Frequency Counter 200Hz..8 MHz

This is probably the simplest frequency meter built on the ATtiny2313 microcontroller. It allows you to measure frequencies from 200 Hz to 8 MHz in four automatically switched bands. The smallest range has a resolution of 1 Hz.

Technical characteristics of the frequency meter:

The range of 1: 9,999 kHz, resolution 1 Hz.

Range 2: 99.99 kHz, resolution up to 10Hz.

Range 3: 999.9 kHz, resolution up to 100 Hz.

Range 4: 9999 kHz, resolution up to 1kHz.

Operation

The Attiny2313 microcontroller operates from an external crystal oscillator with a clock frequency of 20 MHz (this is the maximum allowable frequency). The accuracy of the frequency meter is determined by the accuracy of the quartz. The minimum length of the half-period of the measured signal must be greater than the period of the crystal oscillator (this is due to the limitations of the architecture of the microcontroller ATtiny2313). Therefore, 50 percent of the clock frequency of the generator is 10 MHz (the maximum value of the measured frequency).

The input signal through the resistor R1 goes to the pin 9 of the microcontroller via a buffer on the transistor KT368. Counting is performed using a 16-bit timer counter. Overflow increases the 8-bit register by writing to a 24-bit variable. Then this value is converted to a decimal value and displayed on the led indicator.

All measured frequency values are always displayed in kHz. Automatic range selection changes the position of the decimal point. The data refresh rate is 1 Hz.

A four-digit led indicator is used to display the measured frequency. The cathodes of the led indicator are connected to port B, and the anodes to port D. due to the use of the multiplex mode of information display and the SuperBright indicator, there is no need to use key transistors to reduce the load from the ports of the microcontroller.

The frequency of the multiplex is 156.25 Hz. You can apply the indicator CA56-12SRWA. Resistors R2...R9 limit the flowing current (not more than 40 mA).

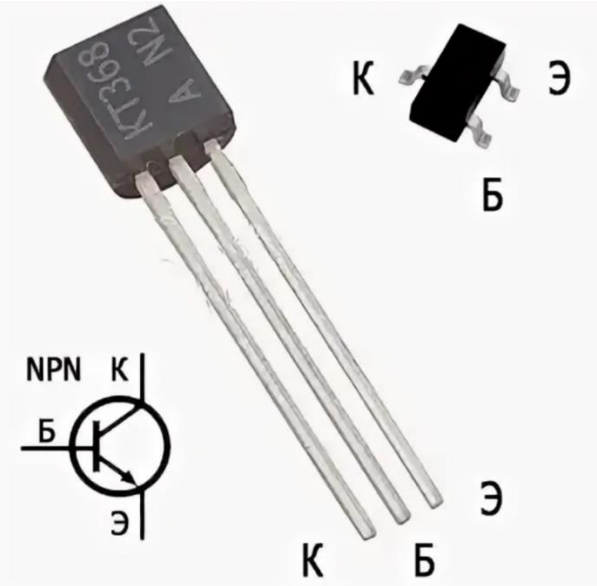
This frequency meter is powered by a stabilized source 5V, built on an integral stabilizer 78L05. Recommended input power 78L05-9..12V.

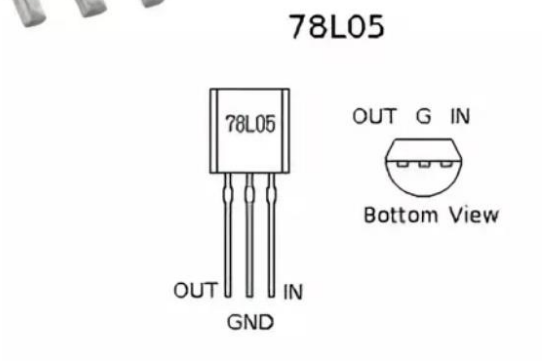
The frequency meter does not need to be adjusted. When installed correctly, it starts working the first time you turn it on. If there is no signal on the screen "0000". If there is a signal, it outputs the measured frequency up to approximately 10 MHz. If the input signal exceeds 10 MHz, the screen will display incorrect absolutely chaotic values!

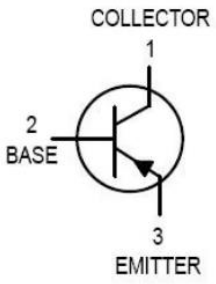
Features of installation and configuration

Mounting the digital scale board does not imply any difficulties. All elements are output; installed according to the diagram and markings on the board. There are no errors or typos on the board. During installation, please pay attention to the recommended assembly order, as there are some minor nuances during installation.

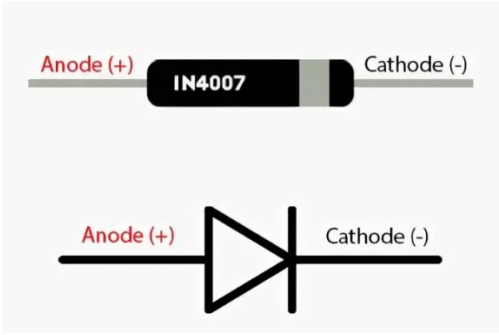
The pinout of the KT368 transistor (in Russian + in English to avoid the mistake), 78L05 stabilizer and 1N4007 diode is shown in the illustrations below.







CASE 29–04, STYLE 17
TO–92 (TO–226AA)



Attention!

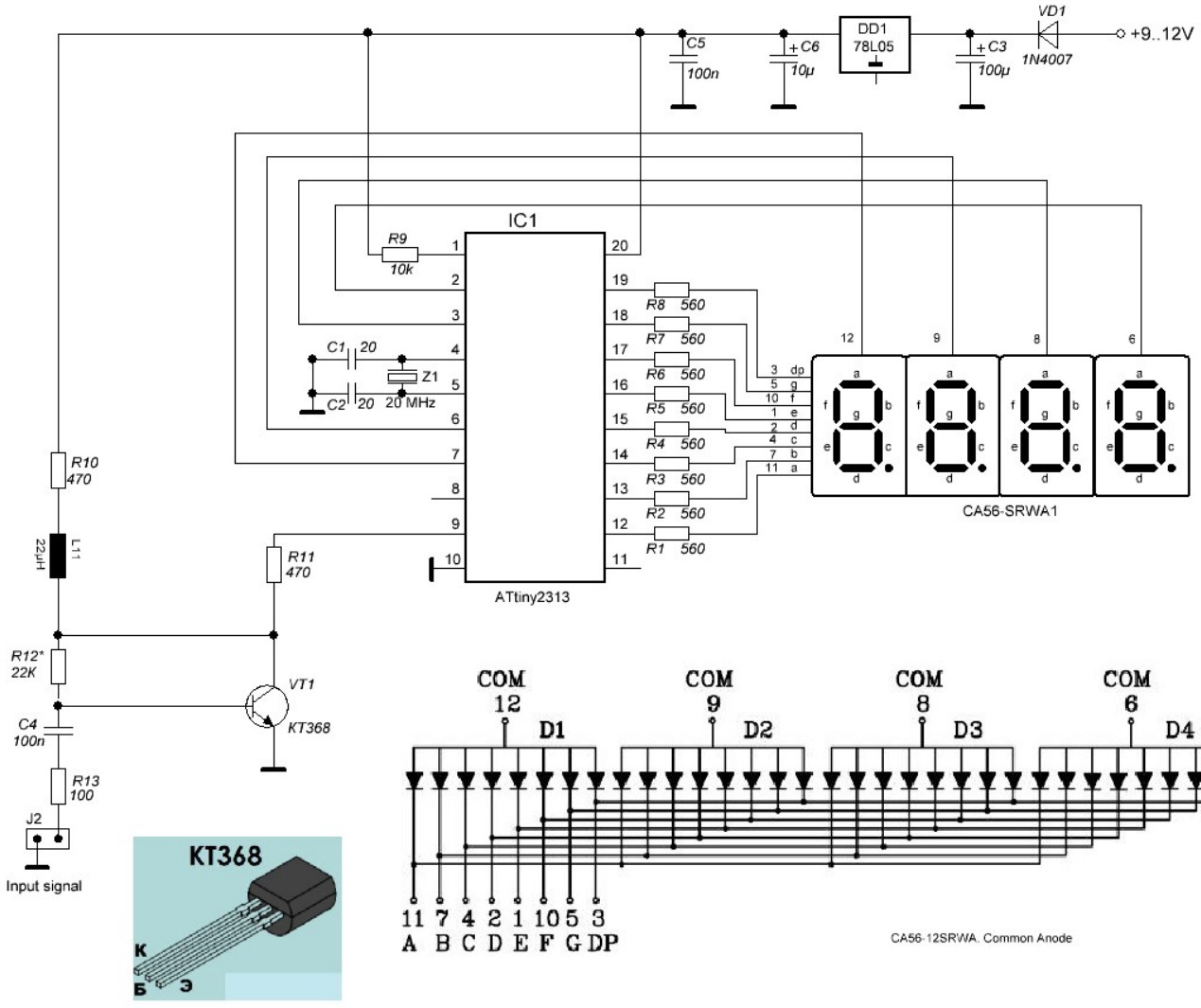
Before starting installation, please check the availability of all elements according to the list of equipment.

Claims for the complete set are accepted within 14 calendar days from the date of receipt of the order.

If you have any questions, feedback and suggestions, you can contact us by e-mail SALES@RV3YF.RU or through the contact window on our website WWW.RV3YF.STORE

Check-list and recommended order of building of board

Element	QTY	Place on the board and commend	Self-✓ Check
1N4007	1	VD1 (see pinout)	
22 uH	1	L1	
20 pF (marking 200)	2	C1, C2	
100 nF (marking 104)	2	C4, C5	
Electrolytic Capacitor 10 uF	1	C6 – it is recommended to mount the capacitor at an angle of 90 degrees (i.e. press it against the board), because then there may be inconvenience with mounting the nut from fastening the indication to the front panel of the housing.	
Electrolytic Capacitor 100 uF	1	C3	
Resistor 100R	1	R13	
Resistor 470R	2	R10, R11	
Resistor 560R	8	R1 – R8	
Resistor 22K	1	R12	
Resistor 10K	1	R9	
Shorting links	4	It is convenient to make jumpers on the board from scraps of resistors and a diode.	
KT368AM	1	VT1 (see pinout and labeling on PCB)	
Crystal 20 MHZ	1	Z1 – be sure to ground the quartz body with a short cut	
78L05	1	DD1 (see pinout)	
ATTINY2313	1	IC1. When mounting the processor, it is important not to overheat the pins. The processor is afraid of static. Be careful during installation and operation.	
PIN Header	4	2 pins for power supply, 2 pins for input signal	
Indicator 0.36”	1	Before mounting the indicator, it is necessary to make a fitting in the front panel. After that, mount the indicator on the board. Do not confuse the top and bottom of the indicator (dots are usually at the bottom)	
Indicator connector 12x	1	Before mounting the boards to each other using the corner mounting stand, be sure to try the boards against the front panel.	


VD1
+9..12V
DD1
78L05
C5
100n
C6
10µ
C3
100µ
1N4007
IC1
R9
10k
R8 560
R7 560
R6 560
R5 560
R4 560
R3 560
R2 560
R1 560
C1 20
C2 20
Z1
20 MHz
ATtiny2313
CA56-SRWA1
R10
470
L11
22µH
R11
470
R12*
22K
VT1
KT368
C4
100n
R13
100
J2
Input signal
COM
12
9
8
6
D1
D2
D3
D4
11 7 4 2 1 10 5 3
A B C D E F G DP
CA56-12SRWA. Common Anode

КТ368
К
Б
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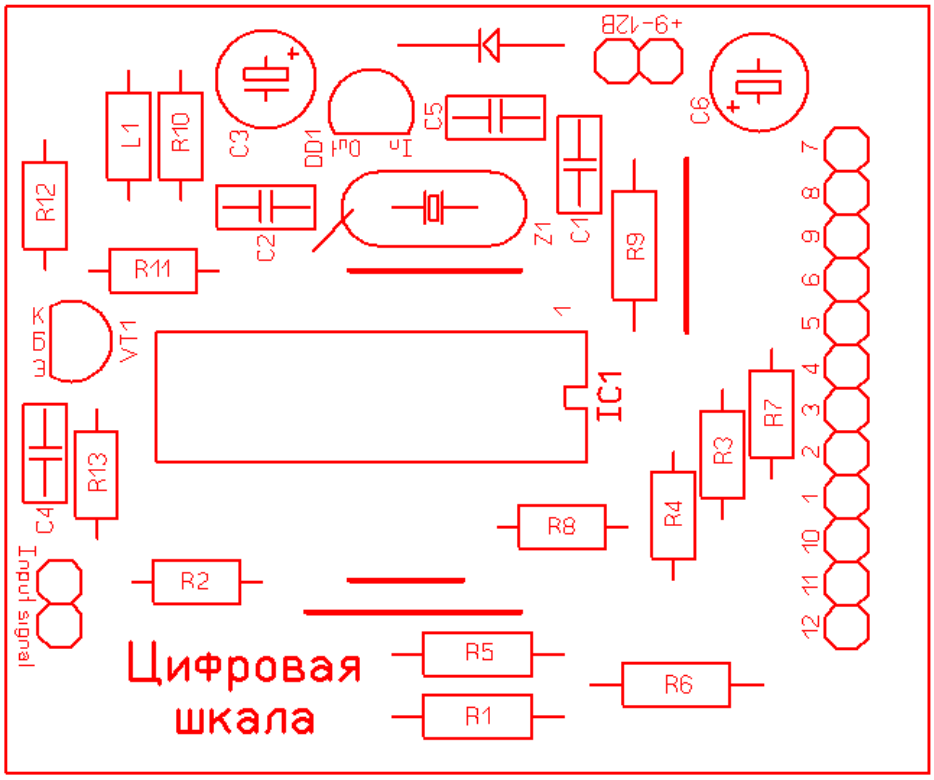
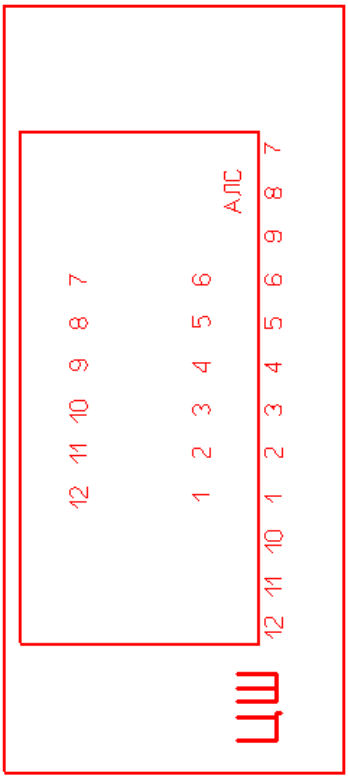
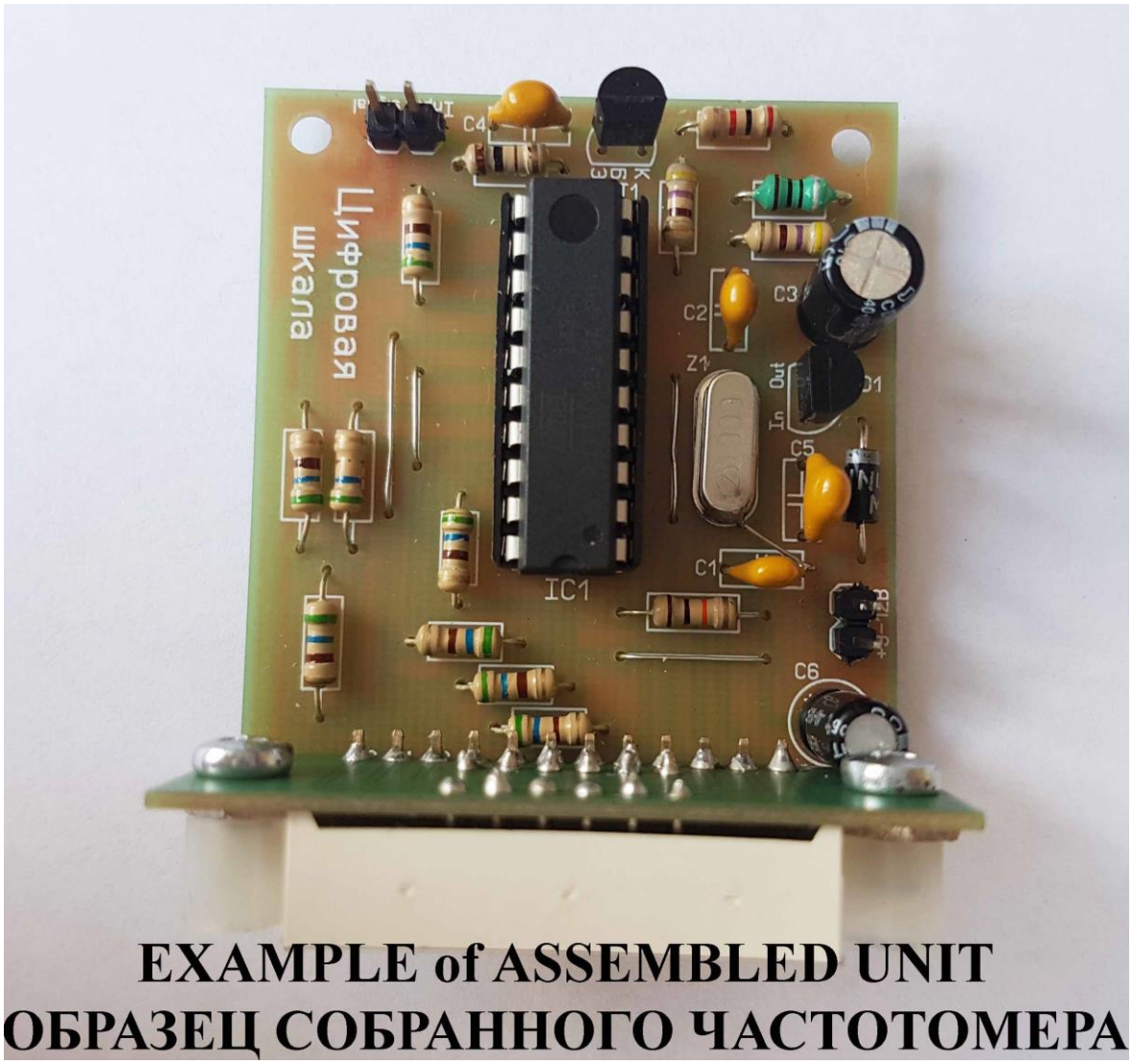
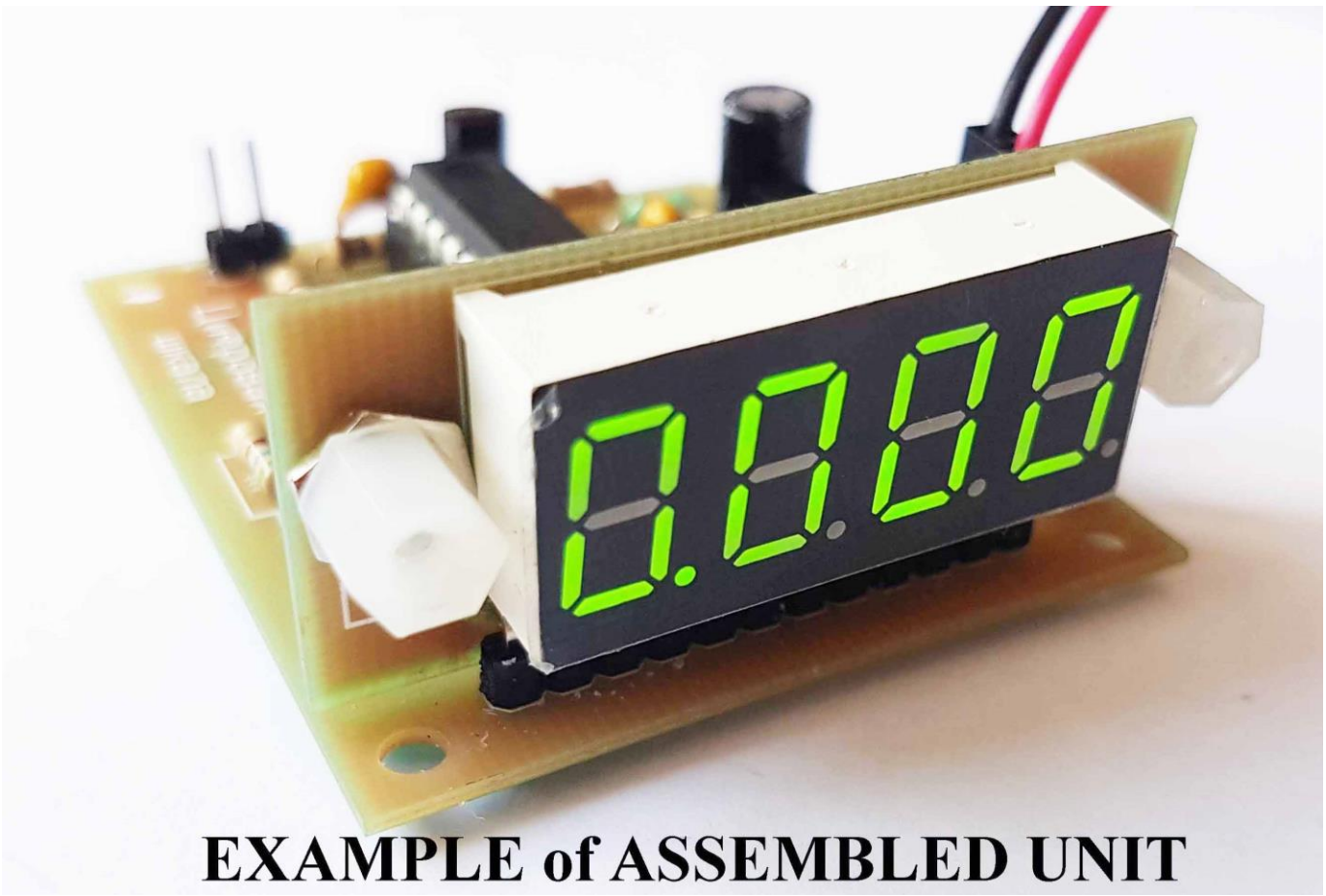

+9-12В
C3
C5
C6
DD1
L1
R10
R12
R11
C2
Z1
C1
R9
VT1
IC1
R13
C4
R7
R3
R4
R8
R2
R5
R6
R1
Input signal
Цифровая
шкала

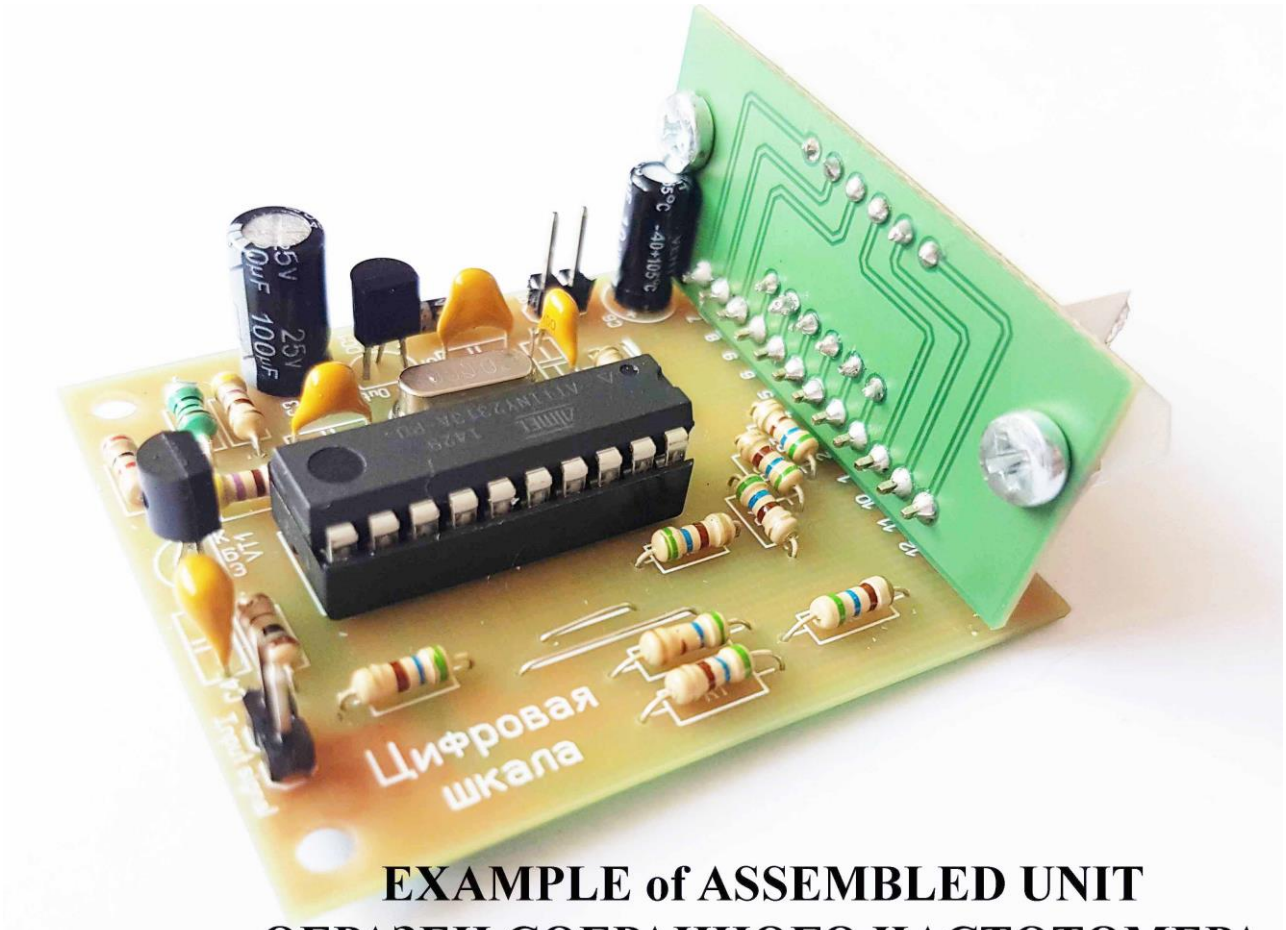

АЛС
ЦШ



EXAMPLE of ASSEMBLED UNIT
ОБРАЗЕЦ СОБРАННОГО ЧАСТОТОМЕРА



EXAMPLE of ASSEMBLED UNIT



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