

SimpliBox IO diy kit

Construction manual

by

H. Wendt

Rev.	Date	Description
A	2015-07-06	First release

You need the following tools:

*a regulated soldering iron
(25..40W) with small tip*



*a wet sponge to clean the
tip*



thin solder wire



a diagonal cutter for wires












Needle nose pliers












A basic multimeter is not required but recommend



Parts

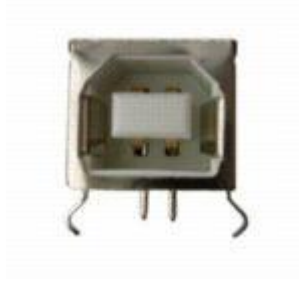
 <p>3x Resistor 68 Ohm (R3, R5, R6)</p>	 <p>6x Resistor 1KOhm (R1, R2, R11, R12, R13, R14)</p>	 <p>1x Resistor 1,5KOhm (R4)</p>
 <p>1x Resistor 3,3 KOhm (R7)</p>	 <p>1x Resistor 6,8 KOhm (R8)</p>	 <p>1x Resistor 10 KOhm (R9)</p>
 <p>1x Capacitor 100nF (C2)</p>	 <p>1x Electrolytic capacitor 47μF (C1)</p>	 <p>1x LED red, 3mm (D6, D7, D8, D9)</p>

 <p>2x Z-Diode 3,6V / 0,5W (D1, D5)</p>	 <p>5x Diode 1N4148 (D2, D3, D4, D10, D11)</p>	 <p>2x Transistor BC547B (T1, T2)</p>
 <p>1x Optocoupler LTV829 (IC1)</p>	 <p>1x Microcontroller ATTINY45 (IC2)</p>	 <p>2x IC socket, 4 pole</p>
 <p>2x Relay LEG-5 (Re1, Re2)</p>	 <p>2x Terminal block RM5 / 3pole (K5, K6)</p>	 <p>2x Terminal block RM3,5 / 3pole (K1, K2)</p>

Construction manual SimpliBox IO diy kit – Rev A

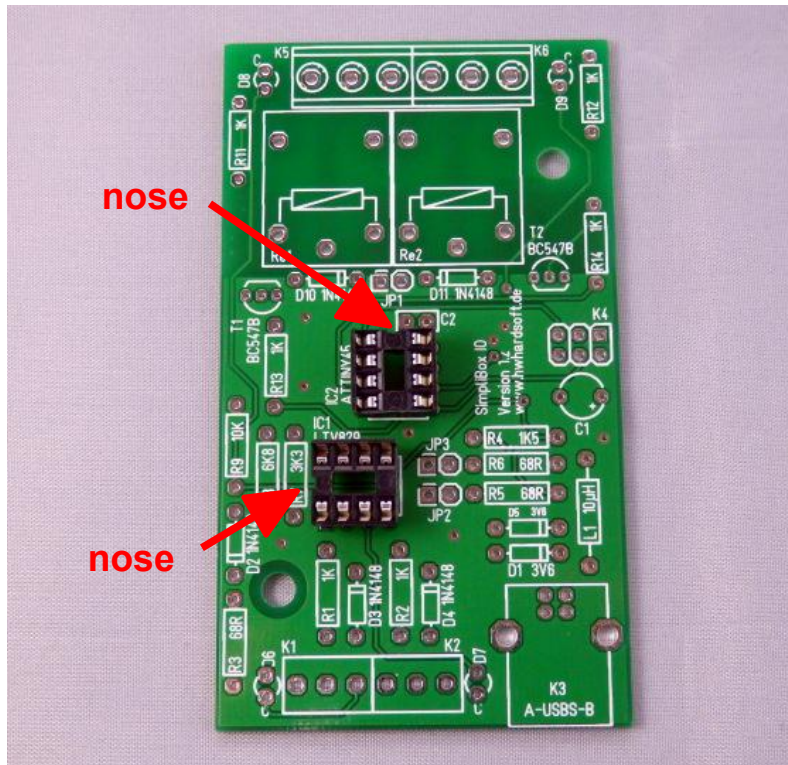


1x
Ferrite 10uH
(L1)

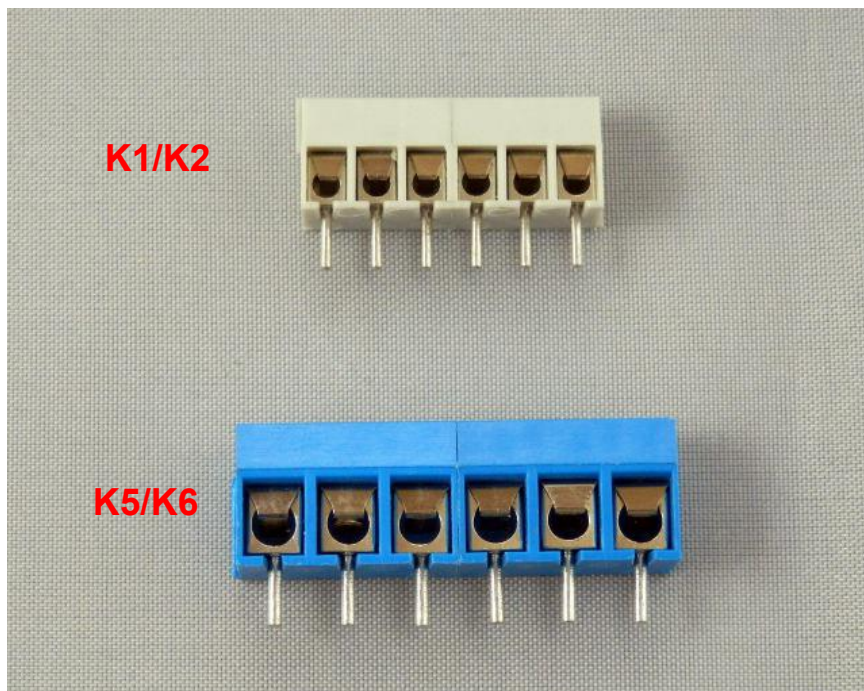


1x
USB-B socket
(K3)

1.) *Assemble the IC sockets*

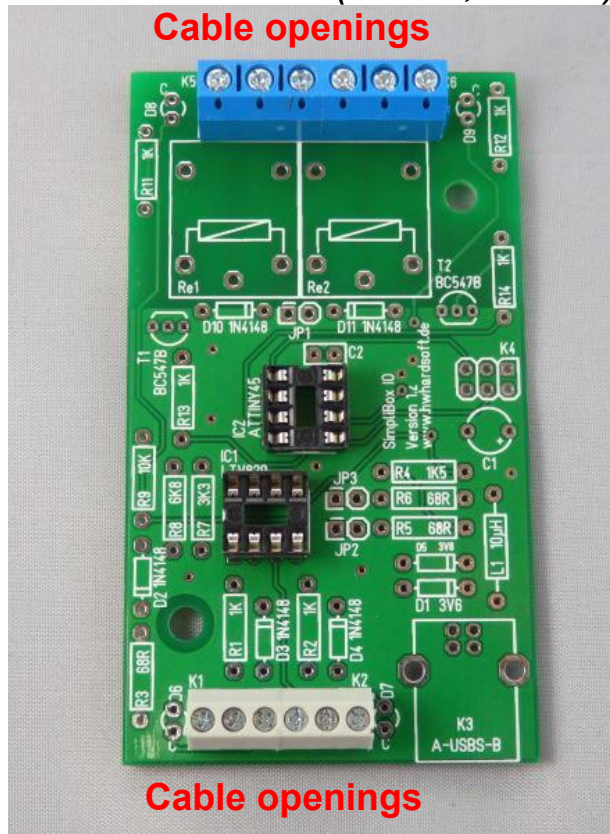


2.) *Prepare the terminal blocks*

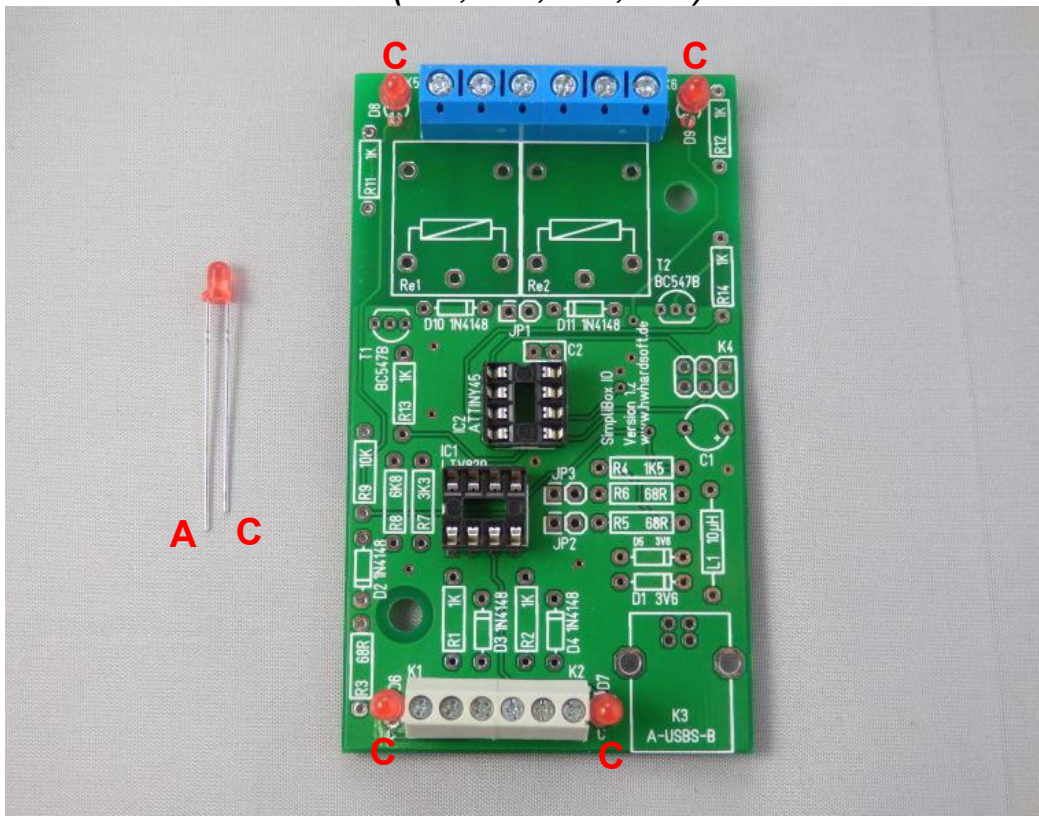


Slide two 2-pin and two 3-pin blocks together!

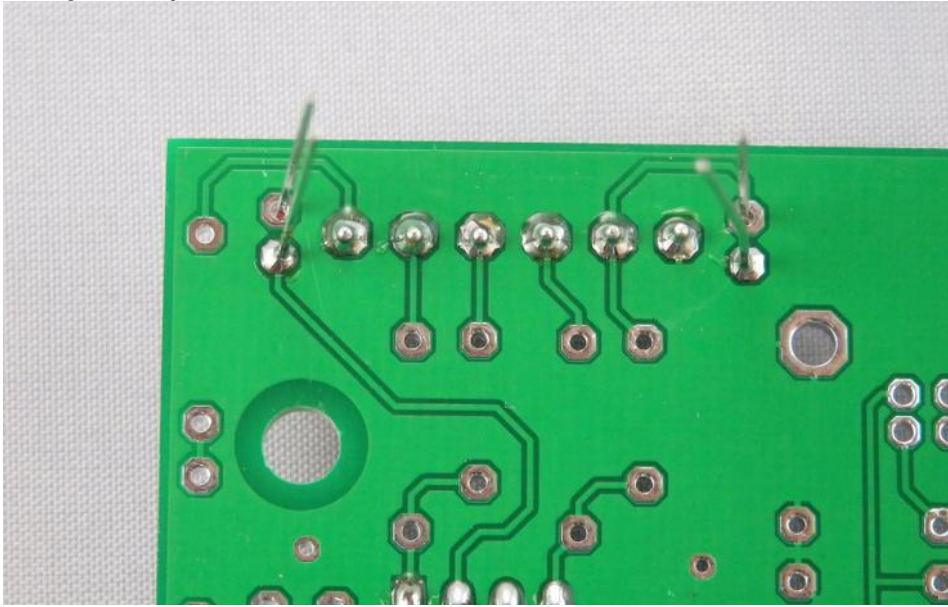
3.) Assemble the terminal blocks (K1/K2, K5/K6)



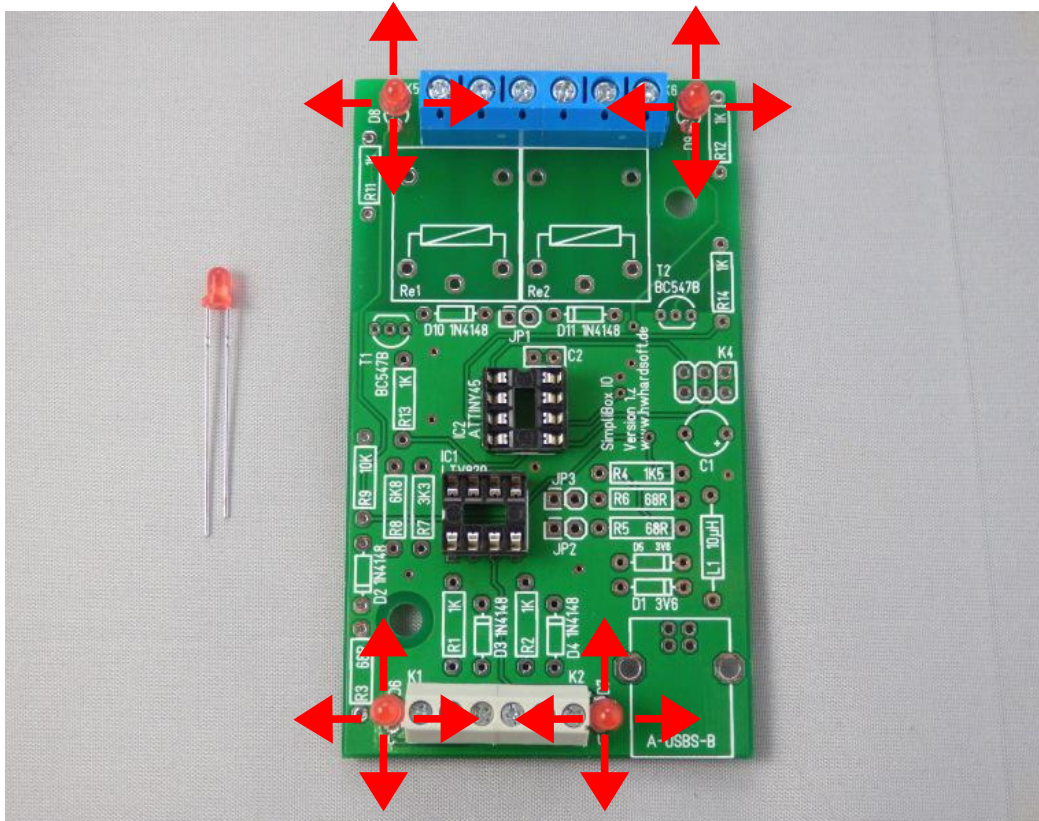
4.) Assemble the 4 Leds (D6, D7, D8, D9)



3.1 solder only one pin of each LED first

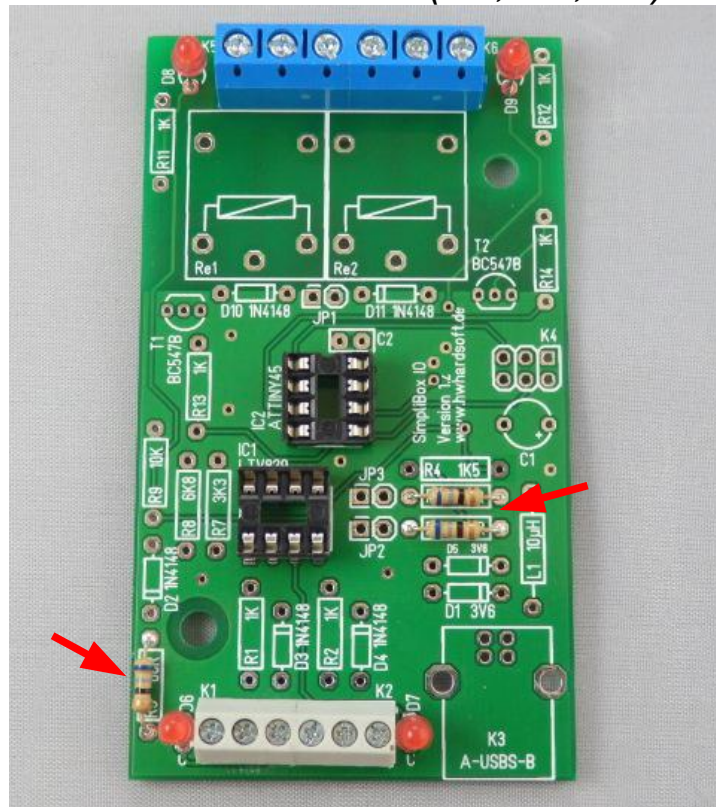


3.2 align all four LEDs

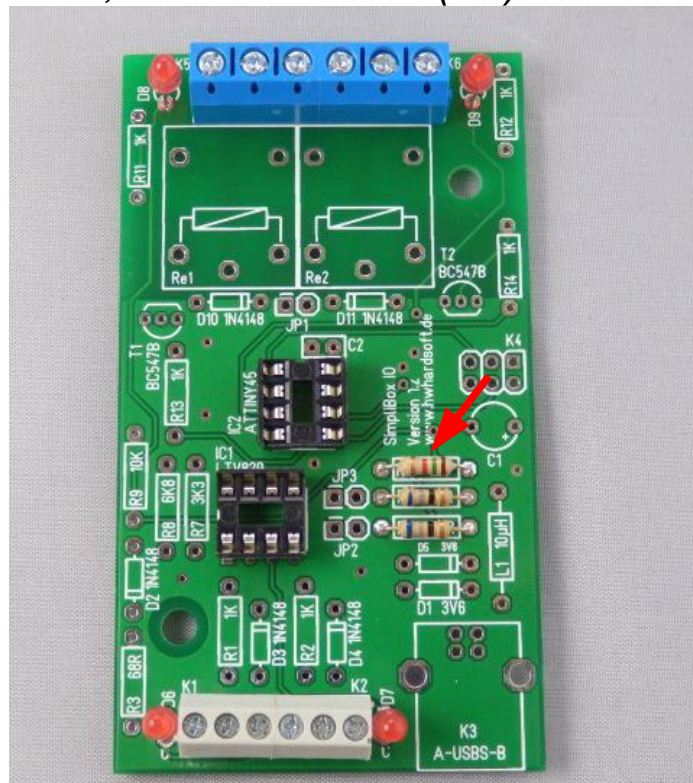


3.3 solder the other pin of any LED!

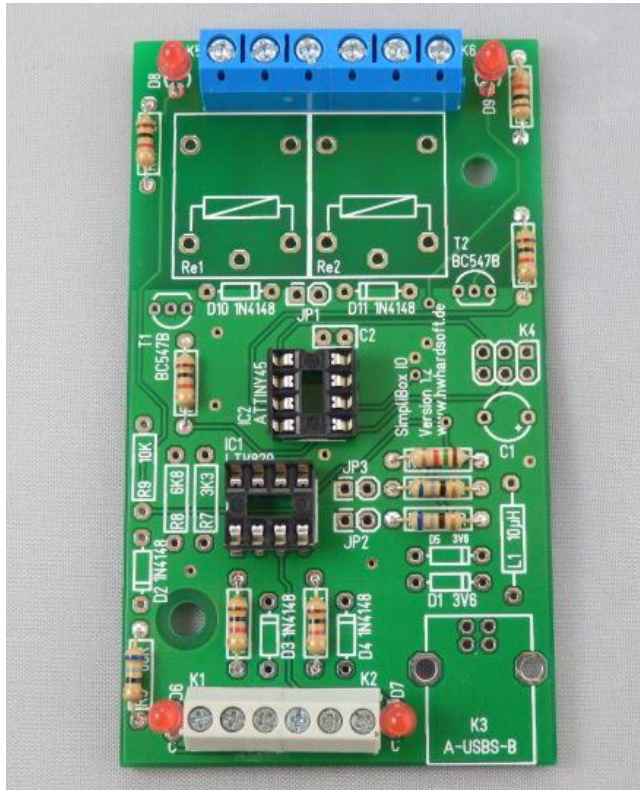
4.) Assemble the 68 Ohm resistors (R3, R5, R6)



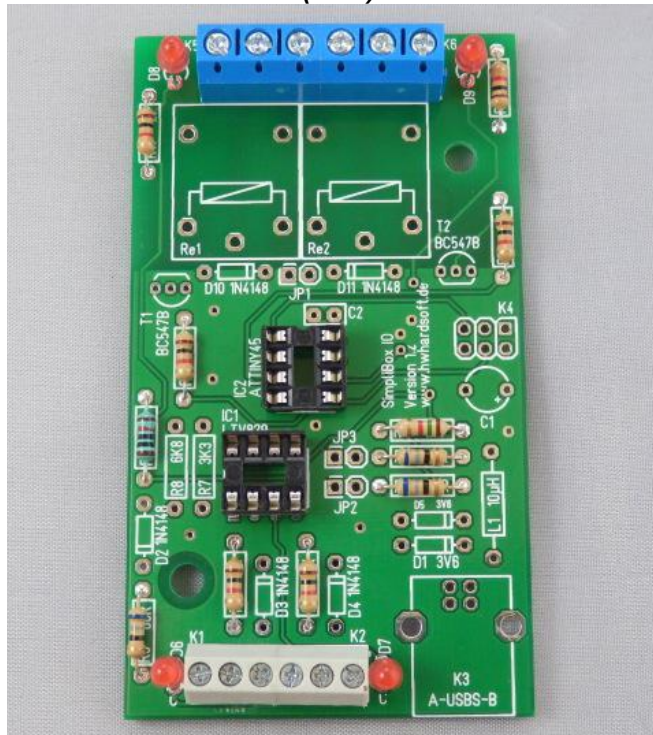
5.) Assemble the 1,5 KOhm resistor (R4)



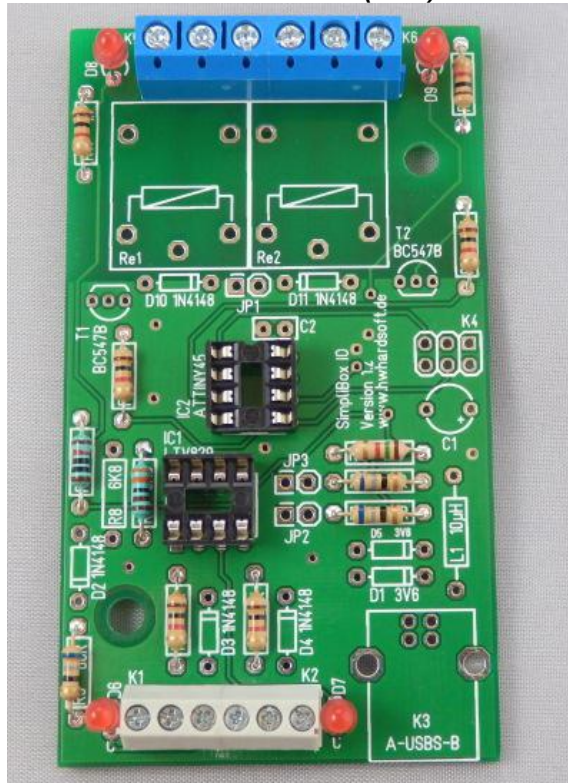
6.) *Assemble the 1KOhm resistors (R1, R2, R11,R12, R13, R14)*



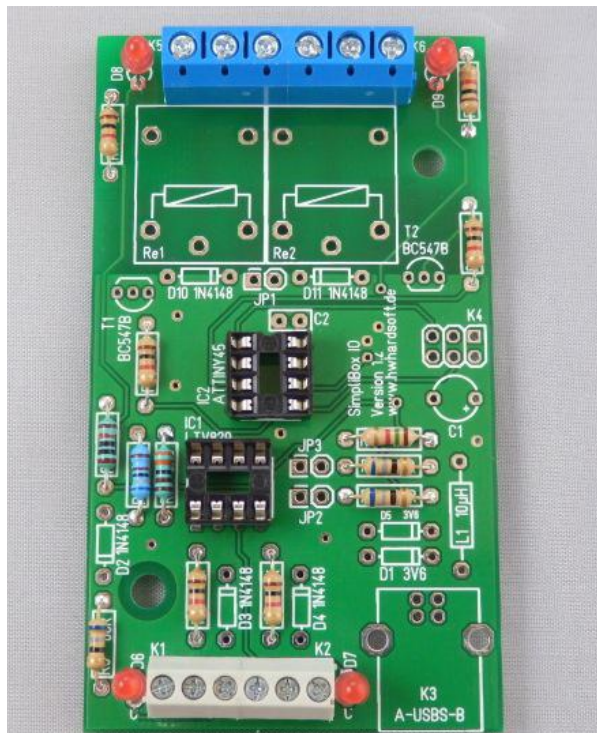
7.) *Assemble the 10K resistor (R9)*



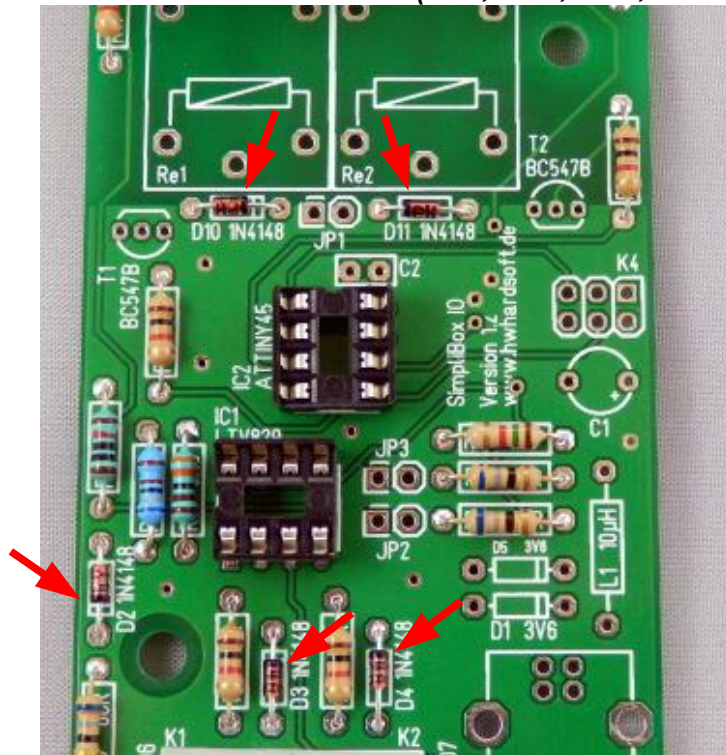
8.) Assemble the 3,3KOhm resistor (R7)



9.) Assemble the 6,8 KOhm resistor (R8)

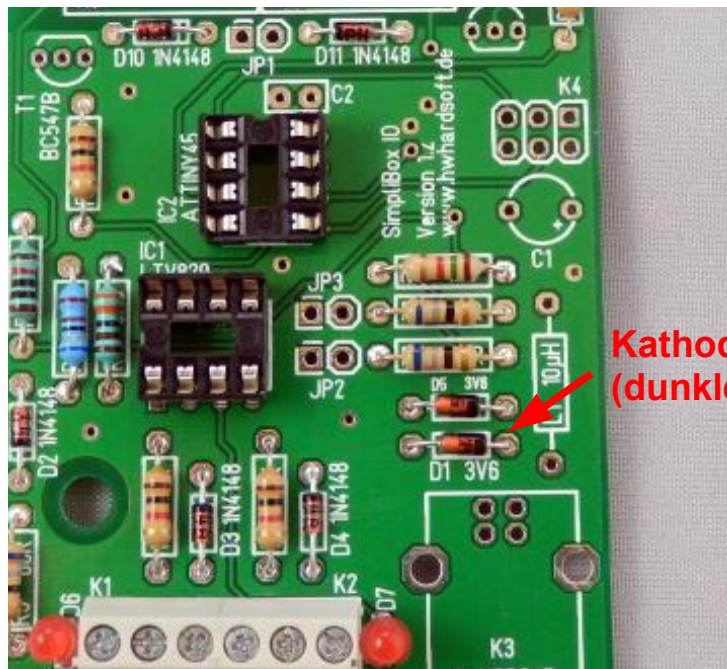


10.) Assemble the 1N4148 Diodes (D2, D3, D4, D10, D11)



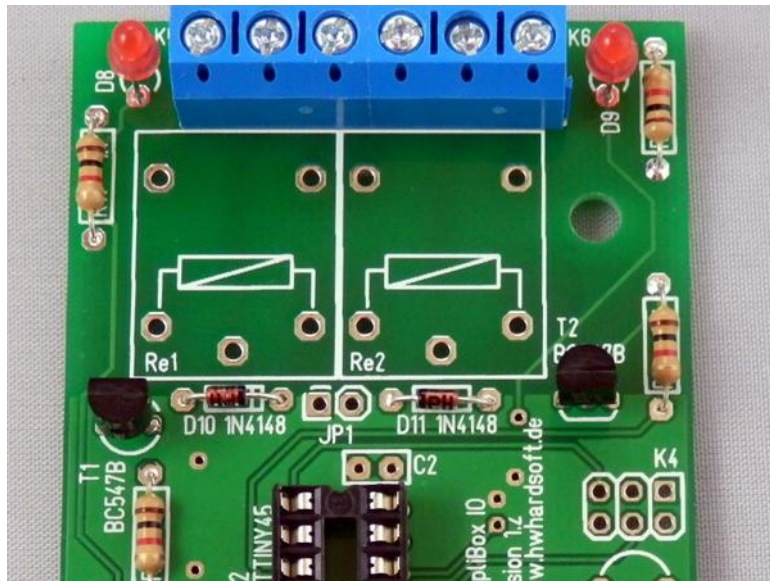
Cathodes
(marked with
dark loop)

11.) Assemble the 3,6V Z-Diodes (D1, D5)

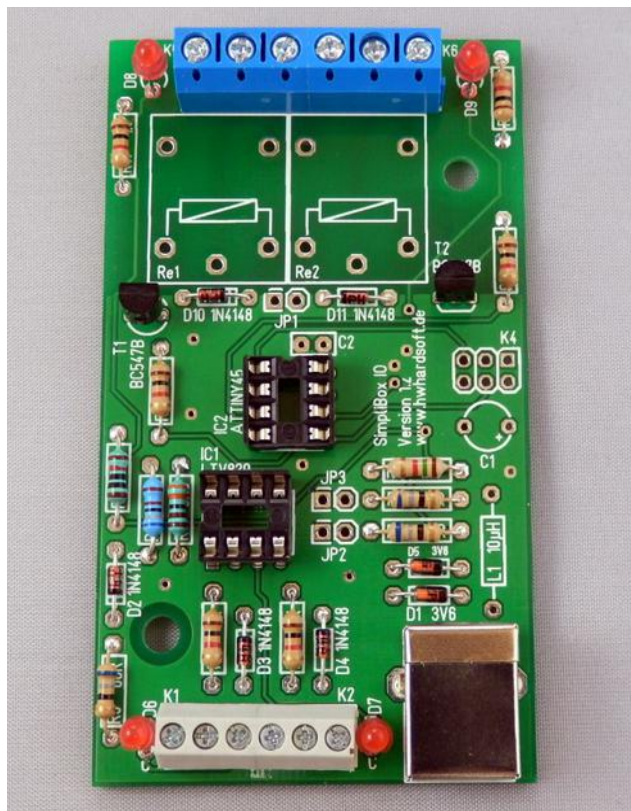


Kathoden
(dunkler Ring)

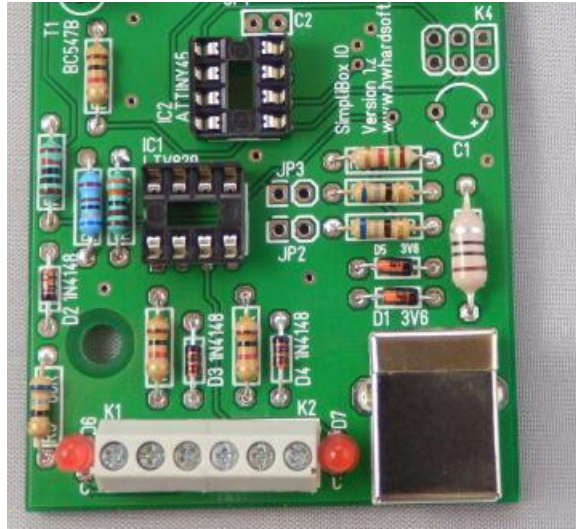
12.) Assemble the BC548B Transistors (T1, T2)



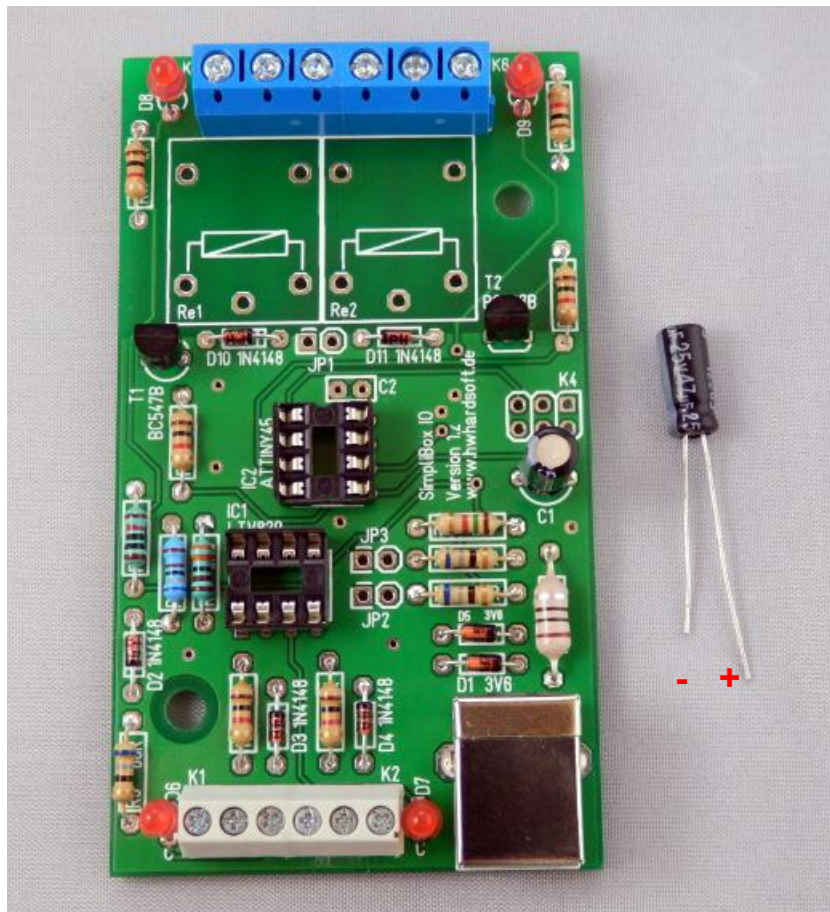
13.) Assemble the USB-socket (K3)



14.) Assemble the Ferrite (L1)



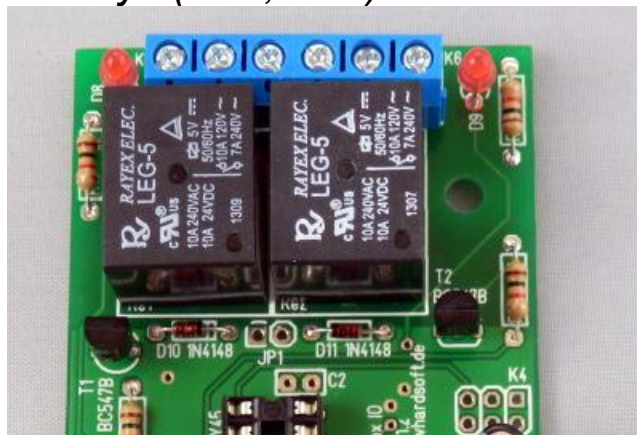
15.) Assemble the electrolytic capacitor (C1)



16.) Assemble the 100nF capacitor (C2)



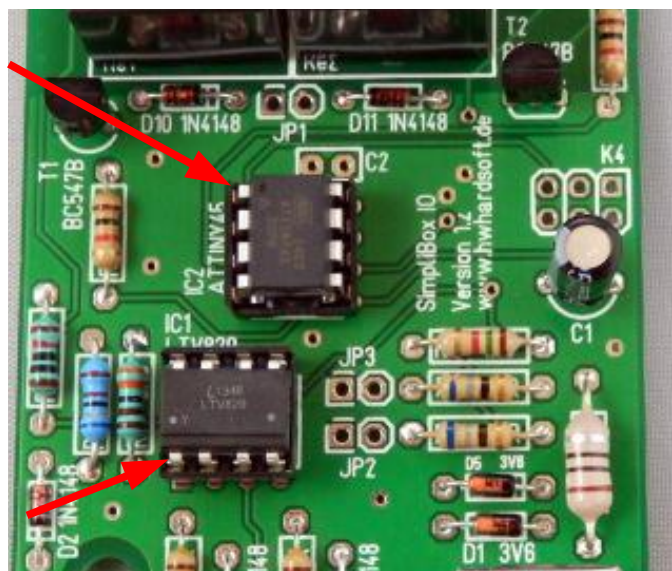
17.) Assemble the relays (Re1, Re2)



18.) Place the microcontroller and optocoupler in the IC sockets

ATTINY45
(Pin1)

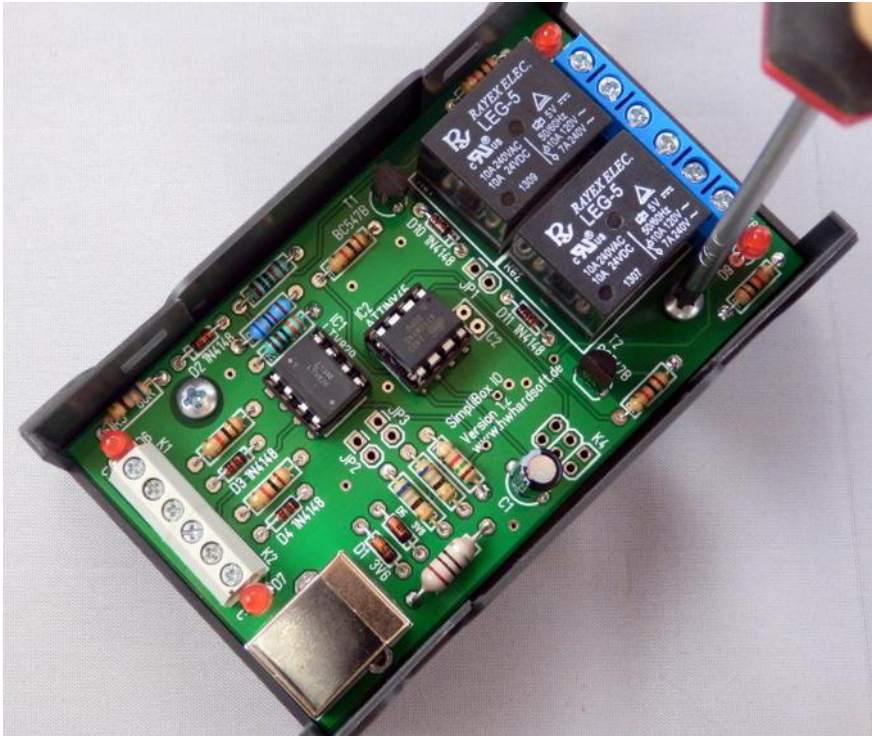
LTV829 (Pin1)



Finish!

The following steps are only important if you have an additional din rail enclosure kit!

19.) *Mount the pcb in a din rail enclosure with self-tapping screws*

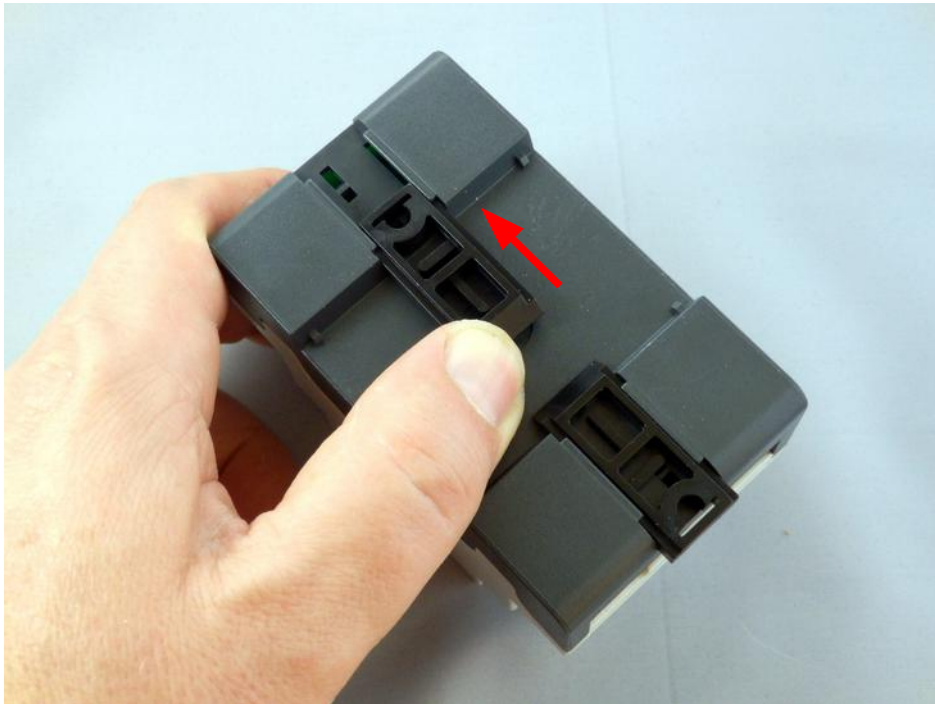


20.) *Click the upper shell to the lower shell*

Milled opening for USB-socket



21.) Mount the both holders for the din rail



Attention: It's important to mount the holders from the inside to the outside - not in the opposite direction!

Trouble-shooting:

Problem	Solution
Device can not be detected by the host	<ul style="list-style-type: none"> - check the polarity of the microcontroller according point 18 - check the soldering - check another USB cable - check another USB port of the host
Some leds don't shine	<ul style="list-style-type: none"> - check the polarity of the LEDs; cathode should be mounted in direction to the pcb outline - check the LED soldering - check the soldering of the series resistance
Inputs without any function	<ul style="list-style-type: none"> - check the polarity of the optocoupler according point 18 - for potential free contacts: you need a voltage for the optocoupler inputs, please check the datasheet
Relais without any function	<ul style="list-style-type: none"> - check the soldering - check the polarity of the both transistors T1 and T2 according point 12 - check another USB cable