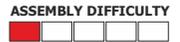




AVT 1790



Thermometer with 56mm displays, measuring temperatures from $-55... +125^{\circ}\text{C}$. It is ideal as a temperature gauge for reading temperature from long distances, e.g., in sports or production halls. The thermometer can be mounted in a Z37 housing.

Specifications

- temperature measuring range: $-55^{\circ}\text{C} \div 125^{\circ}\text{C}$
- update of readings every 2s
- accuracy of measurement: $\pm 0.5^{\circ}\text{C}$ ($-10^{\circ}\text{C} \div 85^{\circ}\text{C}$), $\pm 2^{\circ}\text{C}$ ($-55^{\circ}\text{C} \div 125^{\circ}\text{C}$)
- reading resolution: 0.1°C over the entire measuring range
- no calibration required
- supply: 12 VDC / 300 mA

Circuit description

Electrical diagram of the thermometer is shown in Figure 1. The device must be supplied with 12 VDC fed to the ZAS connector. The D1 diode protects the circuit from incorrect polarity of the input voltage, while capacitors C1-C6 act as a power supply filter. The anodes of the displays are supplied with +12 V and the digital part is supplied with +5 V from stabiliser U2. The thermometer is controlled by an ATtiny2313 microcontroller timed by an internal clock

signal, while a DS18B20-type chip acts as the temperature sensor. The design uses the displays with a common anode. Their cathodes were connected to circuit U5 (ULN2803) via the limiting resistors R2-R9, while their anodes were connected to circuit U6 (UDN2983).

The displays are multiplexed and the temperature display is updated every 2 seconds.

Mounting and start-up

Schematic diagram of the device is shown in Figure 2. The circuit assembly should not pose any problems, but some attention is required as the components are mounted on both sides of the PCB. First, mount all the elements on the TOP layer. The displays will be

mounted on the opposite side of the board, so their soldering can only be done in the last phase of assembly, after making sure that the assembly of all other components has been correctly completed. If the thermometer were to be supplied with a

stabilised voltage of 12 V, it is possible not to mount stabiliser U3, but only to short-circuit its extreme leads together.

The temperature sensor should be connected to the PCB by connecting its outer leads to the point marked 'GND' and the centre lead to the point marked 1W. If you will only be measuring the air temperature, it is sufficient to shield the sensor from possible atmospheric influences or mechanical damage using,

for example, heat shrink tubing. In the case of measuring fluid temperature, for example, the sensor and its contacts must be firmly protected against moisture. The easiest way to do this is to place the DS1820 chip in an aluminium tube and pour epoxy resin over it.

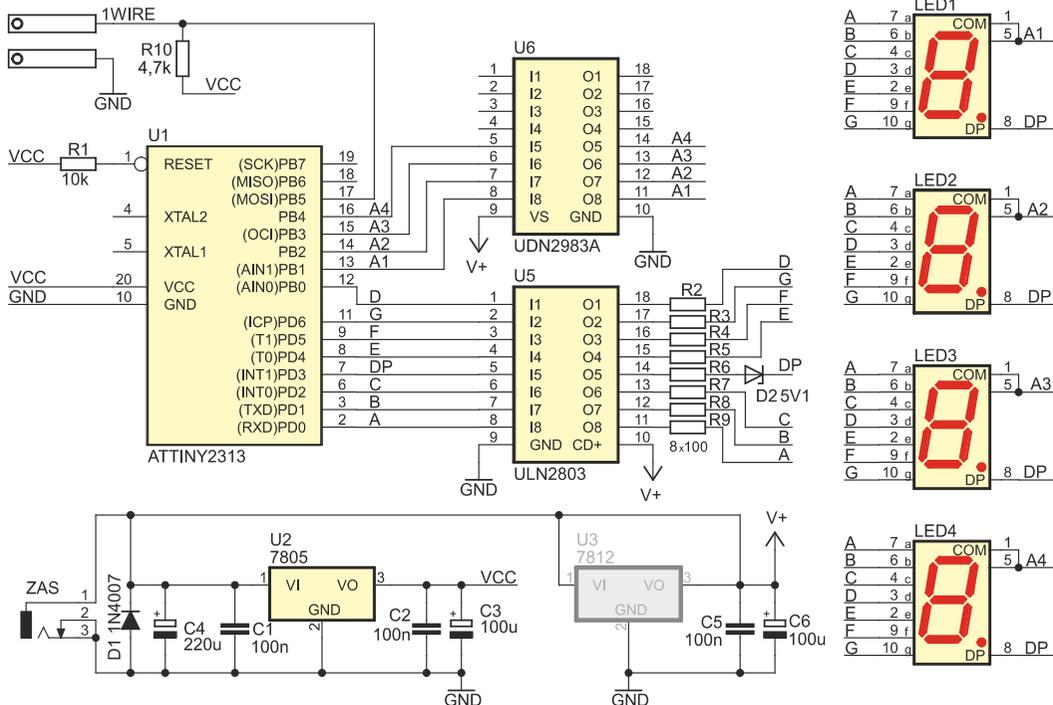


Fig. 1 Schematic diagram

List of elements

Resistors:

R1:10 kΩ
 R2-R9:100 Ω
 R10:4,7 kΩ

Capacitors:

C1, C2, C6:100 nF
 C4:220 μF / 25 V
 C3, C6:100 μF / 25 V

Semiconductors:

D1:1N4007
 D2:Zener diode 5V1
 U1:ATTiny2313
 U2:7805

U3:JUMPER
 U4:DS18B20
 U5:ULN2803
 U6:UDN2983(TD62783)

Other:

LED1-LED4:displays
 ZAS:supply socket
 Screw connector for temperature sensor

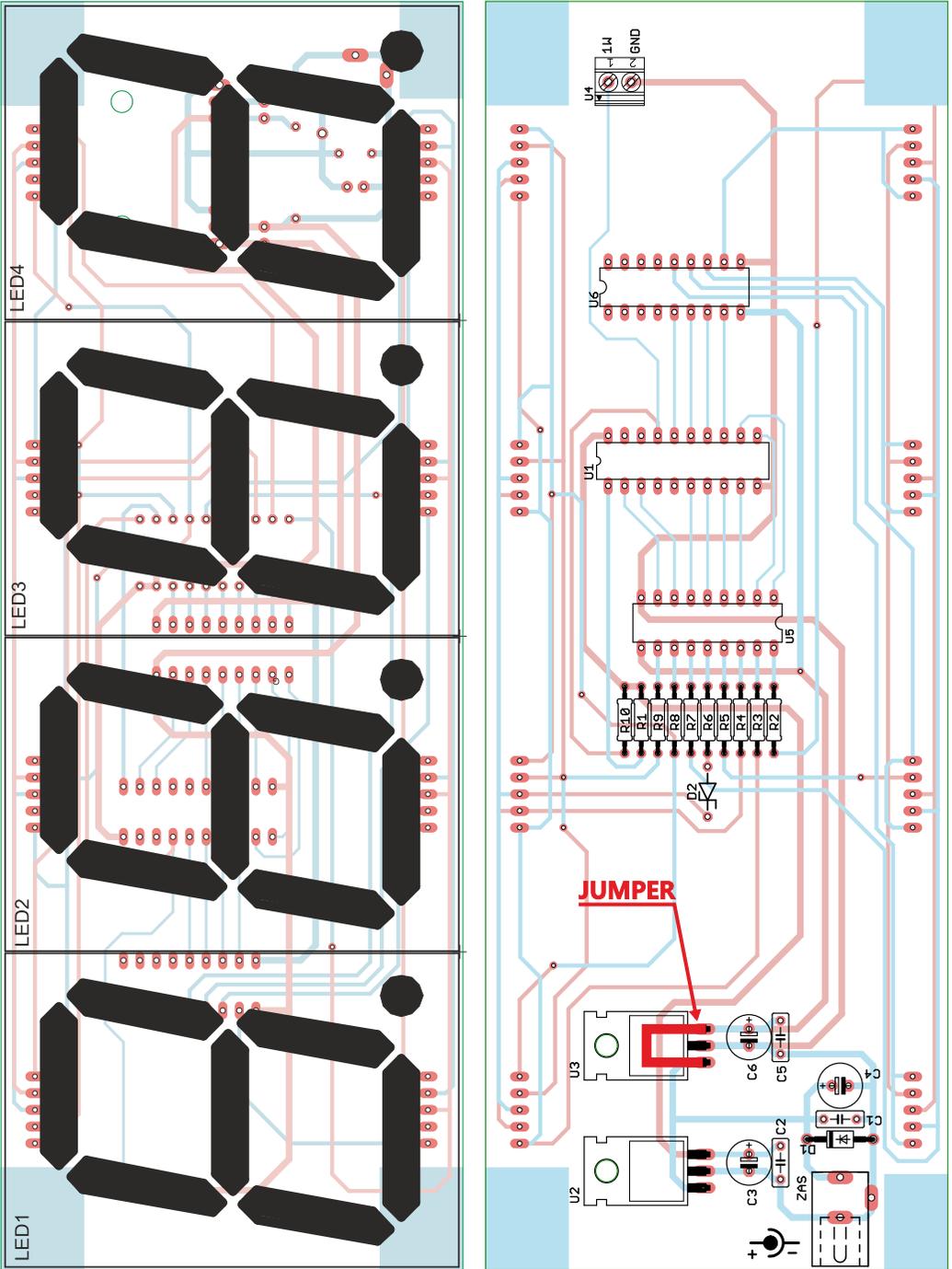
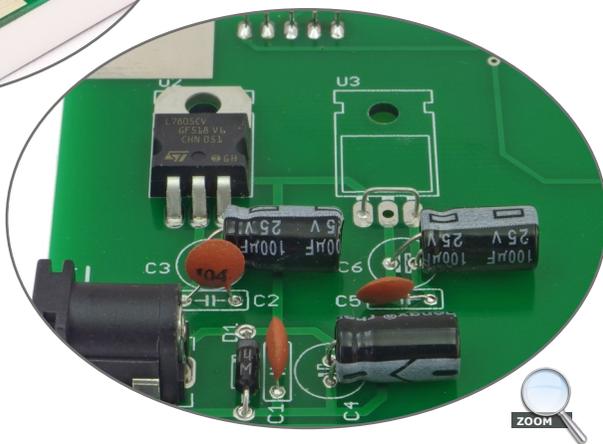
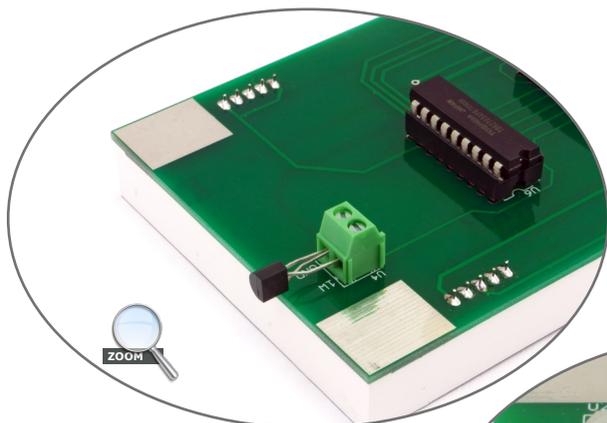
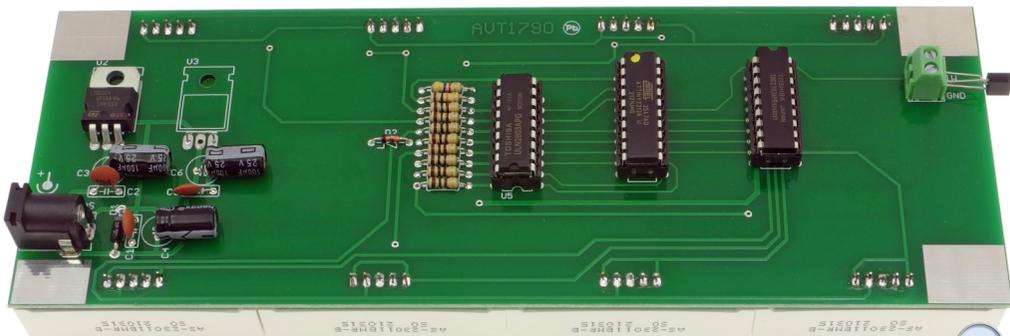
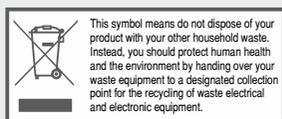


Fig. 2 Arrangement of components on the PCB



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