

Lab. nr 29

TRANZYSTORS

Goals: The goal of this lab is to gain a greatly simplified understanding of the transistor amplifier circuit through construction and evaluation.

1 Bipolar transistor switching characteristic.

1.1 Build the circuit show In Fig. 1 and measure the characteristic: $U_C = f(U_{BE})$ changing the U_{BE} voltage in the range of about 0.5 to 0.7 V with the aid of the decade resistor R.

1.2 Determine the current amplification β for several points of the measured characteristic.

2 Bipolar transistor amplifier.

2.1 Build the common emitter amplifier and demonstrate the effect of voltage amplification using an oscilloscope. Determine the value of the amplification.

2.2 Determine the frequency characteristic of the amplifier = $K_u(f)$ and its cutoff frequency (i.e., frequency at which the voltage gain drops to one, $|K_u| = 1$).

3 FET transistor switching characteristic.

3.1 Build the circuit show In Fig. 2 and measure the characteristic: $I_D = f(U_{GS})$ changing the U_{GS} in the range of 0 to 12 V.

4 FET transistor amplifier.

3.2 Build the common source amplifier and demonstrate the effect of voltage amplification using oscilloscope. Determine the value of the amplification.

5 Background

3.1 Operation of the bipolar and FET transistors.

3.2 Ebers-Moll equation.

3.3 Transistor amplifiers. Stabilisation of the quiescent point of the amplifier. Feedback at dc.

3.4 Oscilloscopes.

Literature

[1] P. Horowitz, W. Hill, *The Art of Electronics*.

[2] T. C. Hayes, P. Horowitz, *Student Manual for The Art of Electronics*.

[3] J. Baranowski, *Półprzewodnikowe układy impulsowe i cyfrowe*.

[4] A. Rusek, *Podstawy elektroniki*.

[5] R. Śledziewski, *Elektronika dla fizyków*.

[6] T. Szczypułowski, *Podstawy elektroniki*.

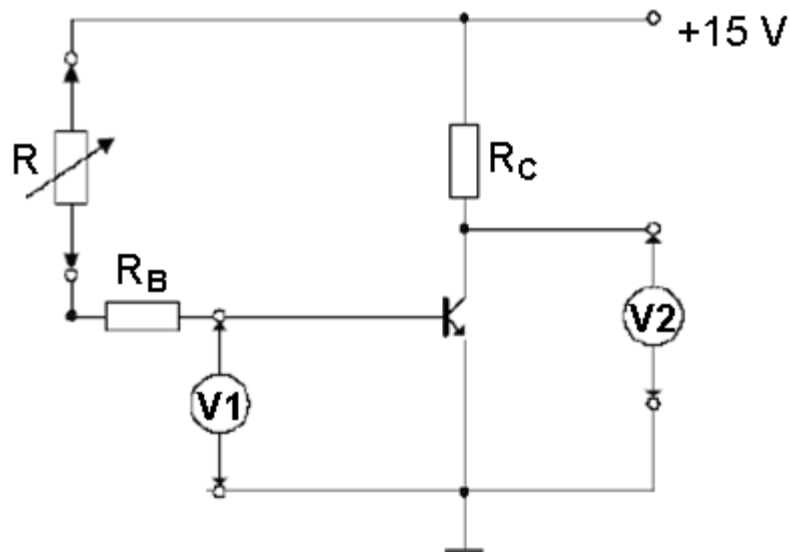


Fig. 1. Scheme of the experimental circuit for bipolar transistors. R is decade resistor.

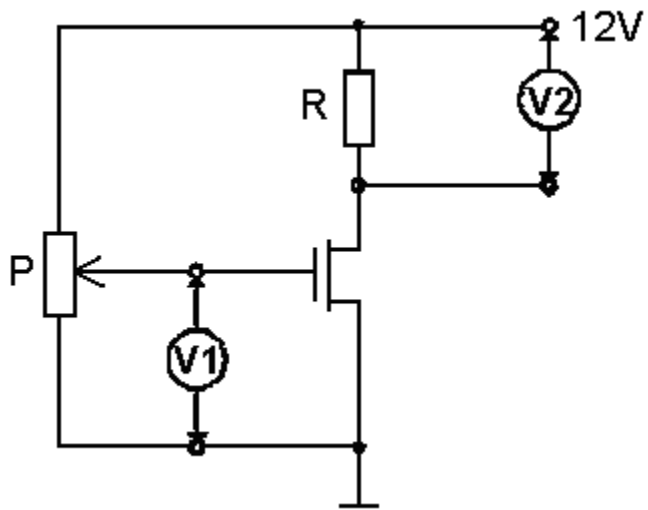


Fig. 2. Scheme of the experimental circuit for FET transistors. P is a precision rotary potentiometer.