

Lab 7 (38 points total)

7-1 JFET Saturation Characteristics (10 points)

3 points for a range of measurements of I_{DSS} and $V_{GS(off)}$ for each of 3 samples of 2N5485 JFET using a sensitive ammeter

6 points for one plot of $\log I_D$ on the y axis and V_{GS} on the x axis for the 3 samples of 2N5485 JFET (make three different lines, and connect the points with straight lines) (You don't need to show a table of your measurements, although you can if you want to.)

1 point for checking that the values fall within the maximum quoted range

7-2 Discreet JFET Current Sources (6 points)

1 point for $V_{GS(off)}$ of the JFET you decided to use

2 points for a plot of I_{out} over R_L for different values. (Get enough points to get a good sense of the behavior.)

2 points for a plot of I_D over V_{DS} for different values. (Get enough points to get a good sense of the behavior.)

1 point for the exact point at which the FET starts to break down (Point out this point on your plot of I_D over V_{D} .)

1 point for "Does your FET's 'active region' begin around this value of V_{DS} ?"

7-3 Improved Current Source (6 points)

1 point for "What is the expected value of I_{out} , the current through the load?"

3 points for table of R_D , V_{DS} , and I_{out} for different values. (Get enough points to get a good sense of the behavior.)

1 point for discussion on if the JFET's linear region (the region with V_{DS} below $V_{GS} - V_{GS(off)}$) restricts the range of circuit performance

1 point for comparing the range of circuit performance to 7.2

7-4 Source Follower (8 points)

1 point for screenshot of small ($0.1 < V < 1$) 1kHz sine wave input and output with peak-to-peak measurements on screen

1 point for how much the gain differs from unity

1 point for why there is a difference

1 point for inferring g_m for I_{DQ}

1 point for comparing your g_m to the g_m shown on the transistor's data sheet (is it lower or higher? Why?)

3 points for using your measured $V_{GS(off)}$ and your measured g_m to make a plot of g_m vs V_{GS} . Make sure your plot extends far enough to reach $V_{GS}=0$, and identify I_{DSS} on your plot (just like Fig 7.8 of the lab)

7.5 Follower with Current Source Load (8 points)

1 point for screenshot of 1V, 1kHz sine wave input and output with peak-to-peak measurements on screen
1 point for comparing the gain to the gain of the simple follower
1 point for theoretical input impedance of this circuit.
1 point for measuring the input impedance $R(in) = V(in)/I(in)$
1 point for screenshot of DC offset
1 point for identifying where the DC offset originates. e.g., Mismatch of FETs? Mismatch of resistors? Anything else?
2 points for what circuit changes would let you find out