AnalogIC Assignment 2

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1 Part A

Question 1

The W & L values that satisfy the requirements was found by varying the minimum and maximum allowable values of the transistor for each parameter and choosing the parameters which maximized for output AC magnitude; this process is shown in figures 1.1 - 1.2. It was found that $W = 16.3\mu m$ and $L = 0.18\mu m$ provide an AC output magnitude larger than 10V/V while keping the transistors in saturation as shown in figures 1.3 - 1.4. In this instance, the V_{ds} is limiting the voltage swing as the output voltage is closer in value to V_{th} than V_{DD}; the output swing is $217.198mV$.

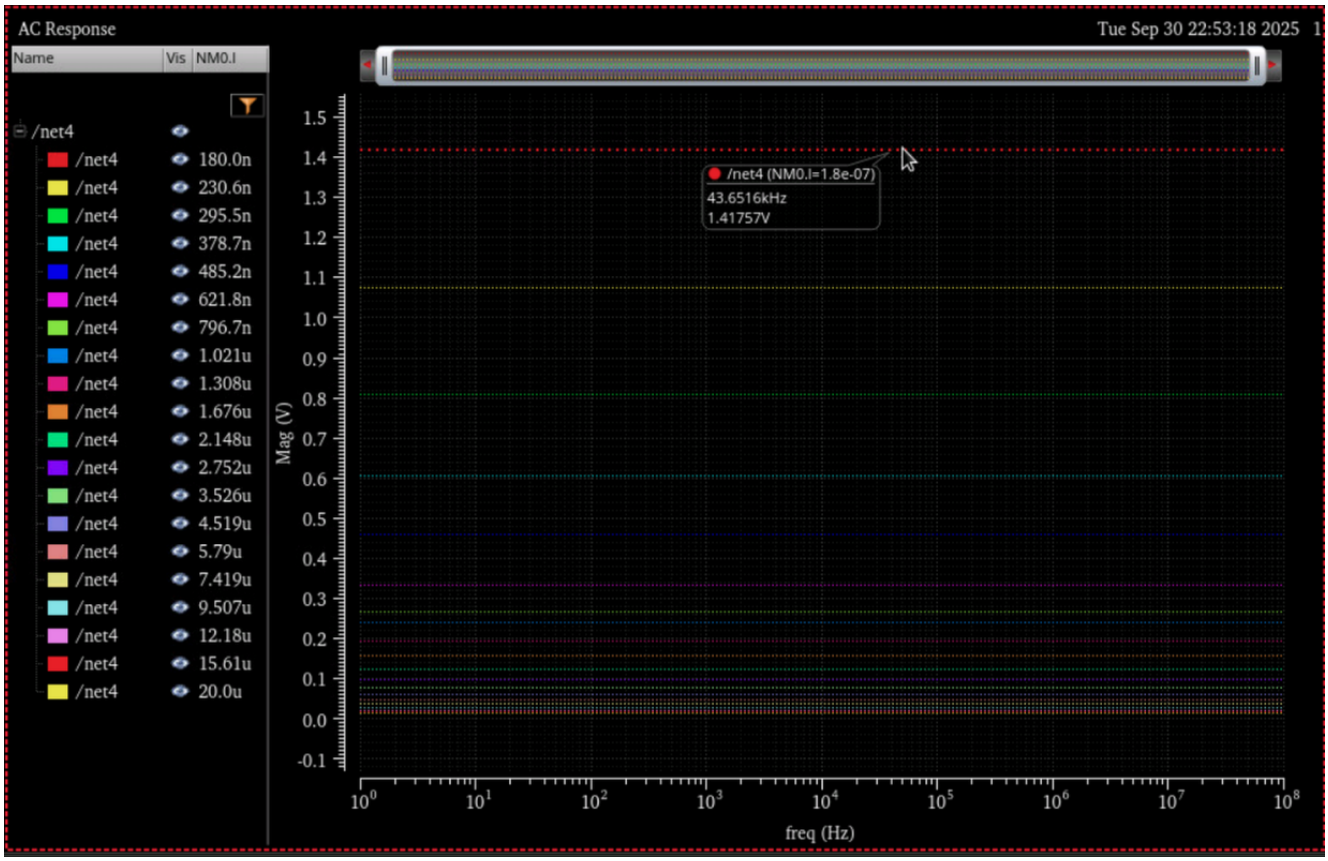

Figure 1.1: AC magnitude results with $W = 1\mu m$ and Length varied

Question 2

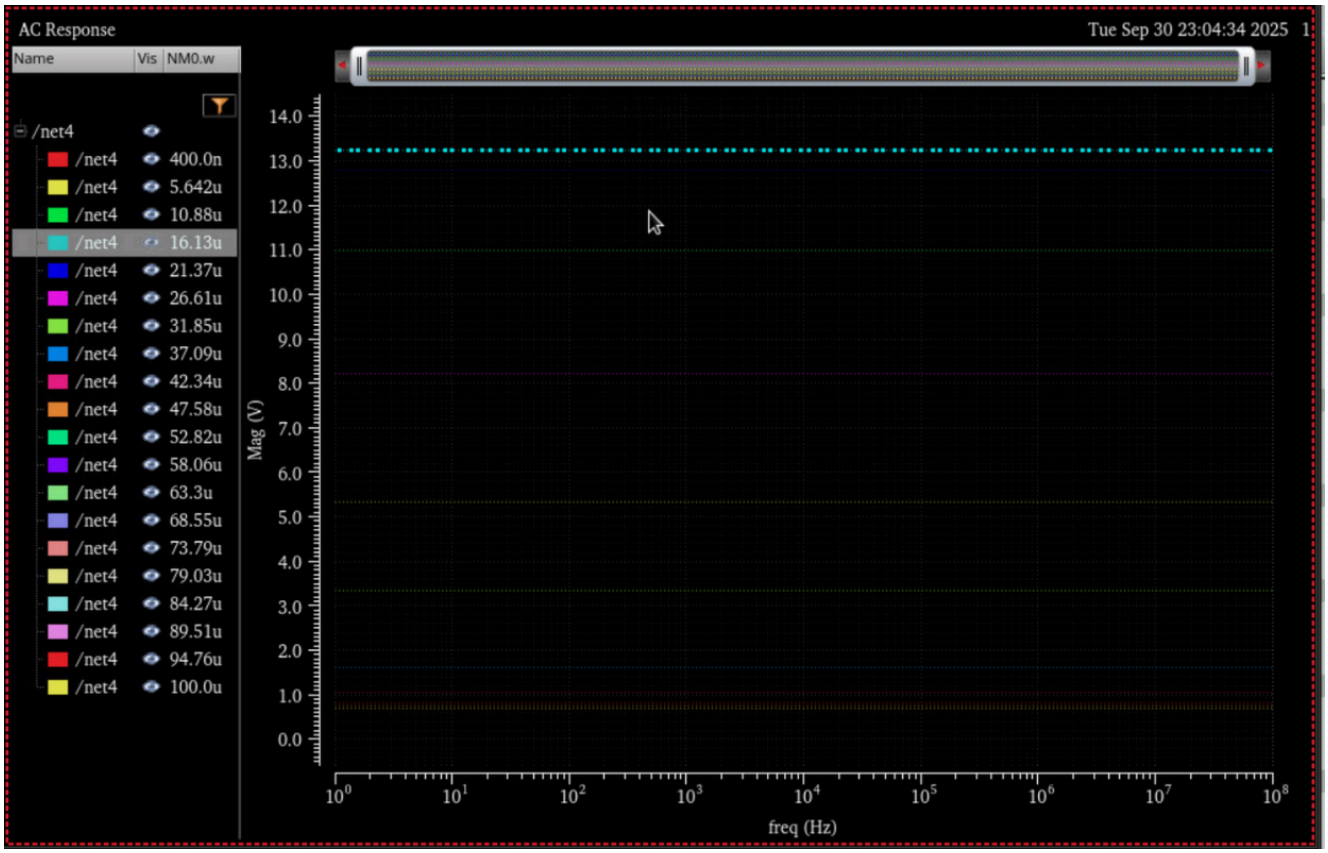

Figure 1.2: AC magnitude results with $L = 0.18\mu m$ and Width varied

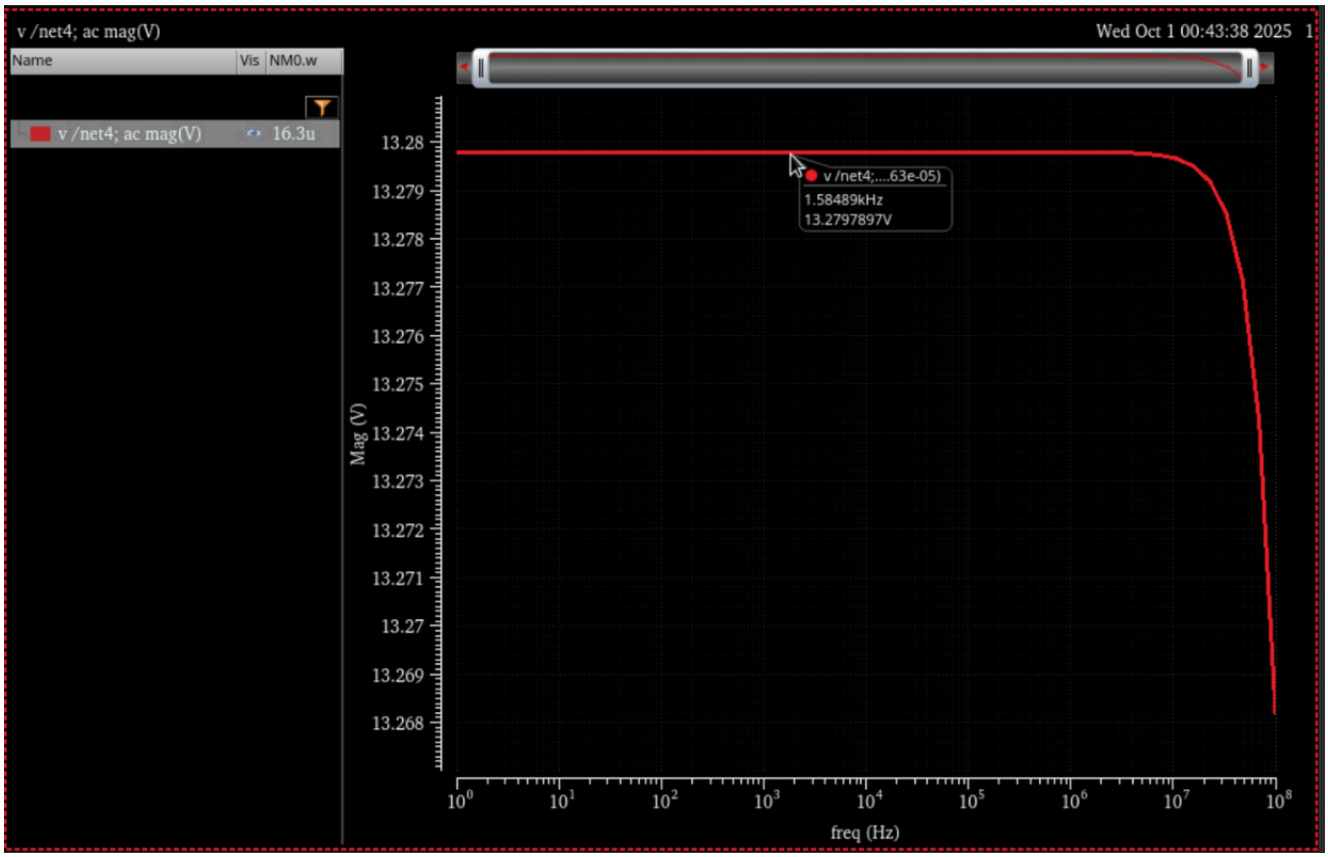

Figure 1.3: AC magnitude results with $W = 16.13\mu m$ and $L = 0.18\mu m$

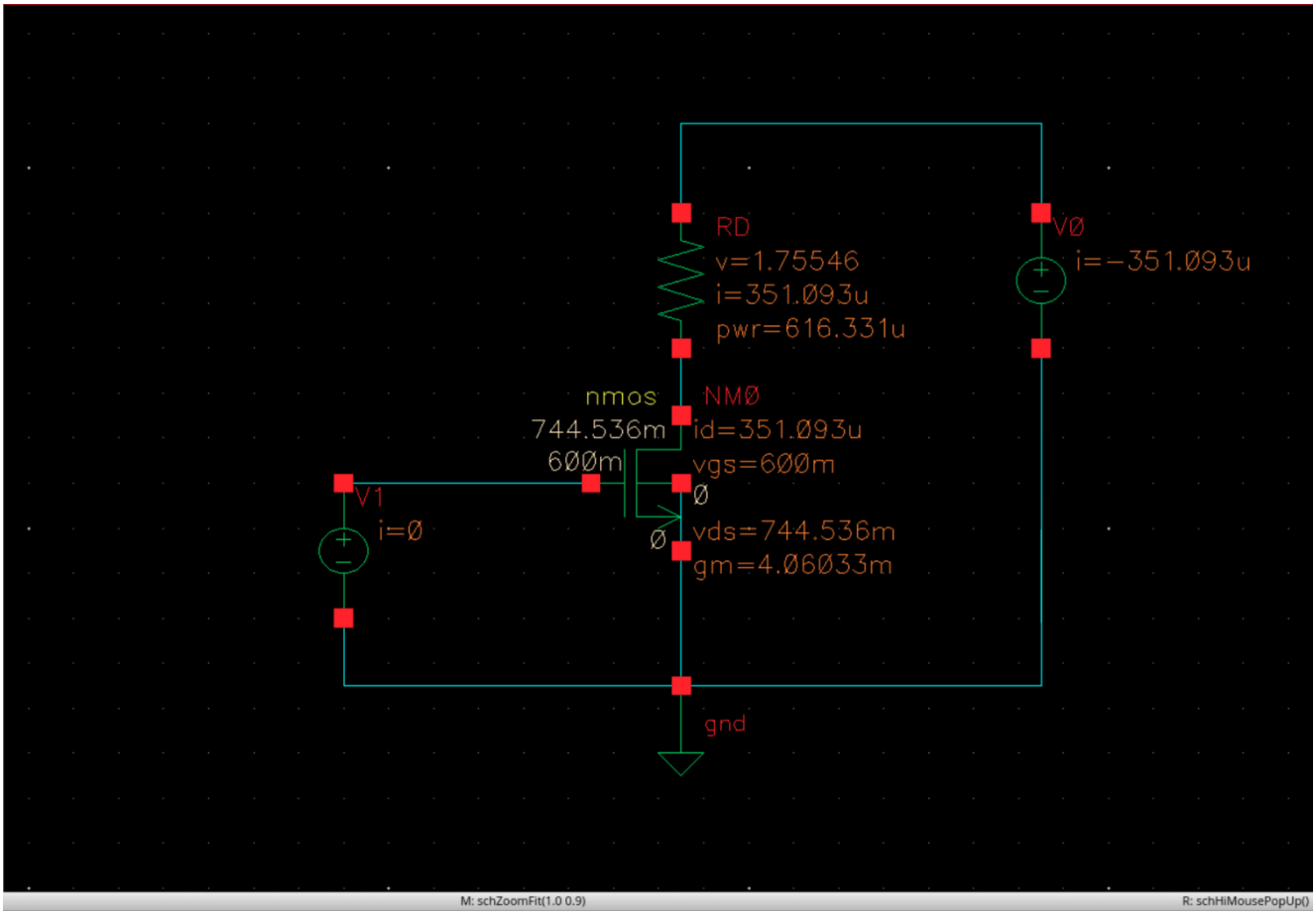

Figure 1.4: Schematic of circuit with DC operating points shown for $W = 16.13\mu m$ and $L = 0.18\mu m$

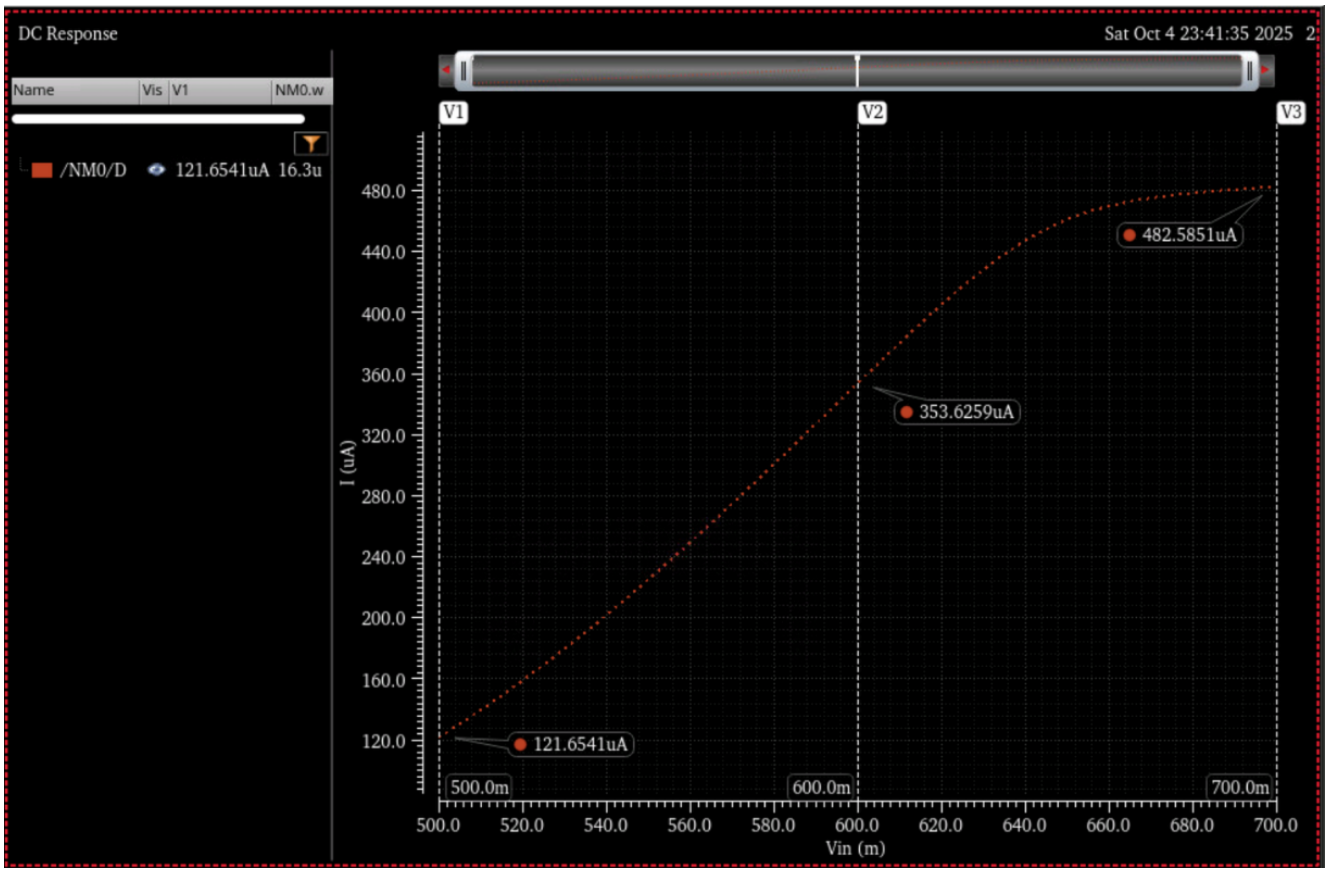

Figure 1.5: output DC current with $\pm 10mV$

2 Part B

Question 1

The same process as Part A Question 1 was used to find the W & L Values (figures 2.1 - 2.2), being $W = 42.34\mu m$ and $L = 0.18\mu m$. The results can be shown in figures 2.3 and 2.4. The DC current of this amplifier was $351.093\mu A$. The output swing found is $229.907mV$, which is limited by V_{ds}.

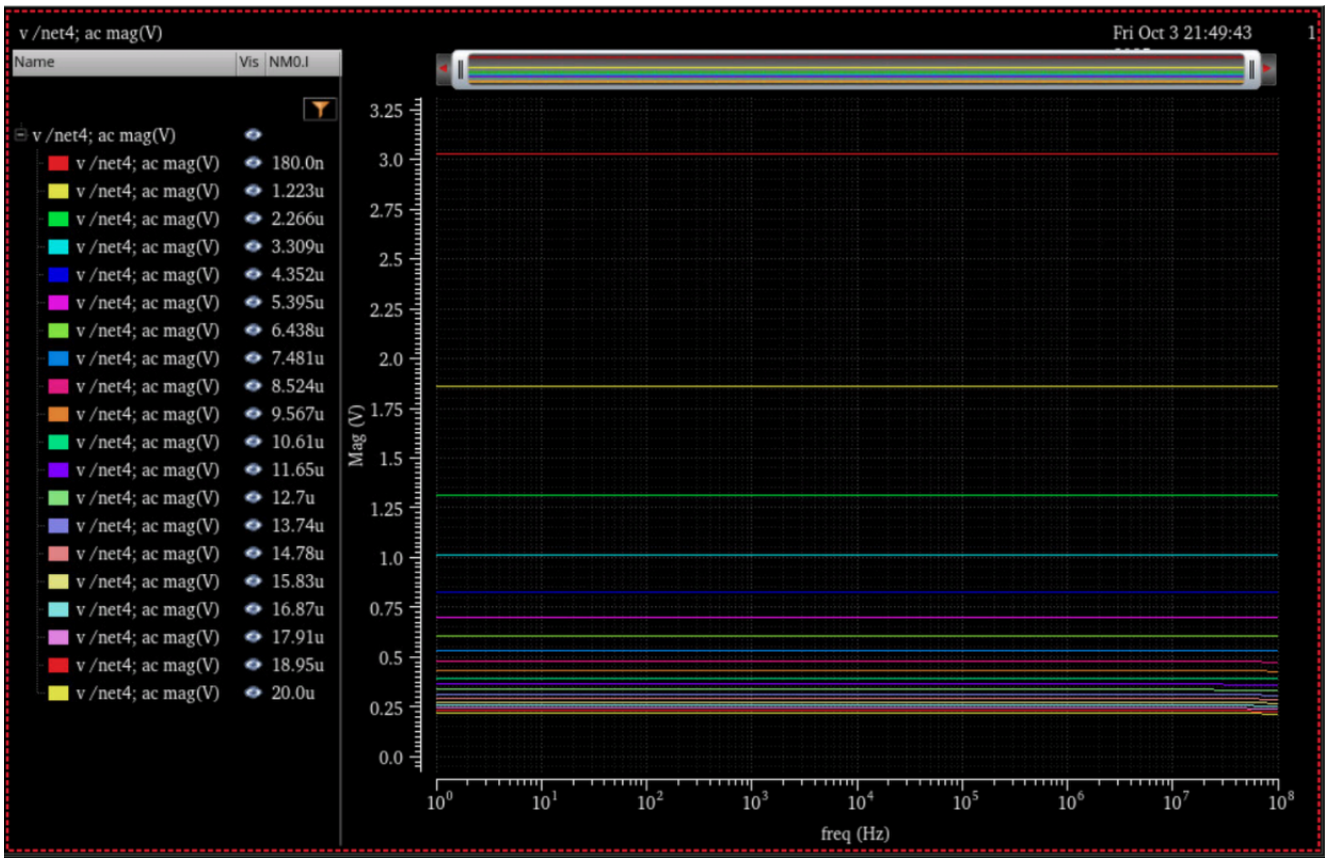

Figure 2.1: AC magnitude results with $W = 3\mu m$ and Length varied

Question 2

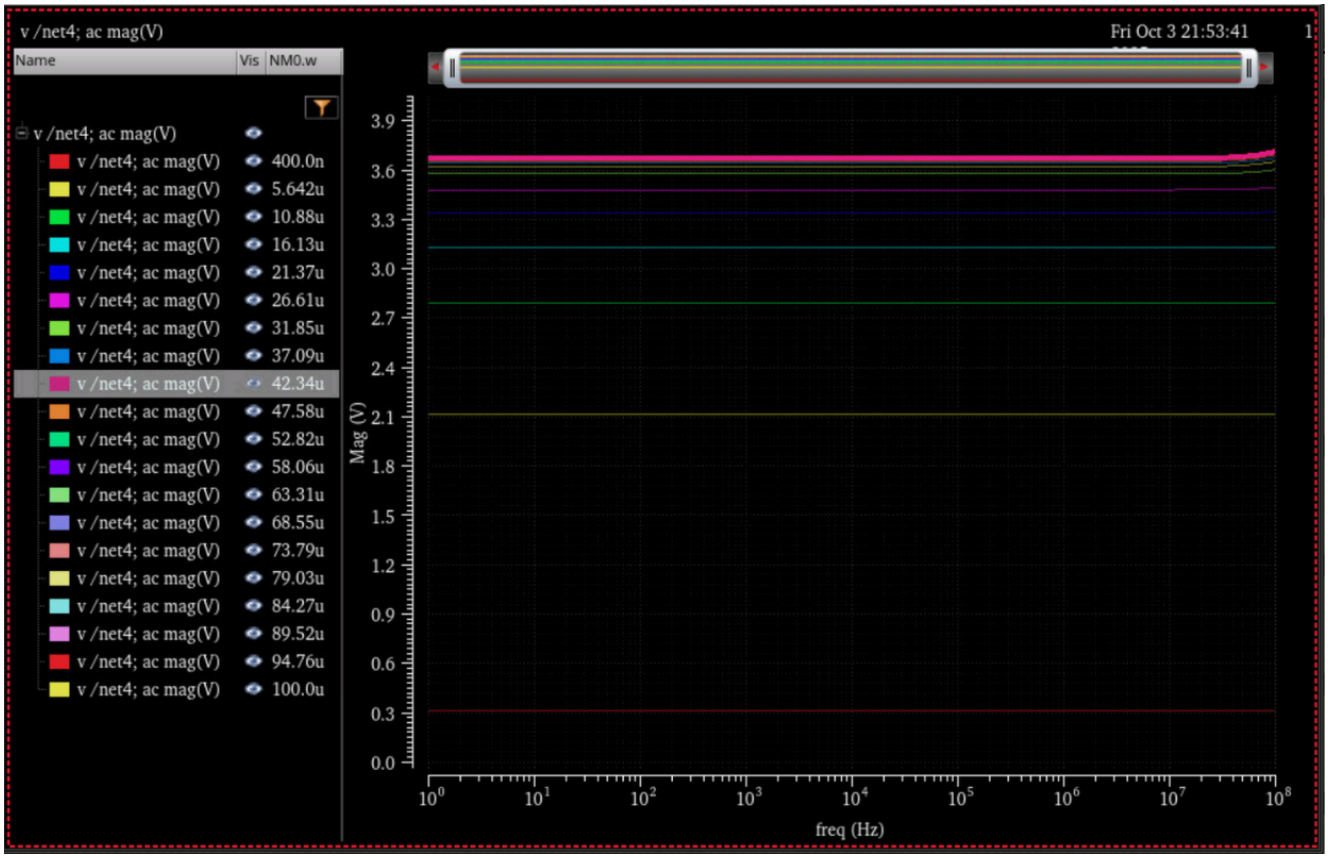

Figure 2.2: AC magnitude results with $L = 0.18\mu m$ and Width varied

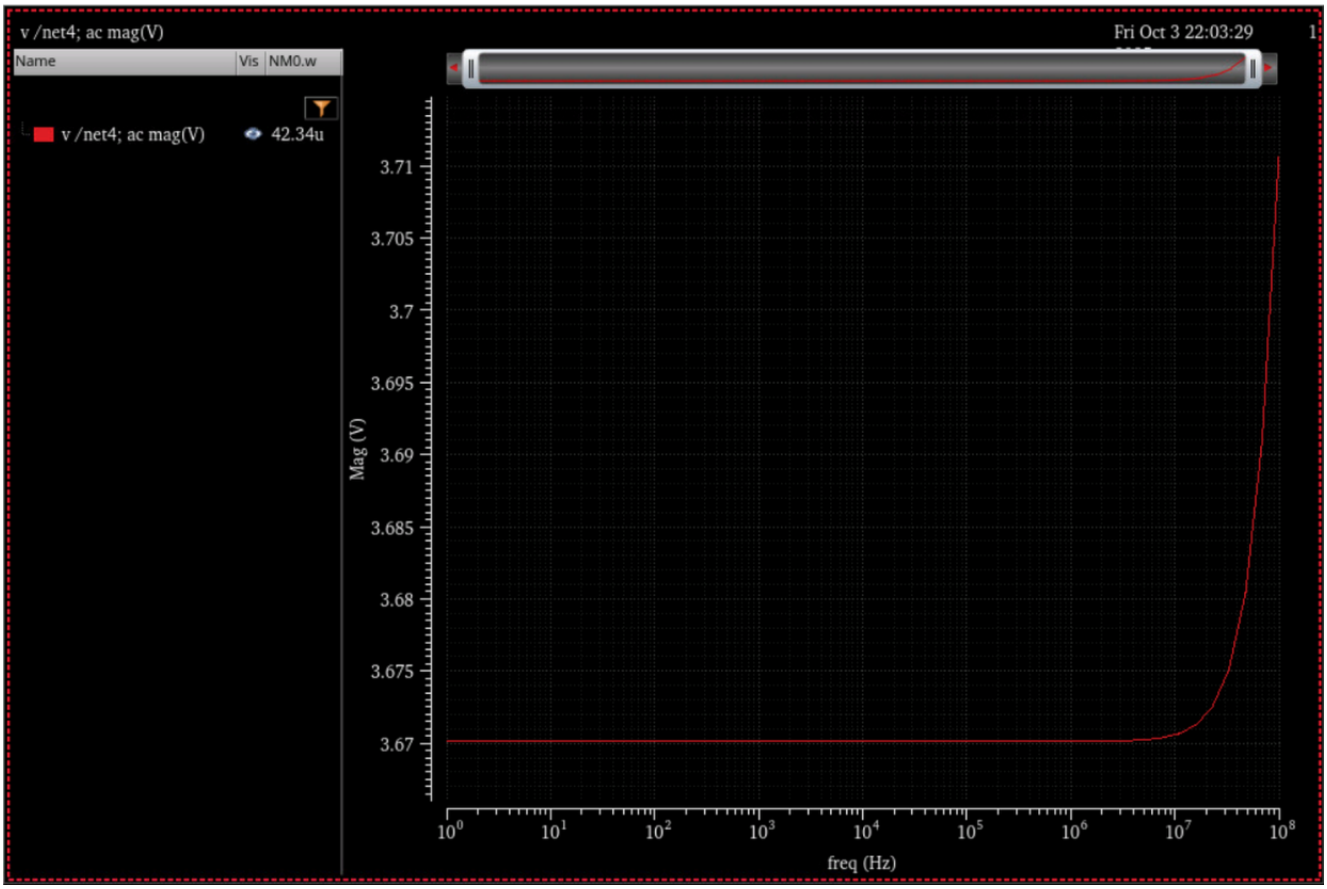

Figure 2.3: AC magnitude results with $W = 42.34\mu m$ and $L = 0.18\mu m$

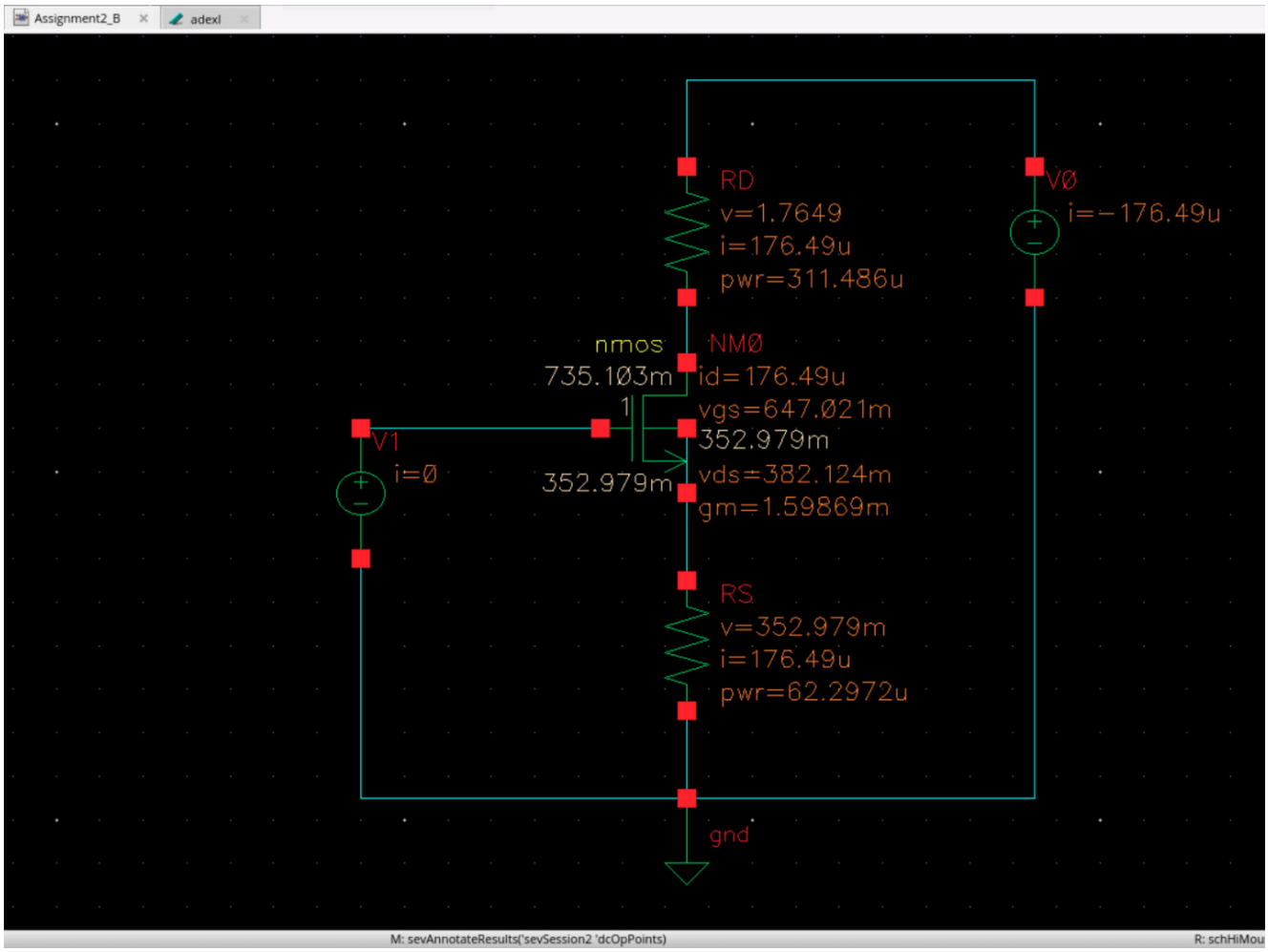

Figure 2.4: Schematic of circuit with DC operating points shown for $W = 42.34\mu m$ and $L = 0.18\mu m$

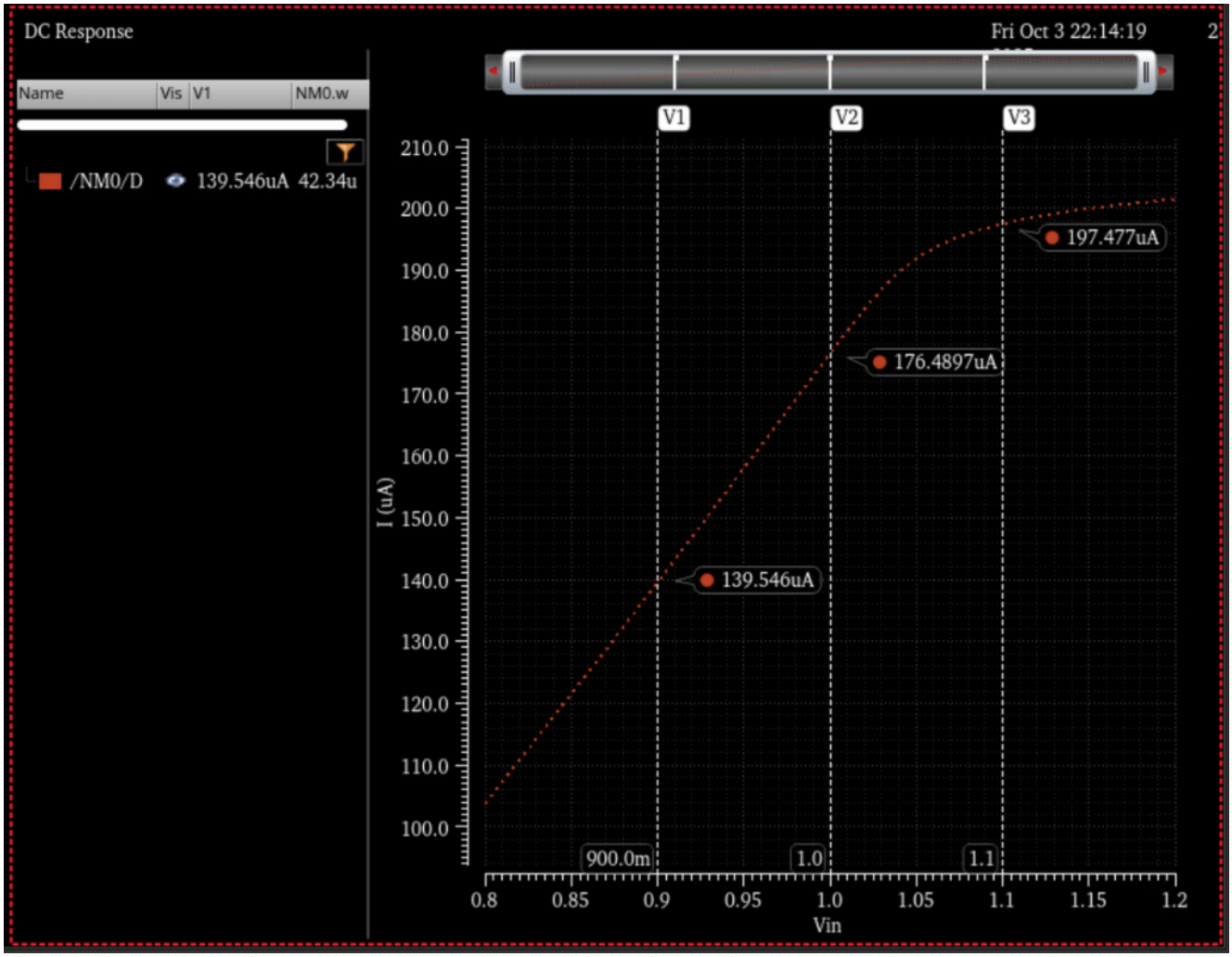

Figure 2.5: output DC current with $\pm 10mV$