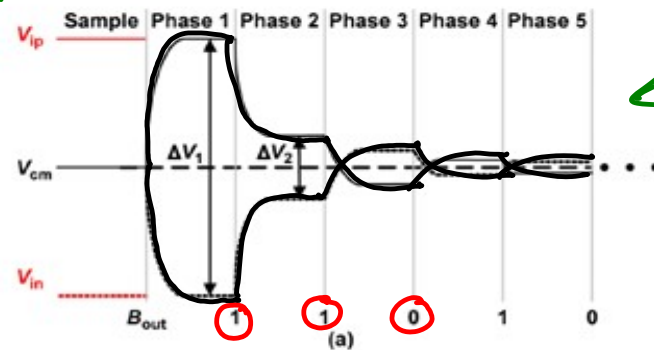
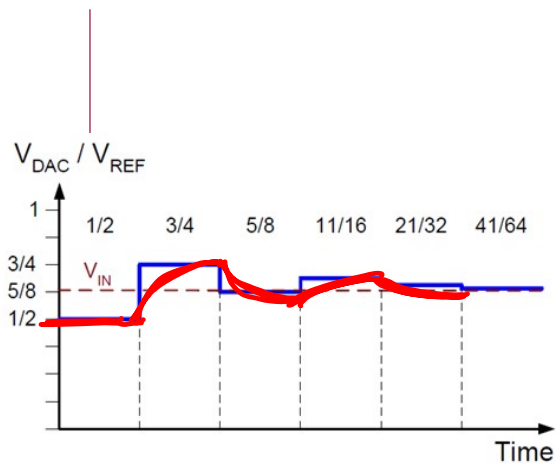




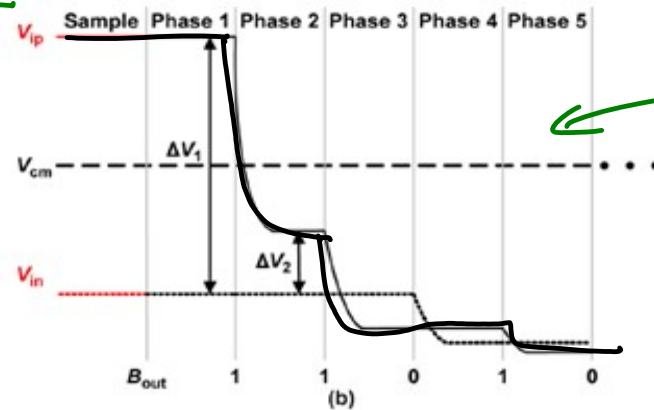
fully-differential
Signal

Single-ended
Signals

$$V_{cm} = \frac{V_p + V_m}{2}$$

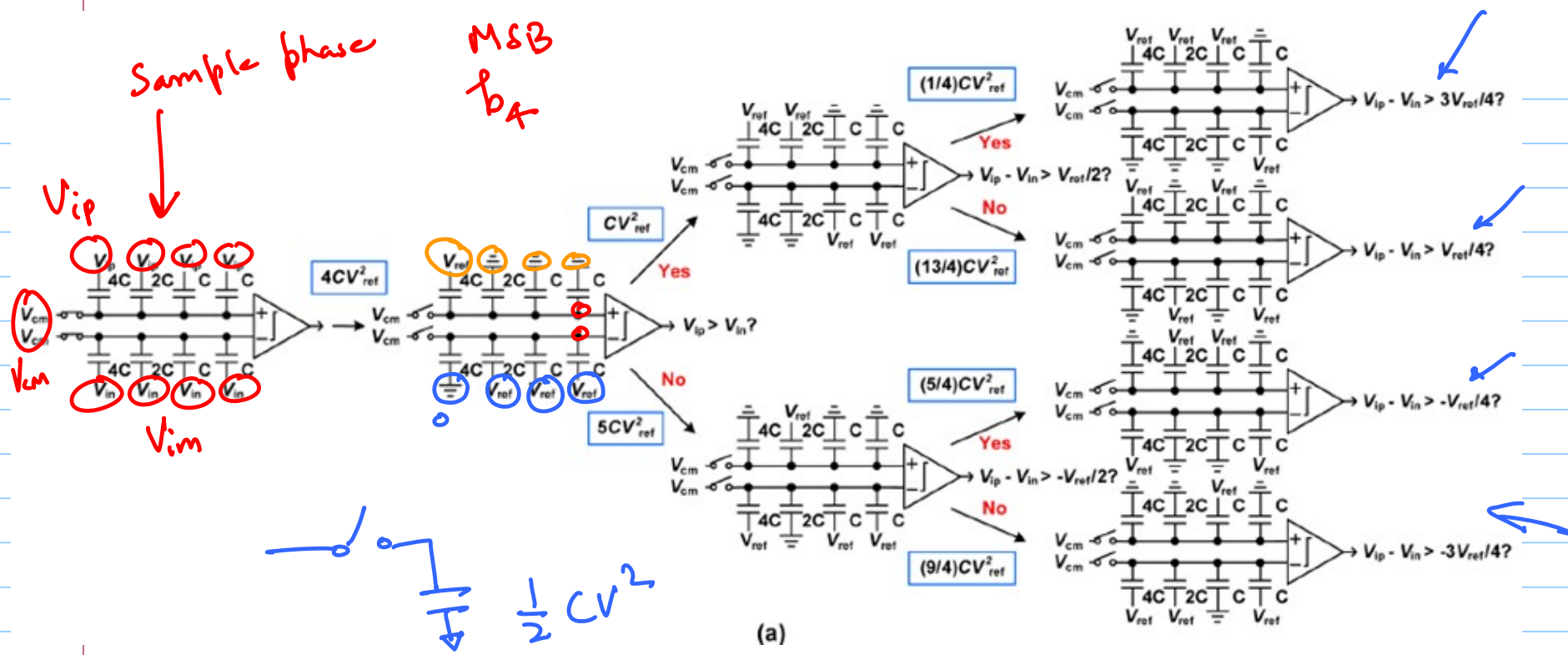


FD SAR



Monotonic Switching Process

Fig. 4. (a) Waveform of conventional switching procedure. (b) Waveform of monotonic switching procedure.

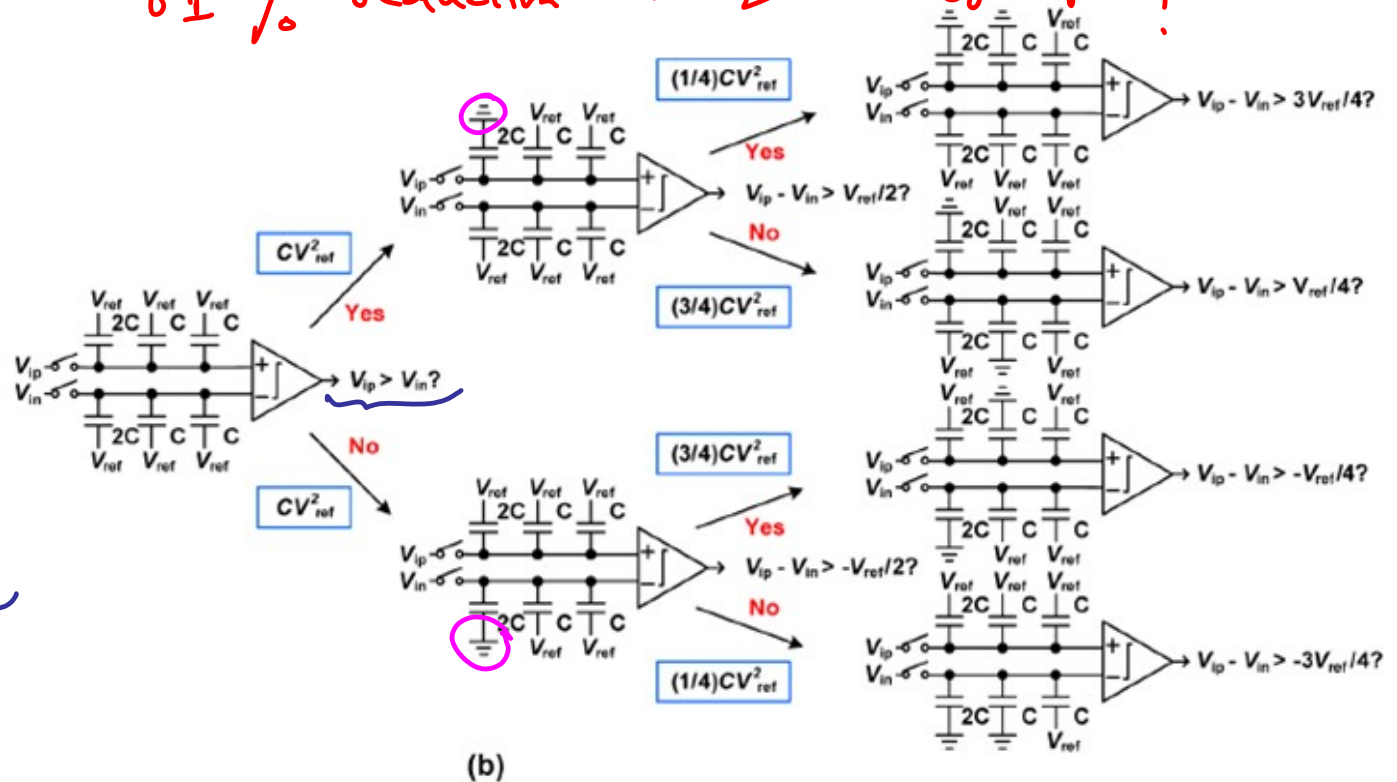


81% reduction in $\frac{1}{2}CV^2$ energy spent!

Sample phase

V_{ip}
 V_{in}
 V_{im}

Input is sampled
on comparator
inputs



Time-interleaved SAR ADCs

