

## 6 FET Transistor amplifiers

### 1) Taskk

Estimate the operating point of a transistor ( $I_{DQ}$ ,  $U_{DSQ}$ ) operating in an amplifier circuit from Figure 1. For calculations, assume:  $R_D = 5 \text{ k}\Omega$ ,  $R_S = 1 \text{ k}\Omega$ ,  $R_G = 1 \text{ M}\Omega$ ,  $E_D = 10 \text{ V}$ ,  $I_{DSS} = 4 \text{ mA}$ ,  $U_{TH} = -2 \text{ V}$ .

### 2) Taskk

Estimate the operating point of a transistor ( $I_{DQ}$ ,  $U_{DSQ}$ ) operating in an amplifier circuit from Figure 2. For calculations, assume:  $R_D = 2 \text{ k}\Omega$ ,  $R_S = 5 \text{ k}\Omega$ ,  $R_{G1} = R_{G2} = R_{G3} = 1 \text{ M}\Omega$ ,  $E_D = 12 \text{ V}$ ,  $I_{DSS} = 4 \text{ mA}$ ,  $U_{TH} = -2 \text{ V}$ .

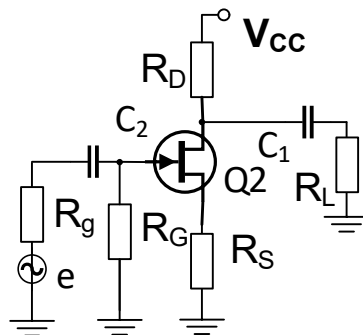


Figure 1 . FET amp. with source auto-polarization

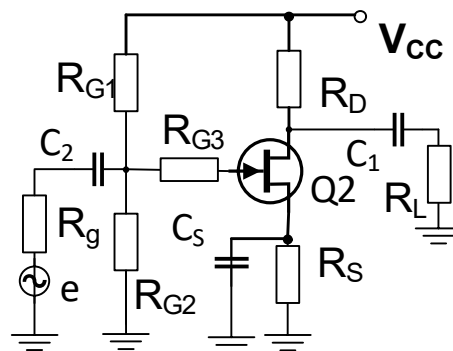


Figure 2 . FET common source amp

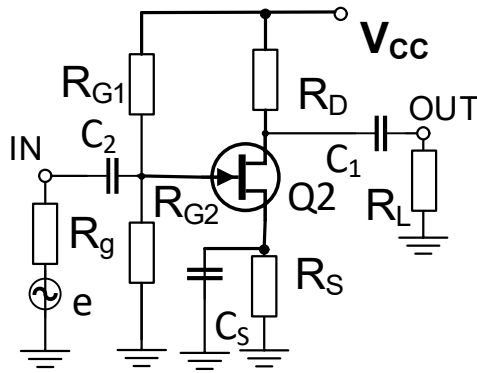


Figure3 . Common source FET amp.

3) Task

Estimate the operating parameters ( $k_{eff}$ ,  $r_{in}$ ,  $r_{out}$ ) of the amplifier circuit from Figure3 . For calculations, assume:  $R_{G1} = 1\text{ M}\Omega$ ,  $R_{G2} = 1\text{ M}\Omega$ ,  $R_D = 5\text{ k}\Omega$ ,  $R_S = 500\ \Omega$ ,  $R_g = 5\text{ k}\Omega$ ,  $R_L = 10\text{ k}\Omega$ ,  $g(m) = 2\text{ mS}$ ,  $g(ds) = 15\ \mu\text{S}$ .

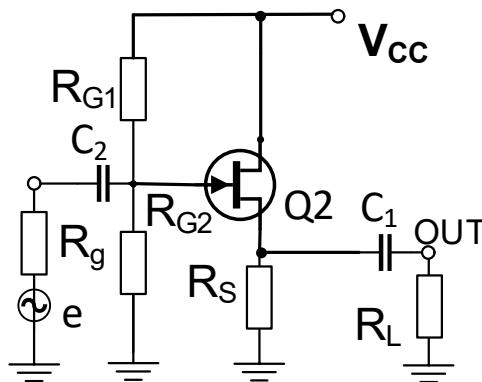


Figure4 . Common drain FET amp.

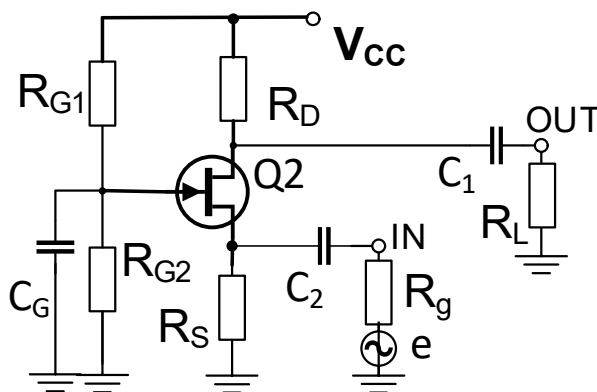


Figure5 .Common gate FET amp

4) Task

Estimate the operating parameters ( $k_{eff}$ ,  $r_{in}$ ,  $r_{out}$ ) of the amplifier circuit from Figure4 . For calculations, assume:  $R_{G1} = 1\text{ M}\Omega$ ,  $R_{G2} = 1\text{ M}\Omega$ ,  $R_S = 5\text{ k}\Omega$ ,  $R_g = 5\text{ k}\Omega$ ,  $R_L = 10\text{ k}\Omega$ ,  $g_m = 2\text{ mS}$ ,  $g(ds) = 15\ \mu\text{S}$ .

5) Task

Estimate the operating parameters ( $k_{eff}$ ,  $r_{in}$ ,  $r_{out}$ ) of the amplifier circuit from Figure 5. For calculations, assume:  $R_{G1} = 1 \text{ M}\Omega$ ,  $R_{G2} = 1 \text{ M}\Omega$ ,  $R_D = 5 \text{ k}\Omega$ ,  $R_S = 500 \text{ }\Omega$ ,  $R_g = 500 \text{ }\Omega$ ,  $R_L = 10 \text{ k}\Omega$ ,  $g_m = 2 \text{ mS}$ ,  $g_{ds} = 15 \text{ }\mu\text{S}$ .