Design Exercise 3

IECE420/520/ICSI522: Introduction to VLSI

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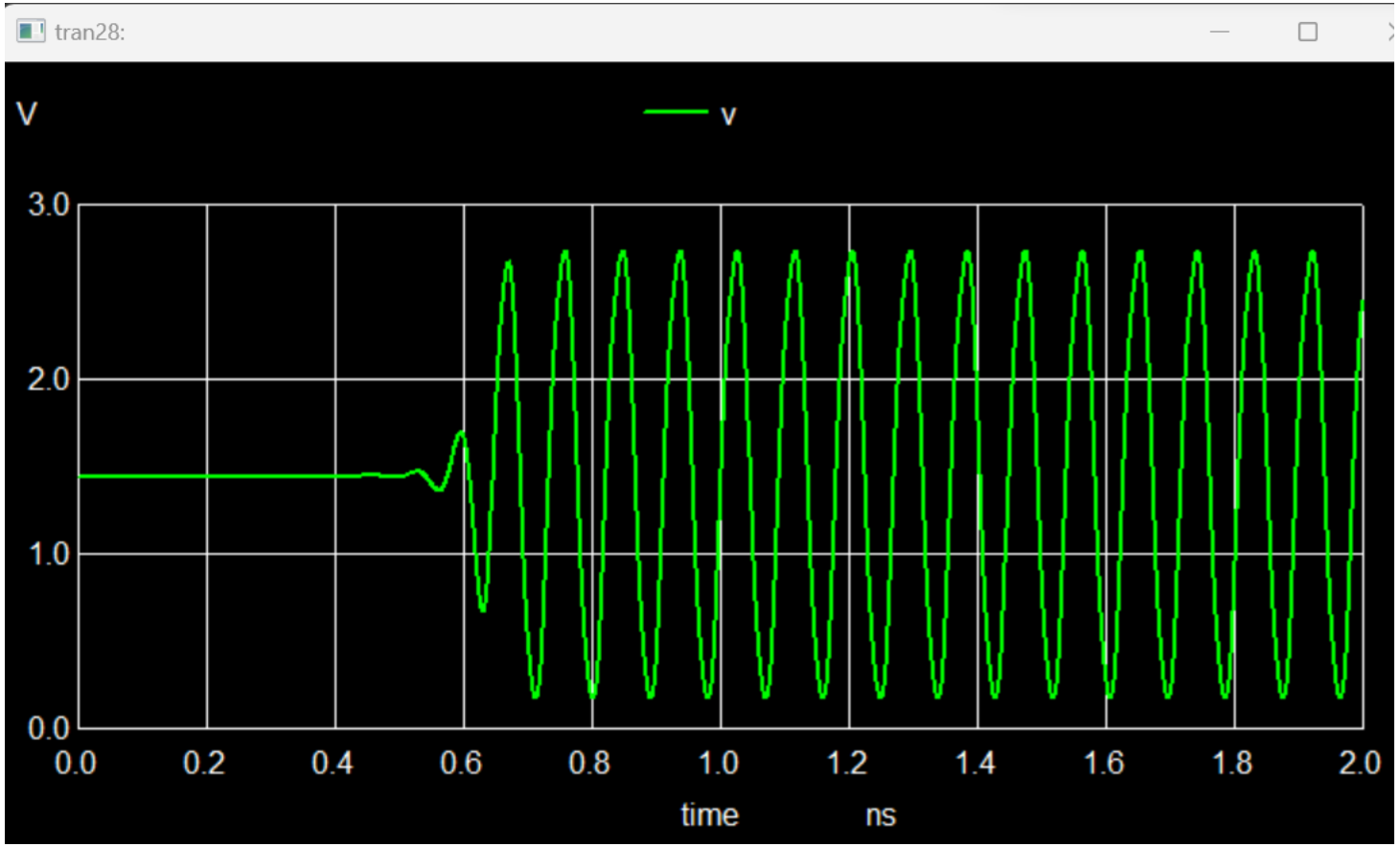
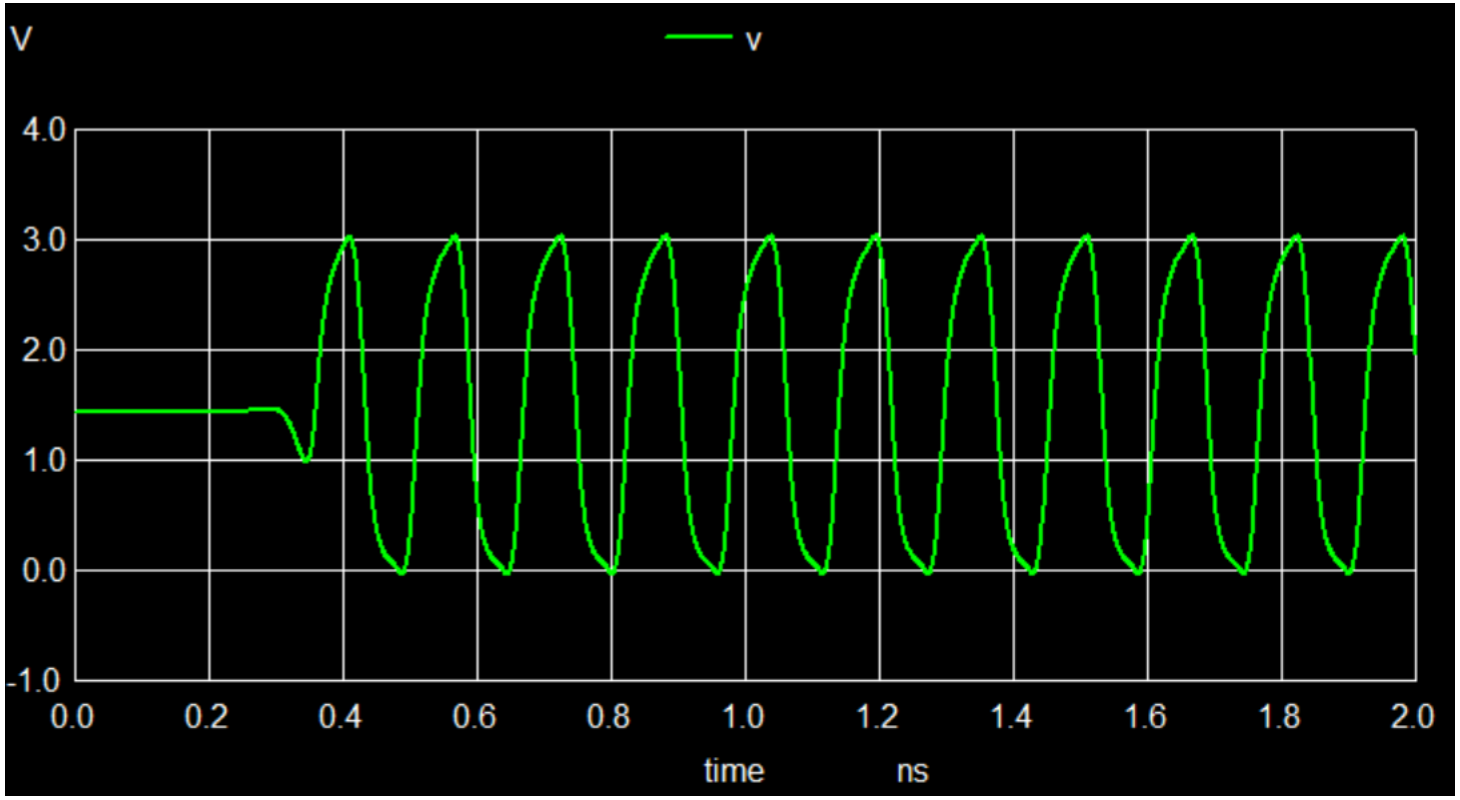
Questions

$2\lambda = 0.18\mu$, $L_{min} = 2\lambda$, $W_{min} = 4\lambda$

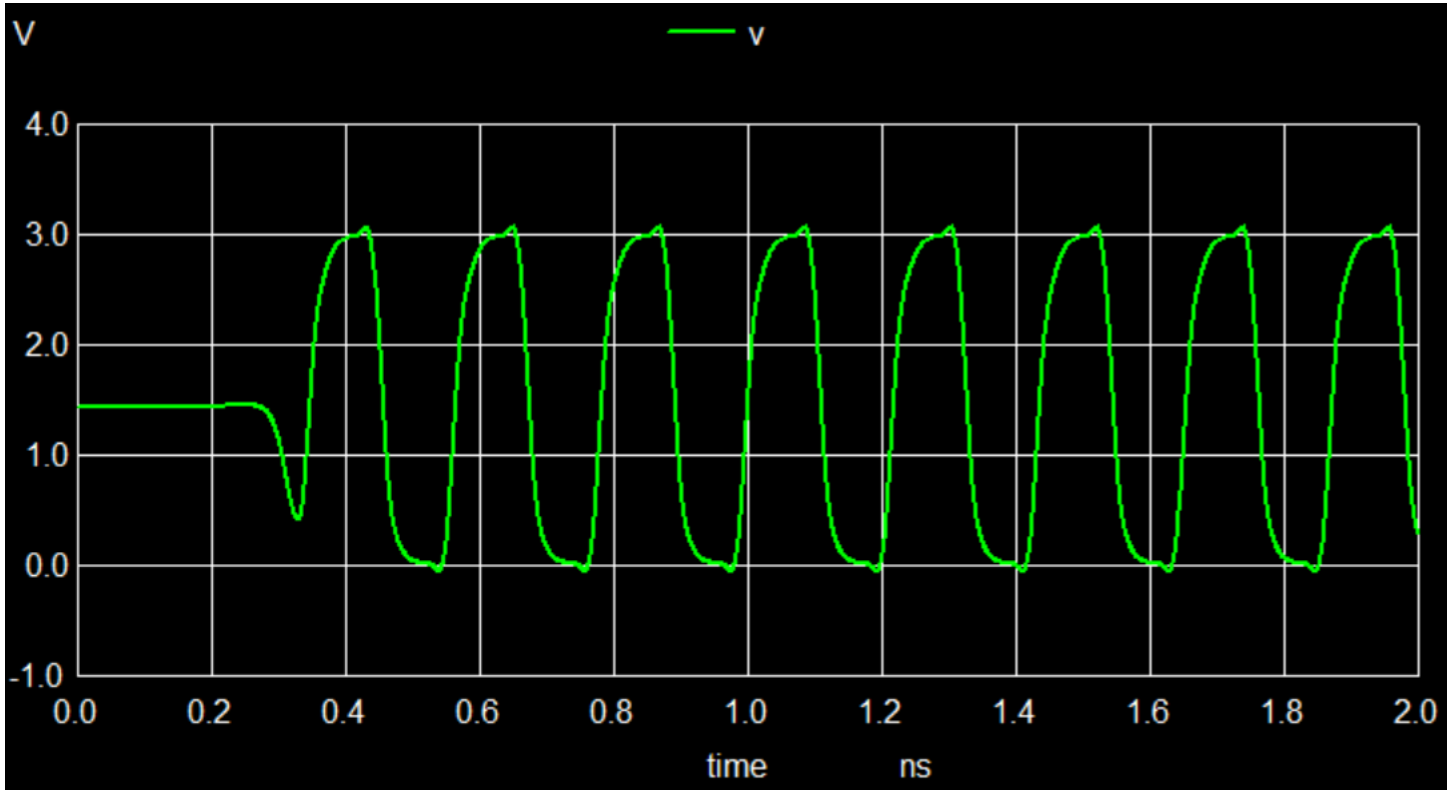
1. Using SPICE, simulate and plot the output for a ring oscillator (built using unit inverters) of
   a) 3 stages (1 point)



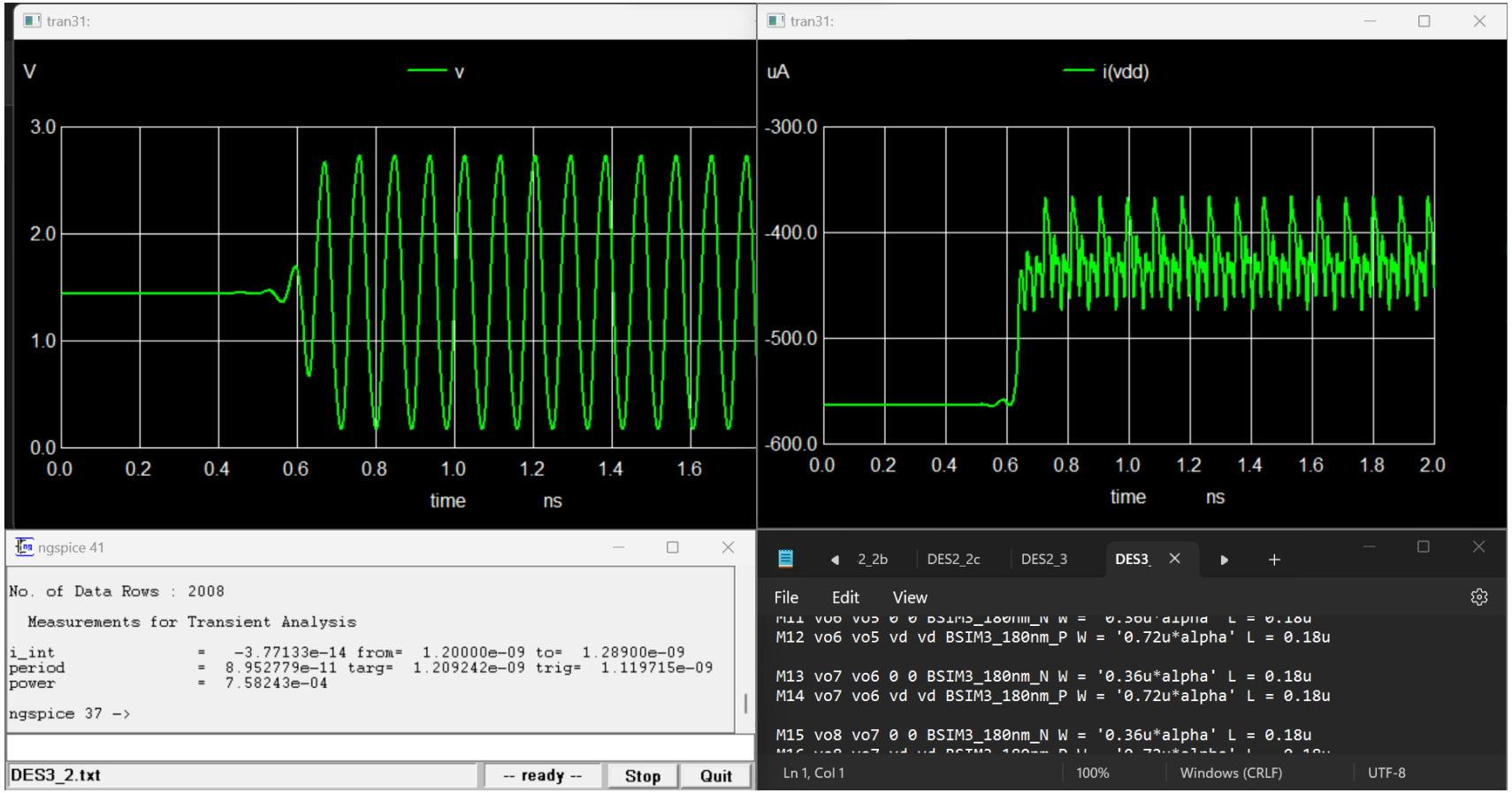
b) 5 stages (1 point)



c) 7 stages (1 point)

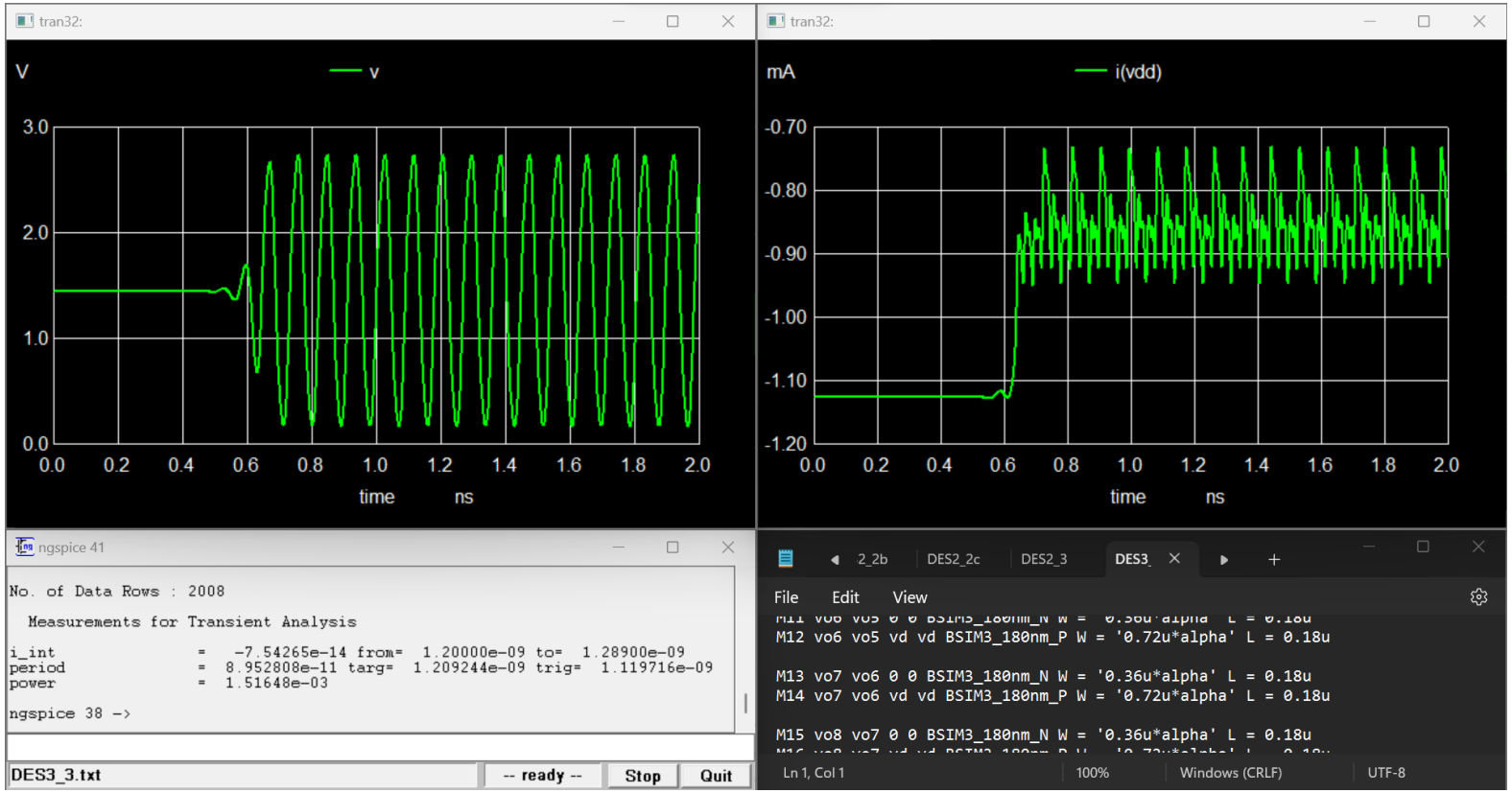


2. Compute average dynamic power of a 3-stage ring oscillator (RO) built with unit inverters (2 points)



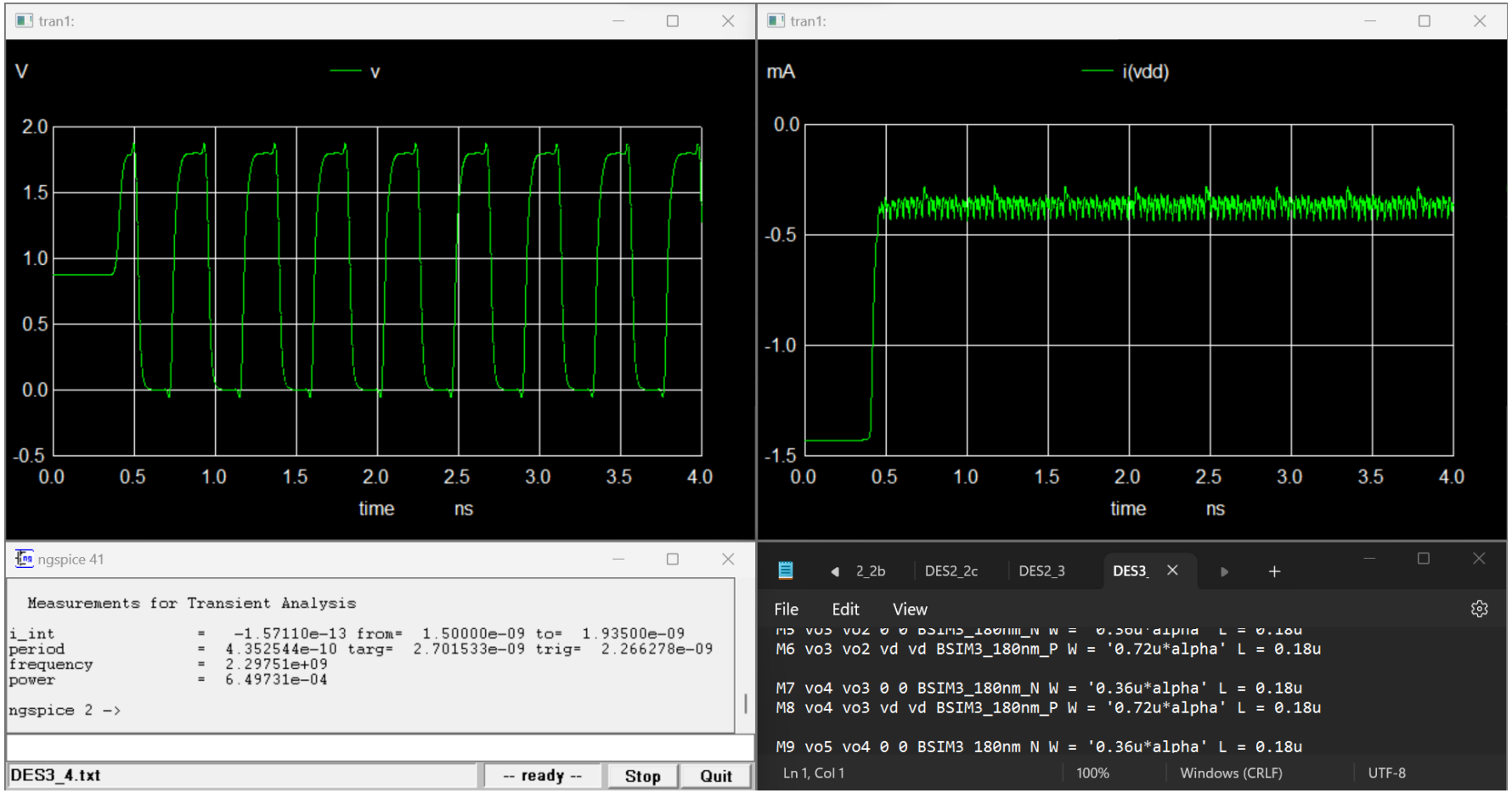
power = 7.58e-4W

3. 5xx (extra credit for 4xx): Let α be the upsizing factor on the unit inverter. Repeat question 2 with α = 2 (1 point)



power = 1.51e-3 W

4. 5xx extra credit (not for 4xx): Repeat question 3 for RO with 11 stages (1 point)



Power = 6.49e-4 W