DIY Particle Detector

Parts Overview - Electron-Detector Variant with four Diodes

Resistors, values in Ohm:

R1 4.7 kΩ (4k7)

yellow purple black brown (brown)

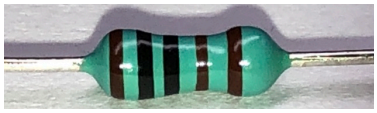
R2 15 kΩ

brown green black red (brown)

R3 10 MΩ

brown black black green (brown)

R4 1 kΩ



brown black black brown (brown)

R5 100 kΩ

brown black black orange (brown)

R6, R7 10 kΩ

brown black black red (brown)

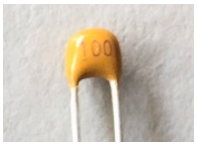
R8 must be shorted with a wire
(0 Ohm)

R9 2.2 kΩ (2k2)

red red black brown (brown)

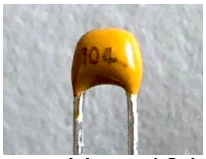
Capacitors, values in Farad:

C1, C2, C6 10 pF



marking: 100

C3, C4, C5, C7, C10 100 nF



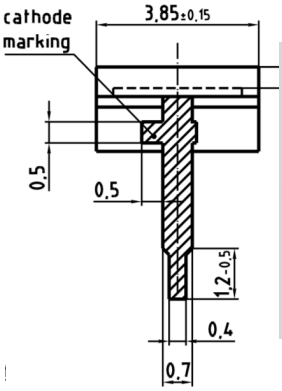
marking: 104

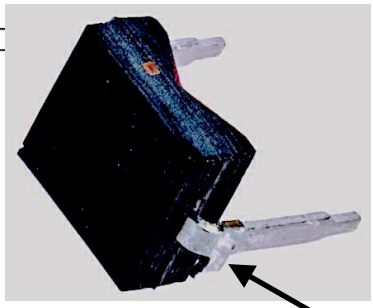
C8 47 µF

polarity: short pin = minus, long pin = plus

C9 is not needed in this variant
(leave empty and do not populate)

D1 - D4, Silicon PIN Diode BPW34 (F)





polarity: pin with notch = cathode

U1, Dual operational amplifier TLE2072

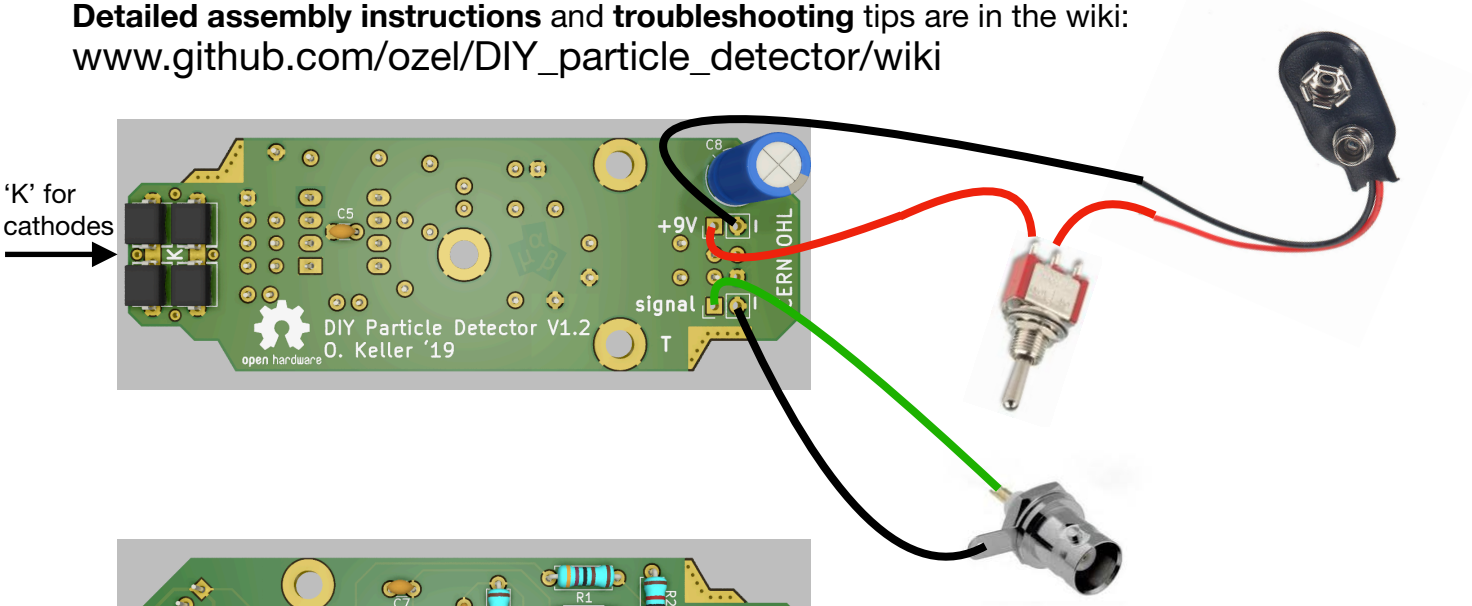
pin 1 on board & chip marked with a circle

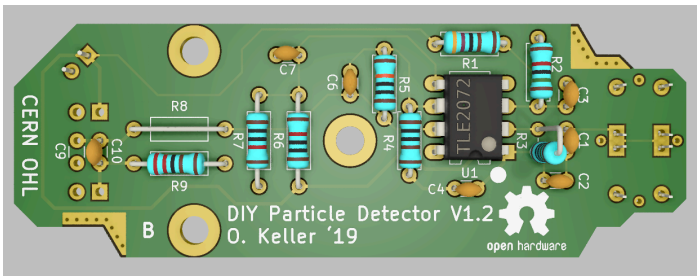
Assembly Instructions

In general: Start with the smallest parts and solder the largest ones at the end.

1. Solder all resistors in the right place, compare their color bands with the pictures.
   - R3 must be soldered upright, the others stay flat and parallel to the board
   - R8 shall be just shorted with a piece of wire
   - cut all resistor leads after soldering as short as possible
2. Solder the small capacitors C1 to C7 and C10.
   - C9 shall be skipped, the large C8 comes later
   - cut all capacitor leads after soldering as short as possible
3. Solder the four BPW34 diodes in place.
   - check the correct diode polarity carefully according to the pictures
   - the cathode pin with the notch must face towards the ‘K’ symbol on the board center
   - cut all diode pins after soldering as short as possible
4. Solder the black amplifier chip U1 in place after bending its pins straight and parallel.
   - check the correct chip polarity carefully according to the pictures
5. Solder the large capacitor C8 and check on which side of the board it fits best
   - choose the side of the board that has enough space available once installed in a case
   - check the correct capacitor polarity carefully according to the pictures
   - cut the capacitor leads after soldering as short as possible
6. If you have a multimeter: check the resistance of the battery connector (+9V and -).
   - if the resistance is not around 9-10 kΩ, there is a problem that must be found
7. Solder the battery connector to the board and the switch as shown below.
   - cut a short piece of wire from the battery clip and solder it between switch and board
8. Mount the board with one or two screws inside the metal enclosure.
9. Mount the switch and the BNC signal connector in holes of the metal case.
10. Solder two more wires from the signal & ground (-) connections to the BNC connector.
11. Attach a full 9 Volt battery, put it in inside the case and close the lid well!
    - light must not reach inside, try covering the case with a dark piece of cloth if unsure
12. Connect an oscilloscope or smartphone/laptop for measuring, see the wiki for details.

Detailed assembly instructions and **troubleshooting** tips are in the wiki:
www.github.com/ozel/DIY_particle_detector/wiki





DIY Particle Detector V1.2
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Oliver Keller, November 2020