

Labor of Fundamentals of Electronics and Power Electronics

Exercise No. 3

VOLTAGE REGULATOR

3.1 Basic information

For the purposes of obtain the current-voltage characteristic and calculate the basic parameters of voltage regulator 78XX are this exercise. It is possible to make tests of three different circuits configuration: basic configuration circuit, elevated load voltage circuit and elevated load current circuit.

References

Ferenczi O.: Linear power supplies DC-DC converters

Tse Chi Kong: Linear circuit analysis

Baranecki A.: Laboratorium układów elektronicznych. Cz. 1, Cz. 2

Kaźmierkowski M.P., Matysik J. T.: Wprowadzenie do elektroniki i energoelektroniki

3.2 Description of exercise

The front panel of the console is show on Figure 3.1.

This panel contain following circuits and elements:

- analog voltage regulator - ULY7805,
- bipolar transistor to increase load current - BDP286,
- measurement and short-circuit sockets,
- load resistance (15 Ω – 33,7 Ω) (alternate the short-circuit sockets).

The panel of the console is powered by controlled voltage (UR) from the main panel. This voltage is supplied by special internal connector (button UR and button 5 – 18 V).

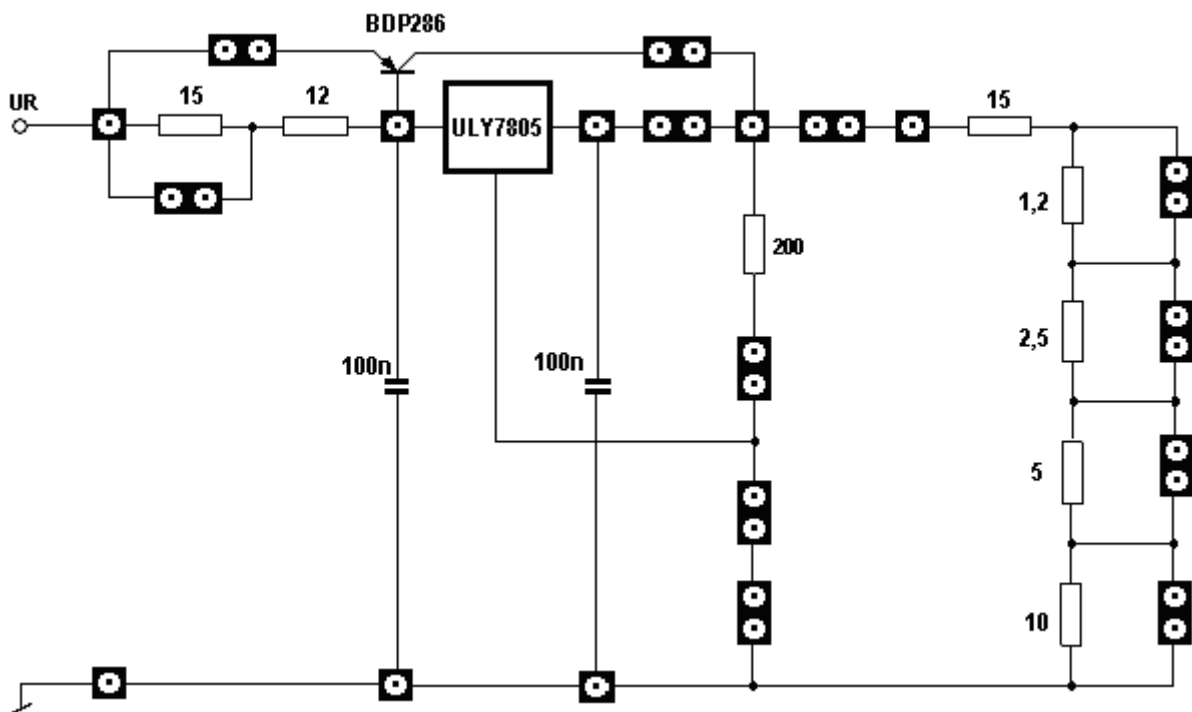


Fig. 3.1

3.3 Schedule of exercise

3.3.1 Test of voltage regulator – Basic configuration circuit (Fig. 3.2).

- Choose the load resistance equal $R_L = R_{MAX} (33,7 \Omega)$.
- Plot characteristic $U_{OU} = f(U_{IN})$ with $U_{IN} = UR = var$.

c) Estimate stabilization factor: $S = \frac{\Delta U_{IN}}{\Delta U_{OU}}$.

d) Set the input voltage $U_{IN} = 15V$.

e) Plot characteristic $U_{OU} = f(I_L)$.

f) Estimate internal resistance of circuit: $r_{INT} = \frac{\Delta U_{OU}}{\Delta I_L}$.

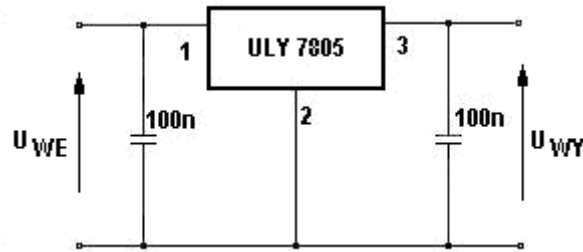


Fig. 3.2

3.3.2 Test of voltage regulator – elevated load voltage circuit (Fig 3.3).

- Establish the output voltage (use voltage divider R1/R2) on limits $7 \div 8 V$.
- Make tests according to point 3.3.1. a ÷ f.

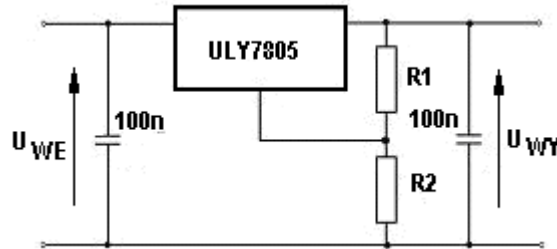


Fig. 3.3

3.3.3 Test of voltage regulator – elevated load current circuit (Fig 3.4).

- Choose the load resistance equal $R_L = 15 \Omega$.
- Choose the resistance R4 and calculate the resistance R3. The transistor BDP286 begin to conduct current when the input current (on pin 1) of integrated circuit is about 150mA.
- Make tests according to point 3.3.1. b ÷ f.

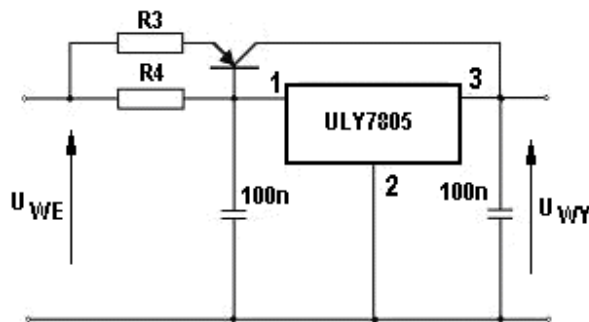


Fig. 3.4