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LE3.1

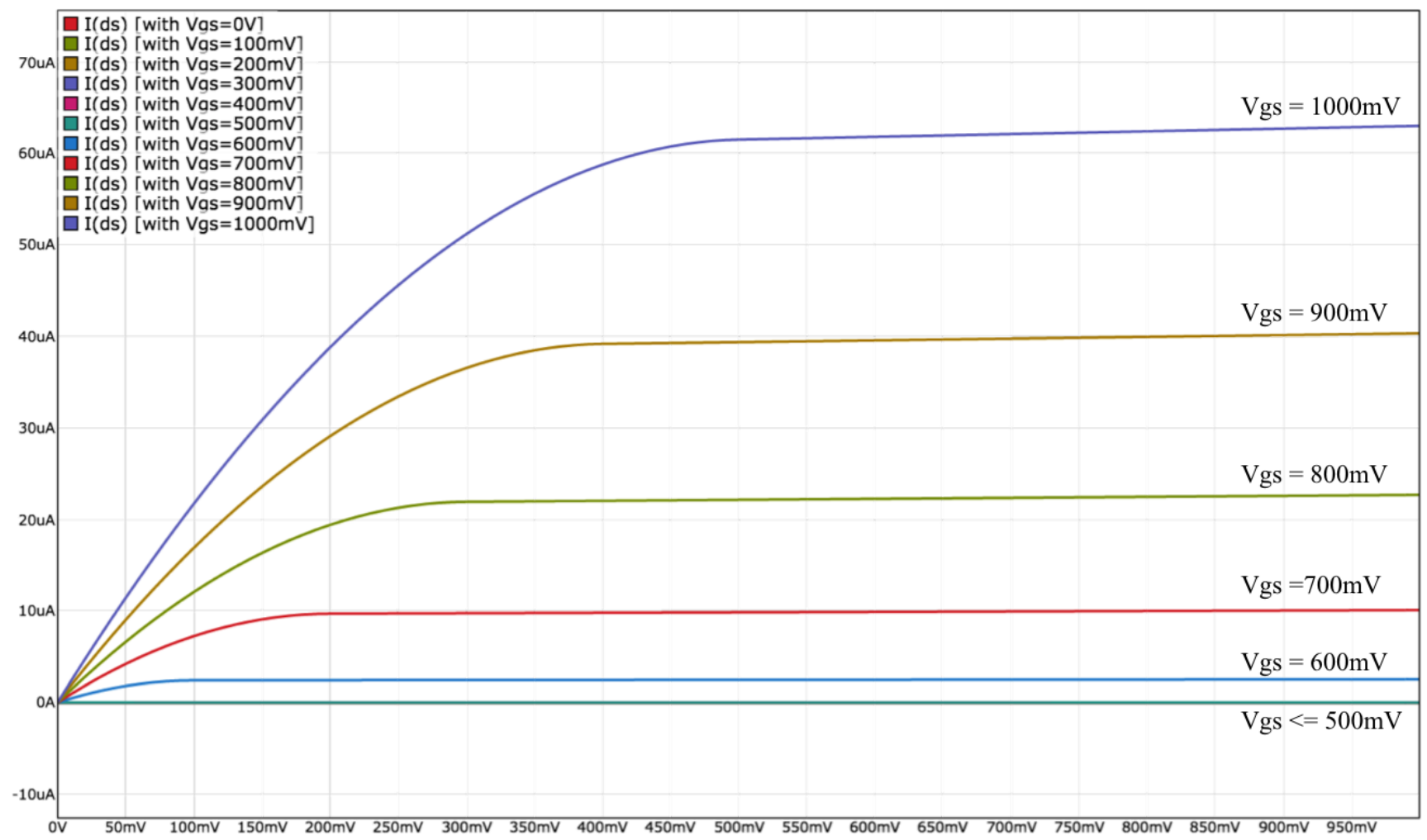
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LE3.1.1: MOSFET Measurements

3/3 points (ungraded)

Here's the figure from the last video showing I_{DS} as a function of V_{GS} and V_{DS} . The threshold voltage, V_{TH} , of the MOSFET is 0.5V. The measurements were taken using an n-channel MOSFET with a width of 4 and a length of 1, expressed as multiples of the minimum feature size for a particular manufacturing process.

In the graph below, the vertical axis is I_{DS} and the horizontal axis is V_{DS} .



Please use the plots to answer the following questions.

(A) If $V_S = .1V$, $V_D = 0.5V$ and $V_G = 0.8V$, how much current will flow through the MOSFET switch, i.e., what is I_{DS} ? Note that the units are in μA .

I_{DS} (in μA , $\pm 10\%$): ✓

(B) Using the topmost curve in the figure, we see that when $V_{GS} = 1V$ and $V_{DS} = .15V$, $I_{DS} = 30\mu A$. Please compute the effective resistance R_{eff} using Ohm's Law, which tells us $V_{DS} = I_{DS}R_{eff}$.

R_{eff} (in Ohms, $\pm 10\%$): ✓

(C) If we changed the width of the MOSFET from 4 to 6 and remeasured I_{DS} when $V_{GS} = 1V$ and $V_{DS} = .15V$, give an approximate value for the new I_{DS} measurement. Hint: $I_{DS} \propto W/L$.

I_{DS} (in μA , $\pm 10\%$): ✓

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<input checked="" type="checkbox"/> <u>(b),,(c).</u> For (B), why is $I_{DS}=30e-6$? For (C), how do we know if I_{DS} is $30\mu A$? and what does the sign between I_{ds} and W/S mean?	4
<input type="checkbox"/> <u>[STAFF] The course is archived. Where can I find the assignments?</u> Hi, 6.004 staff. I began learning the course two weeks ago. And I found the course hard yet incredibly rewarding and am determined ...	6
<input checked="" type="checkbox"/> <u>Saturated Region ?</u> Hello, In the first Question where we are calculating the value of I_{ds} from the plot we can clearly see it in saturated region of the plot...	4

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