

Solutions to *The Art of Electronics 3rd Edition*

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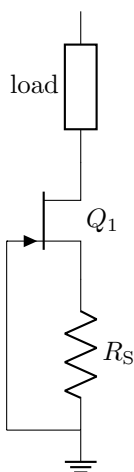
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Solutions for Chapter 3

Exercise 3.1

Figure 1.1: JFET current source



From Figure 3.21 of the book, one can see that a drain current equal to 1 mA corresponds to a gate-source voltage of -0.6 V . Therefore:

$$R_S = \frac{0.6\text{ V}}{1\text{ mA}} = 600\ \Omega$$

Exercise 3.2

At $V_{GS} = V_{G0}$:

$$r_{GS} = r_{G0} = \frac{1}{2k(V_{G0} - V_{th})}$$

The ratio between r_{DS} and R_{G0} returns:

$$\frac{r_{DS}}{r_{G0}} = \frac{2k(V_{G0} - V_{th})}{2k(V_{GS} - V_{th})}$$

Exercise 3.3

Being g_m the differential conductance of the FET operated in aturation region, it can be expressed as:

$$g_m = \frac{\partial I_D}{\partial V_{GS}} = \frac{\partial}{\partial V_{GS}} k (V_{GS} - V_{th})^2 = 2k (V_{GS} - V_{th})$$

Therefore:

$$g_m = \frac{1}{r_{DS}}$$

Exercise 3.4 TODO: write solution

Exercise 3.5 TODO: write solution

Exercise 3.6 TODO: write solution

Exercise 3.7 TODO: write solution

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