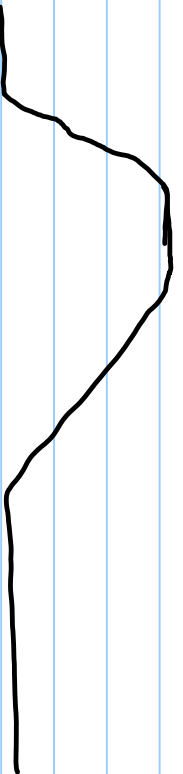
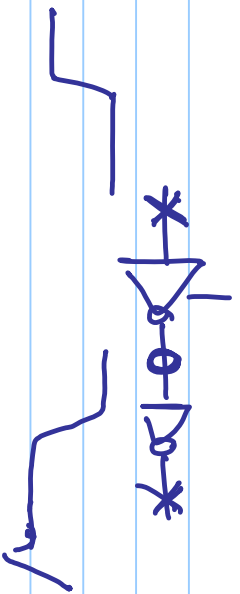
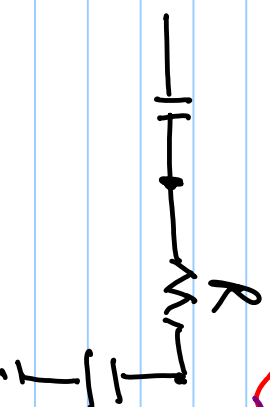
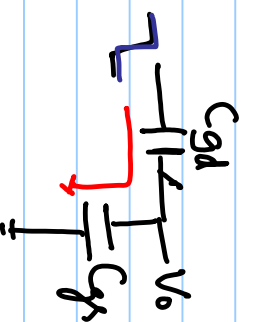
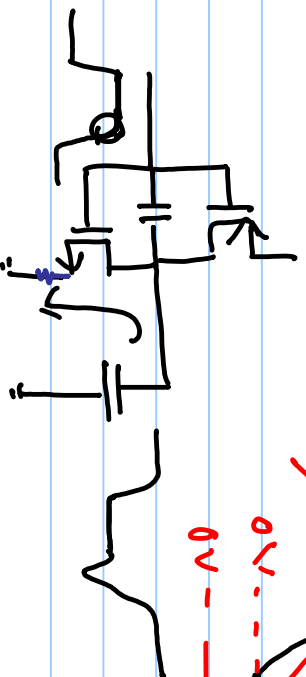
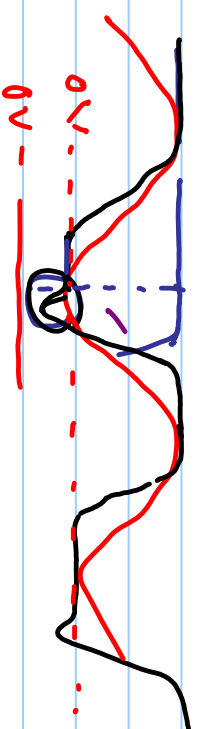
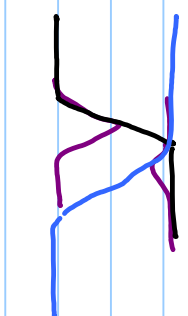
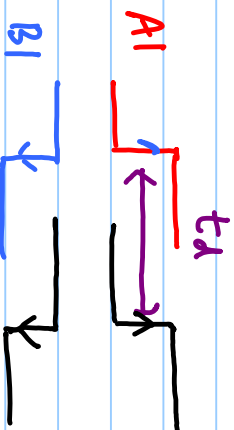
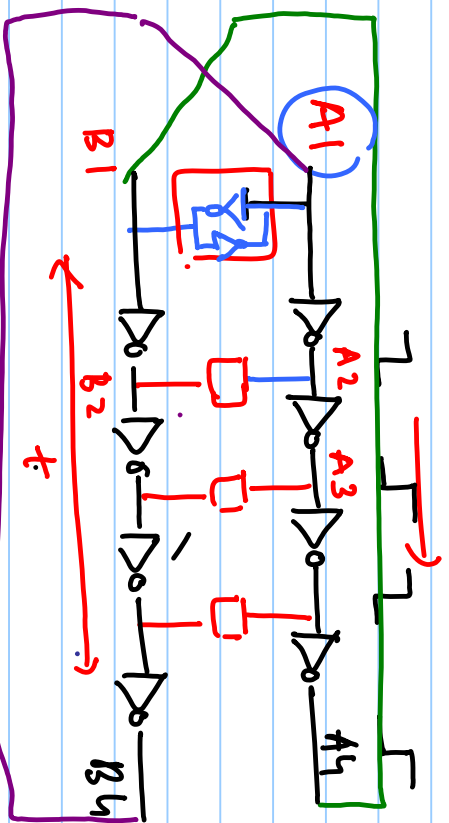
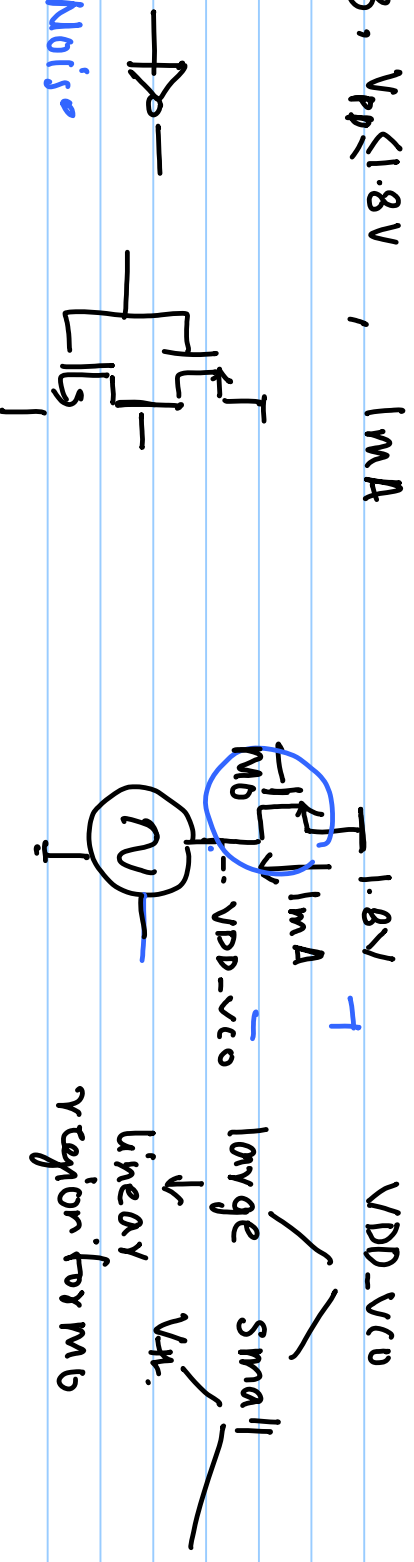


Lecture # 32



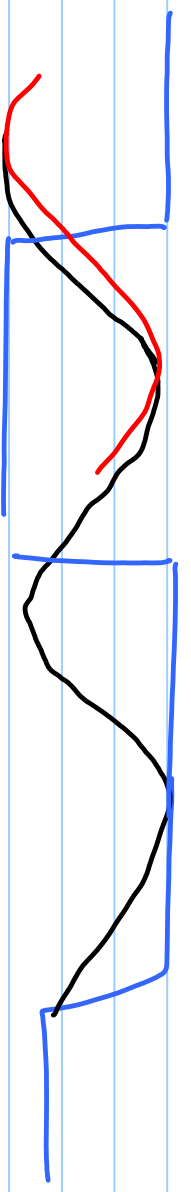
Osc. 1 GHz, $V_{pp} \leq 1.8V$, 1mA



Current Source Noise

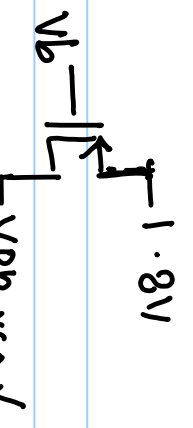
Thermal Flicker

$|V_{thp}| = V_{thn} = 0.6$, $V_{DD-VCO} = 0.65V$

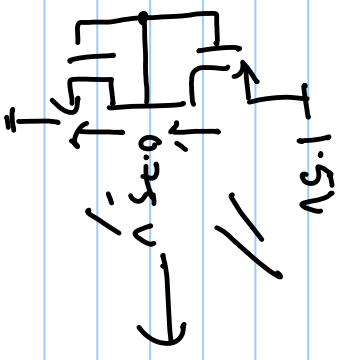


Large $V_{DS} \rightarrow$ large V_{DSat} \rightarrow large length

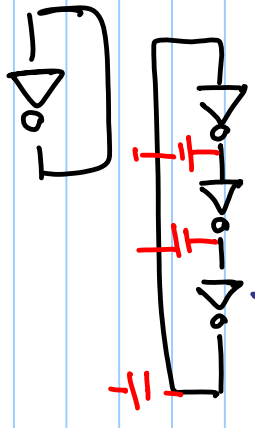
$V_{DD-VCO} > \max(|V_{tnp}|, |V_{tn}|)$



MO : $|V_{nsp}| = |V_{tn}| = 0.2V$



max. freq: 100pK.

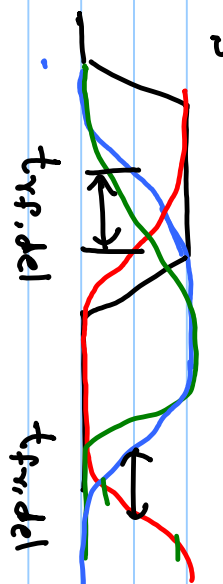
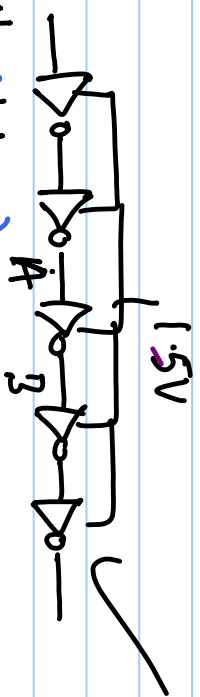
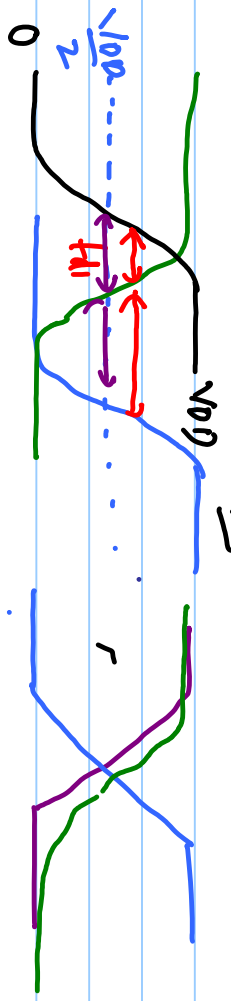


- minimum no. of inverters
- delay is decided by V_{DD-VCO}
- $1.2V = V_{DD-VCO}$.

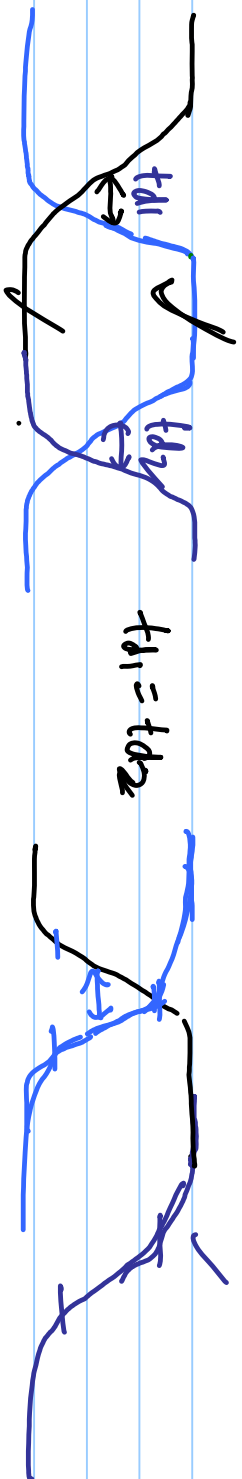


$V_{DD-VCO} \leq 1.6V$ $V_{DD-VCO} = 1.5V$

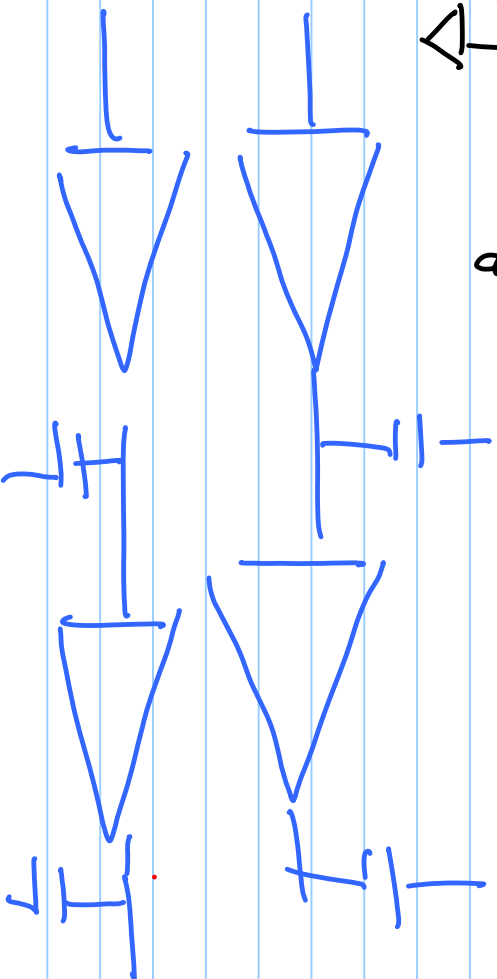
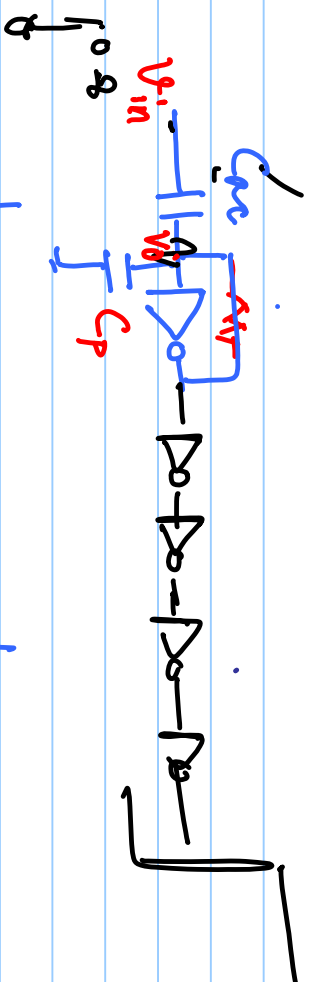
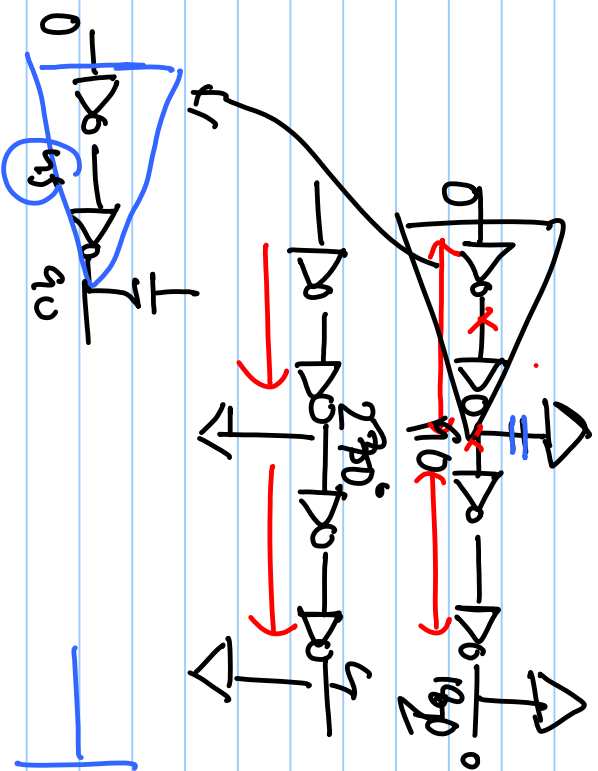
SS, tt, f4 1.6Hz



$t_{trf,del} = t_{tdf,del}$, $t_{rise} \neq t_{fall}$



Φ_0
 Φ_{180}
 Φ_{270}



Charge Pump

