

# Ultra-low power contact tester

PA3FWM – May 2021

Current consumption: about 1 uA idle, 1 mA beeping.

could alternatively be supplied by 2 LR44 cells or 1 CR2032

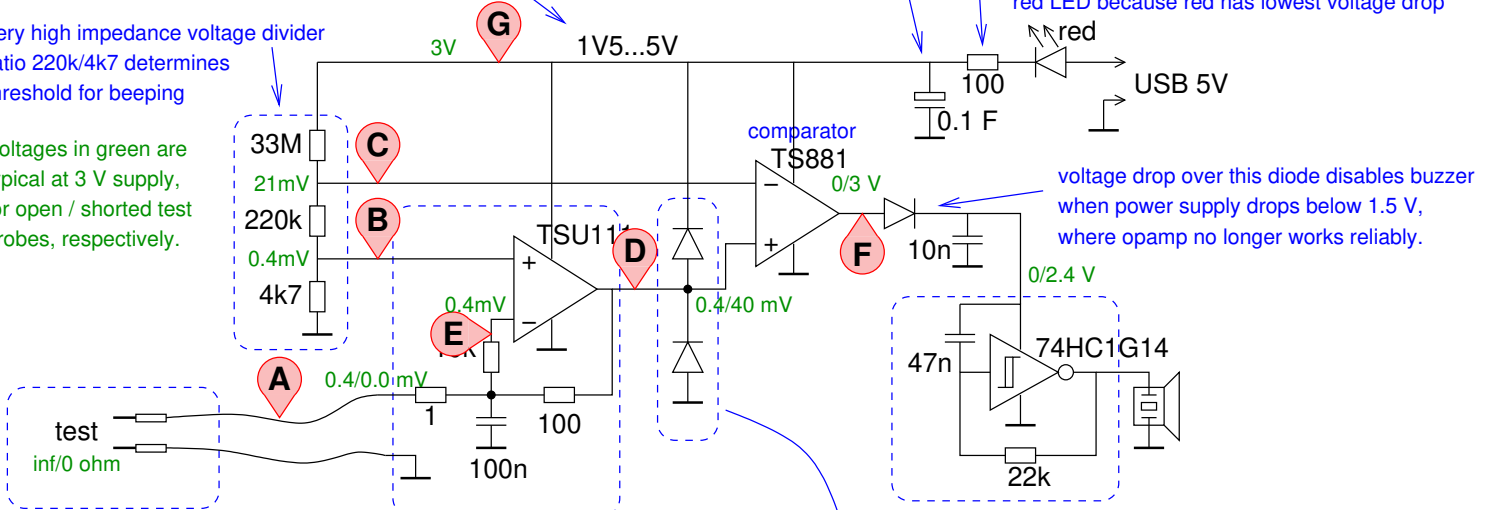
0.1 F supercap can be charged from USB

100 ohm resistor limits charge and LED current

red LED because red has lowest voltage drop

very high impedance voltage divider  
ratio 220k/4k7 determines  
threshold for beeping

Voltages in green are  
typical at 3 V supply,  
for open / shorted test  
probes, respectively.



Circuit never applies more than  
0.4 mA or (in theory) 0.4 mV to the  
test pins, yet only beeps if there's  
less than 1 ohm between them.  
(In practice, open input voltage  
is about 3 mV, as opamp output doesn't go lower.)

Amplifies the 0.4 mV from the voltage divider  
by a factor determined by the probed resistance.  
open – amplification factor 1  
0 ohm – amplification factor 100

logic gate used as oscillator  
better not use a faster logic family, as they draw  
more current when used in this kind of circuit.

Protect (somewhat), via 1 and 100 ohm resistors, against  
overvoltage on input, e.g. from a charged capacitor.  
Preferably schottky diodes (lower threshold voltage).

