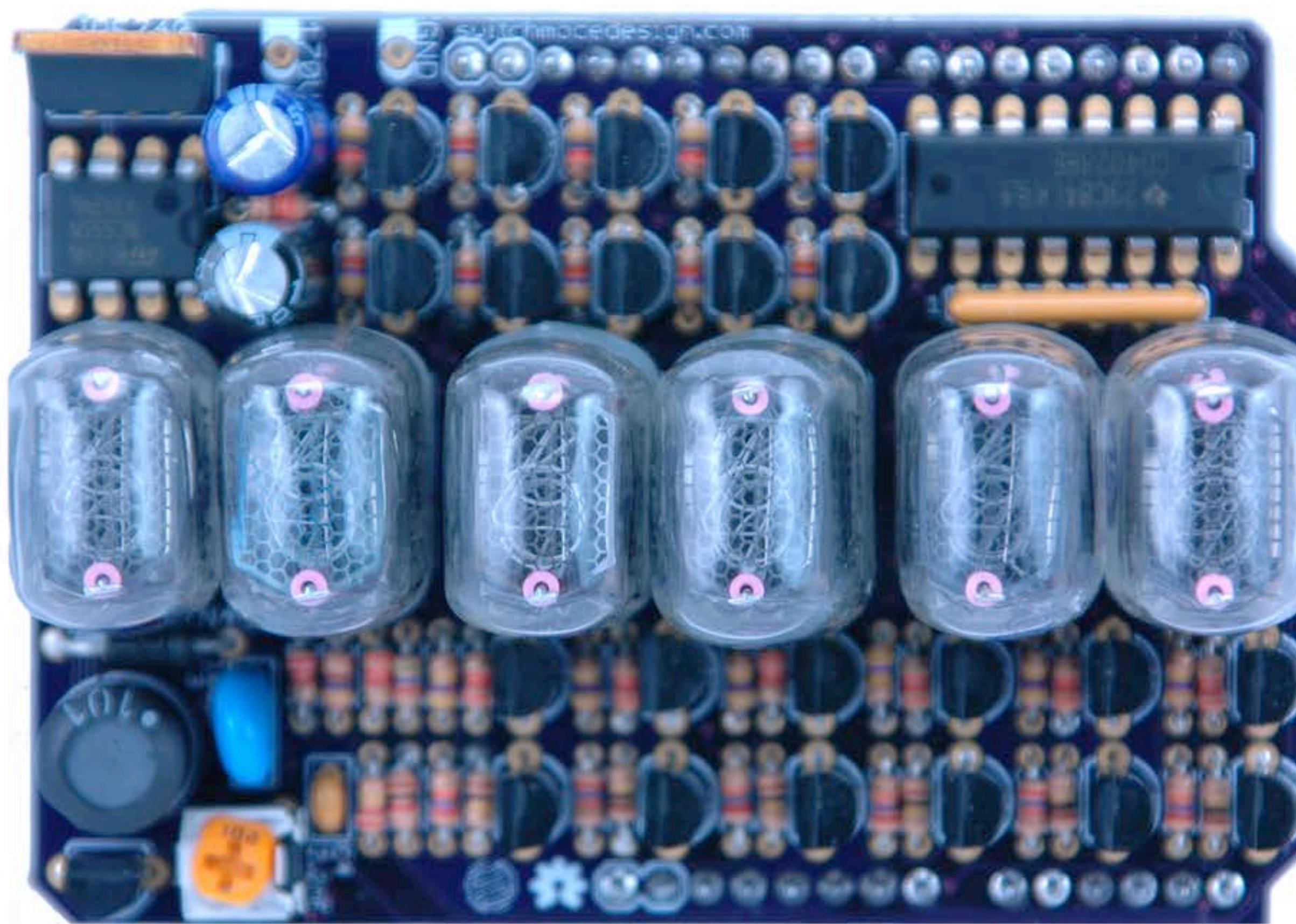


Open Source Nixie Tube Shield

Assembly Guide

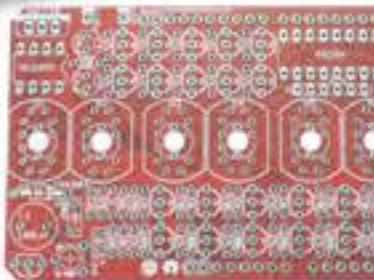


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Parts in the Kit

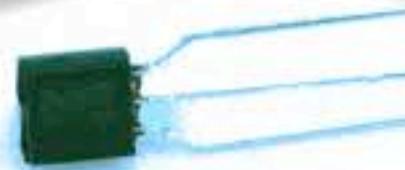
(1) Printed Circuit Board



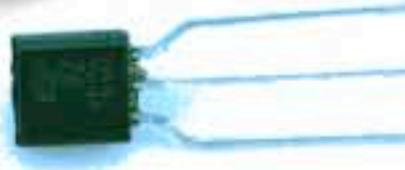
(1) 2.2uF Capacitor



(17) NPN Transistors



(6) PNP Transistors



(1) 4028N IC



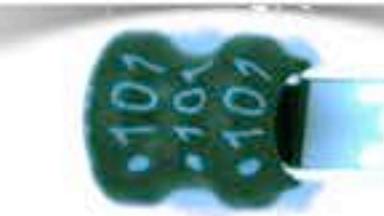
(6) Blue LEDs



(1) 555 Timer IC



(1) 100uH Inductor



(1) IN4004 Diode



(1) 40 Pin Header



(1) 330uF Capacitor



(1) 100pF Capacitor



(1) IRF740 MOSFET



(1) 330Ohm Resistor



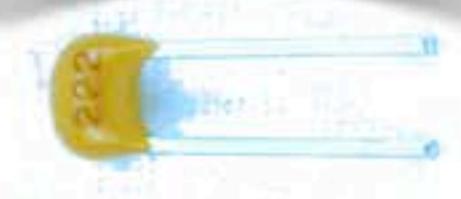
(1) 1kOhm Potentiometer



(1) 2.2kOhm Resistor



(1) 2.2nF Capacitor



(1) 330Ohm Resistor Network



(1) 56kOhm Resistor



(1) 470Ohm Resistor



(1) 1kOhm Resistor



(1) 220kOhm Resistor



(6) 27kOhm Resistors



(6) 33kOhm Resistors



(10) 47kOhm Resistors



(1) 10kOhm Resistor



(6) 100kOhm Resistors

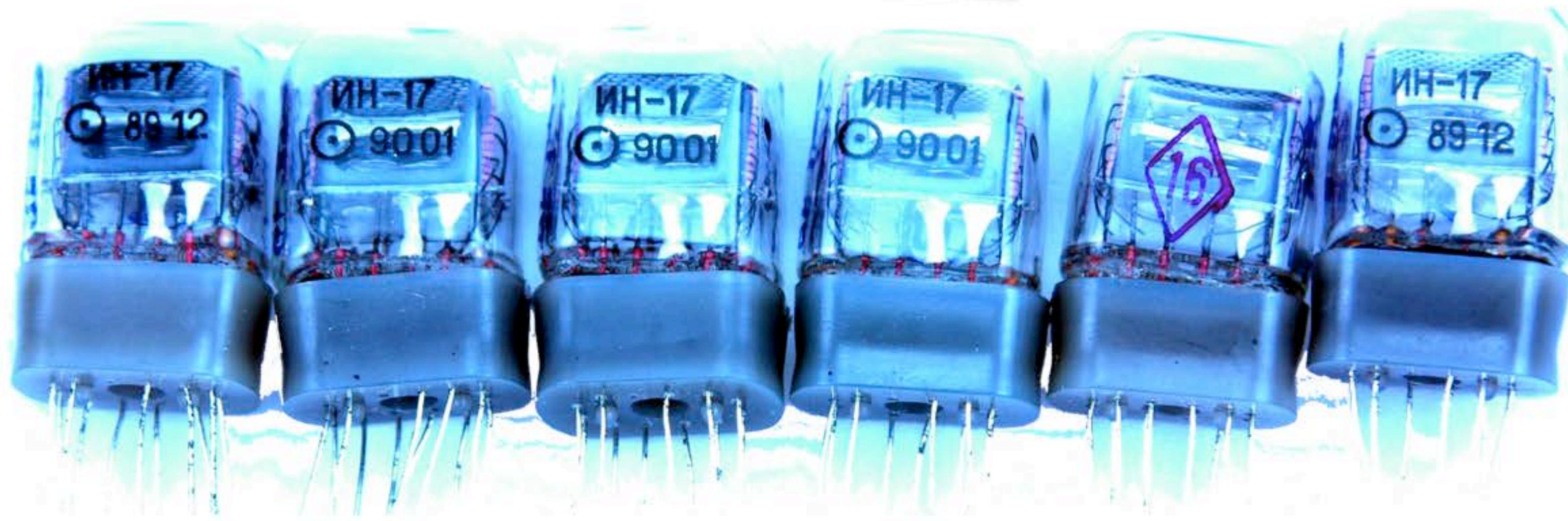


(6) 470kOhm Resistors



Kits with Nixie Tubes

Your kit will include six IN-17 Nixie Tubes if you purchased a kit with included tubes



If you purchased the standalone printed circuit board or a kit without Nixie Tubes, you can find sets of Nixie Tubes by searching on eBay



Tools You Will Need For Assembly

Soldering Iron



Solder



Digital Multi-Meter (recommended)



Soldering Heat Sink (optional)



Add the Backlight LEDs

Trim the short lead of the LEDs

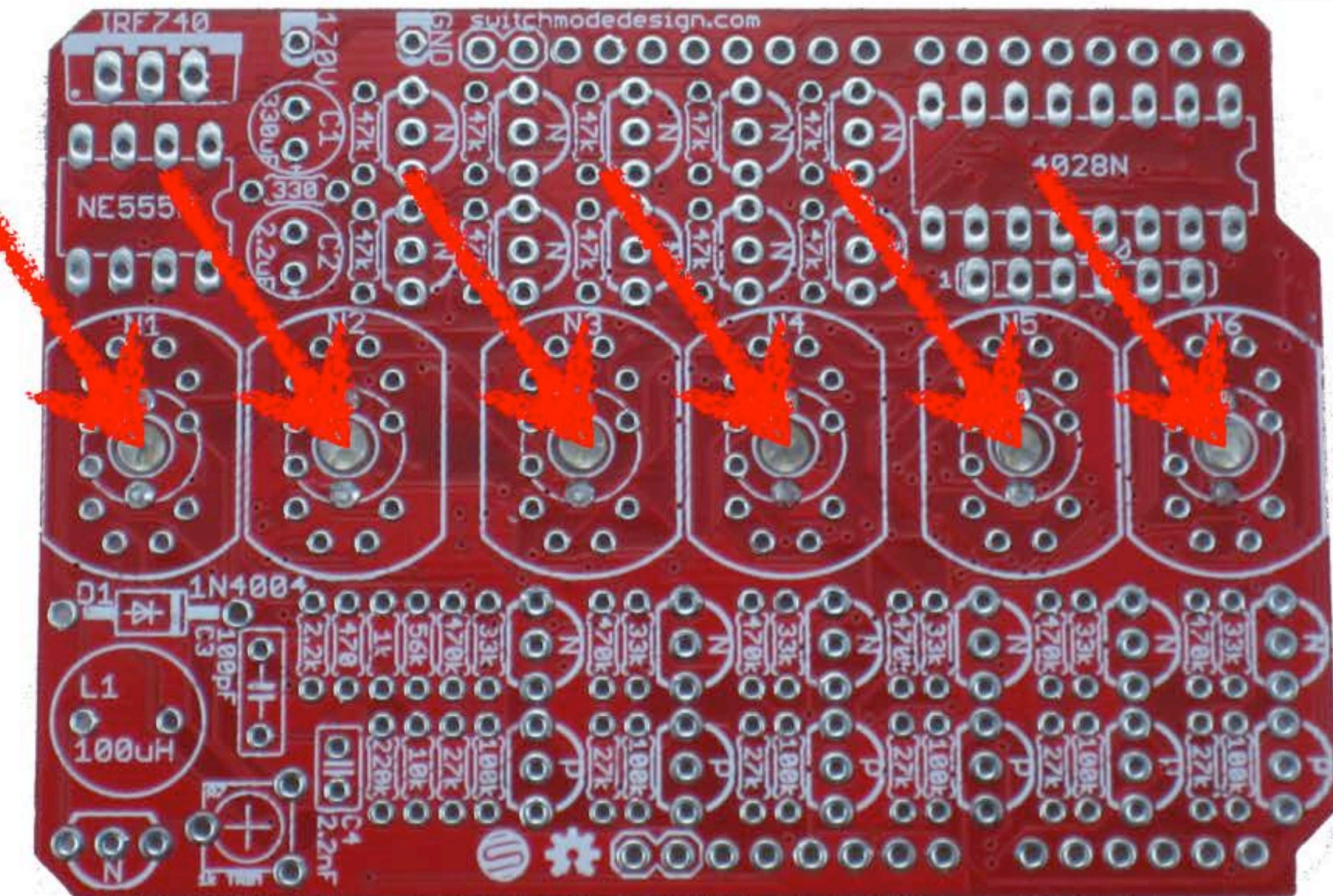


Bend the LED leads 180 degrees



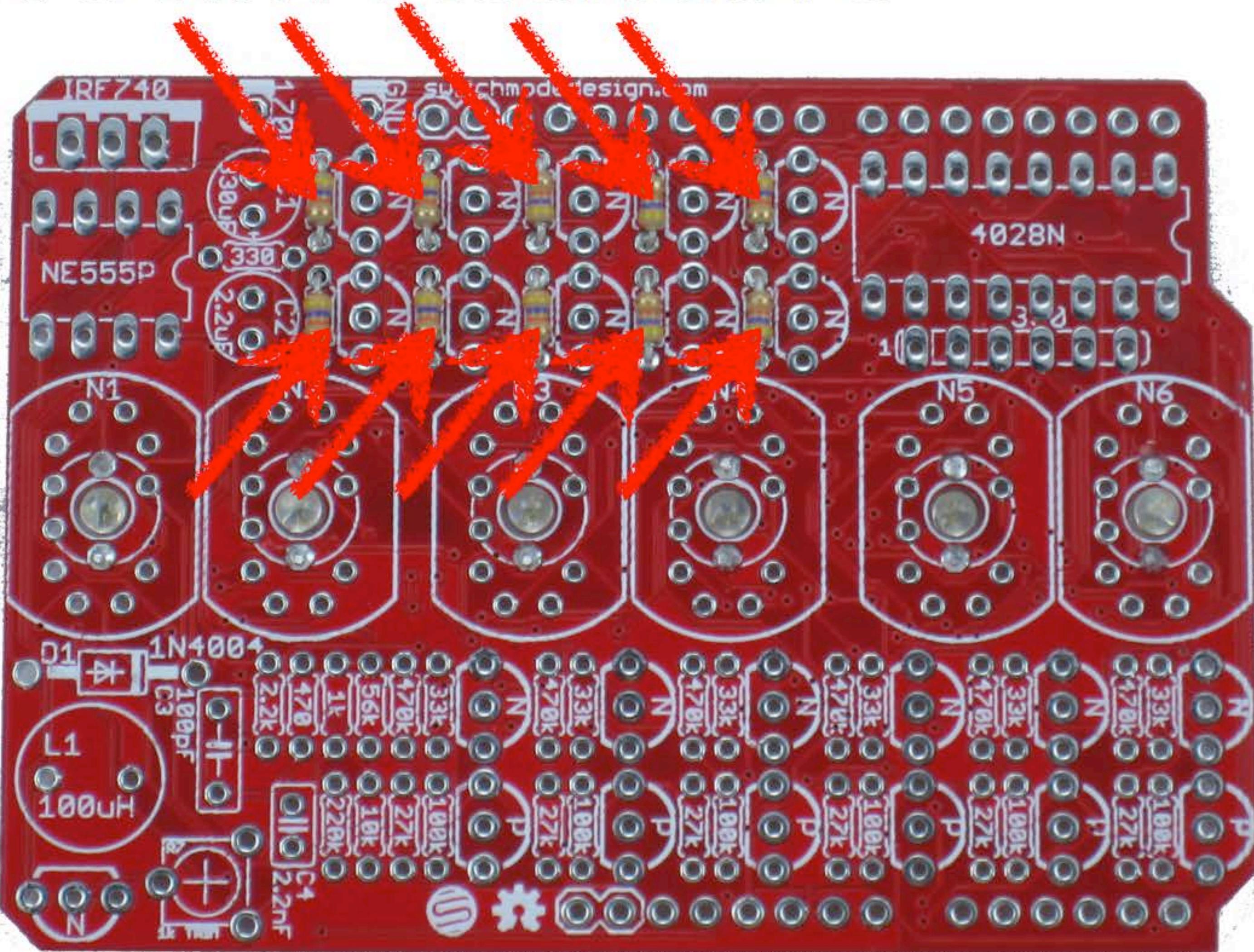
Insert the LEDs from the bottom of the board, taking note of the polarity of the leads

Solder the short lead to the ‘S’ terminal
and the long lead into the ‘L’ terminal



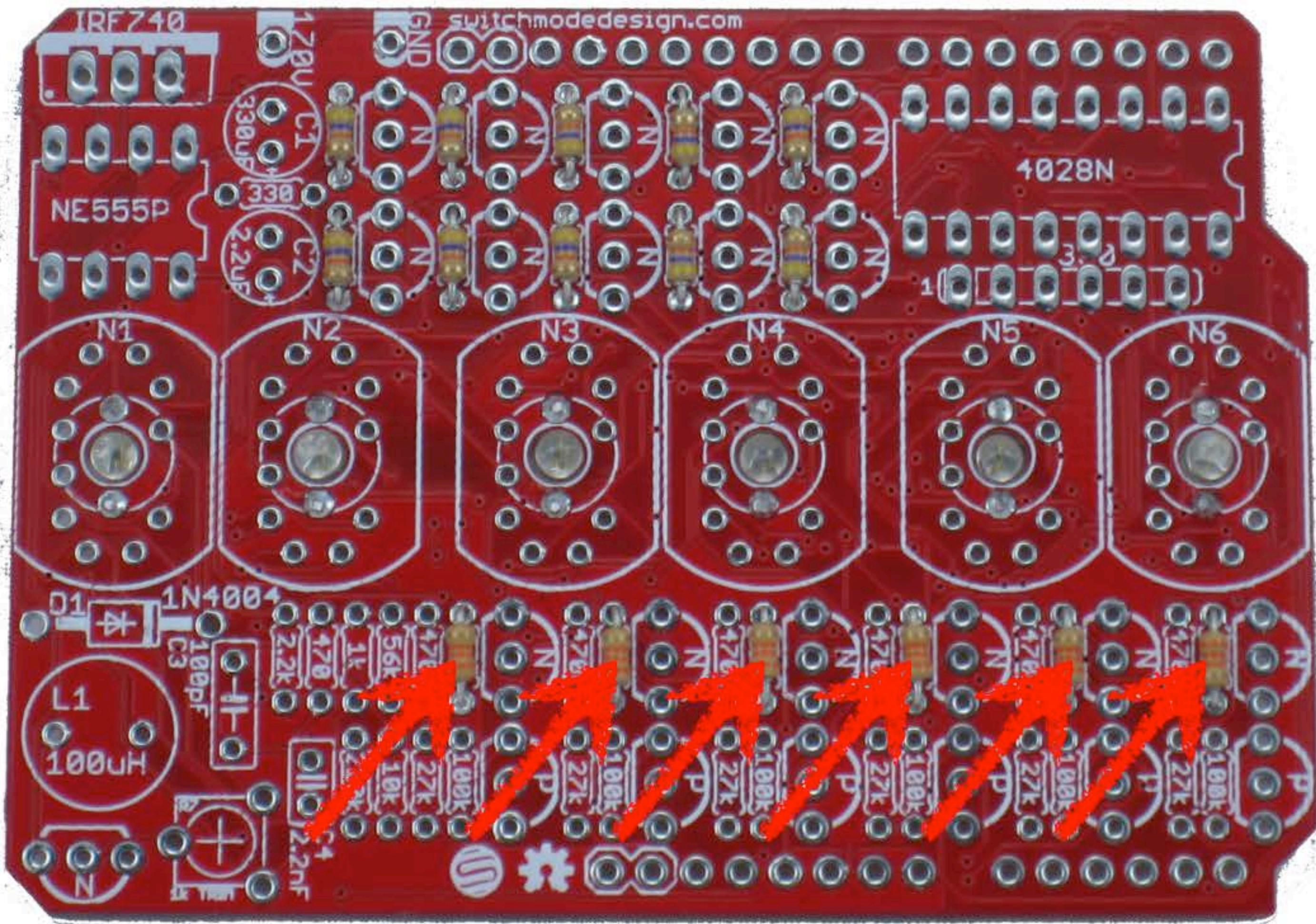
Add the 47kOhm Resistors

Solder the ten 47kOhm resistors



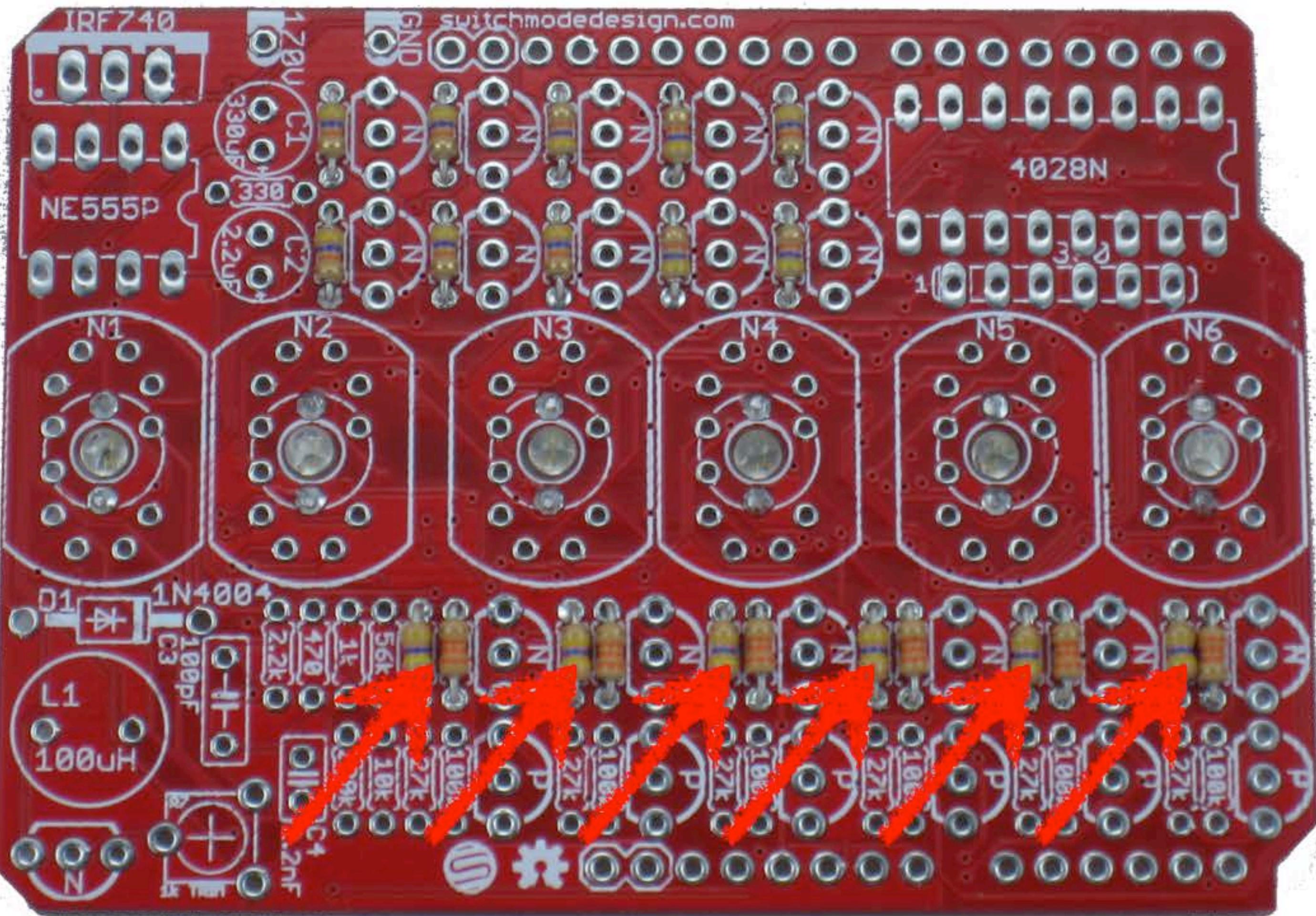
Add the 33kOhm Resistors

Solder the six 33kOhm resistors



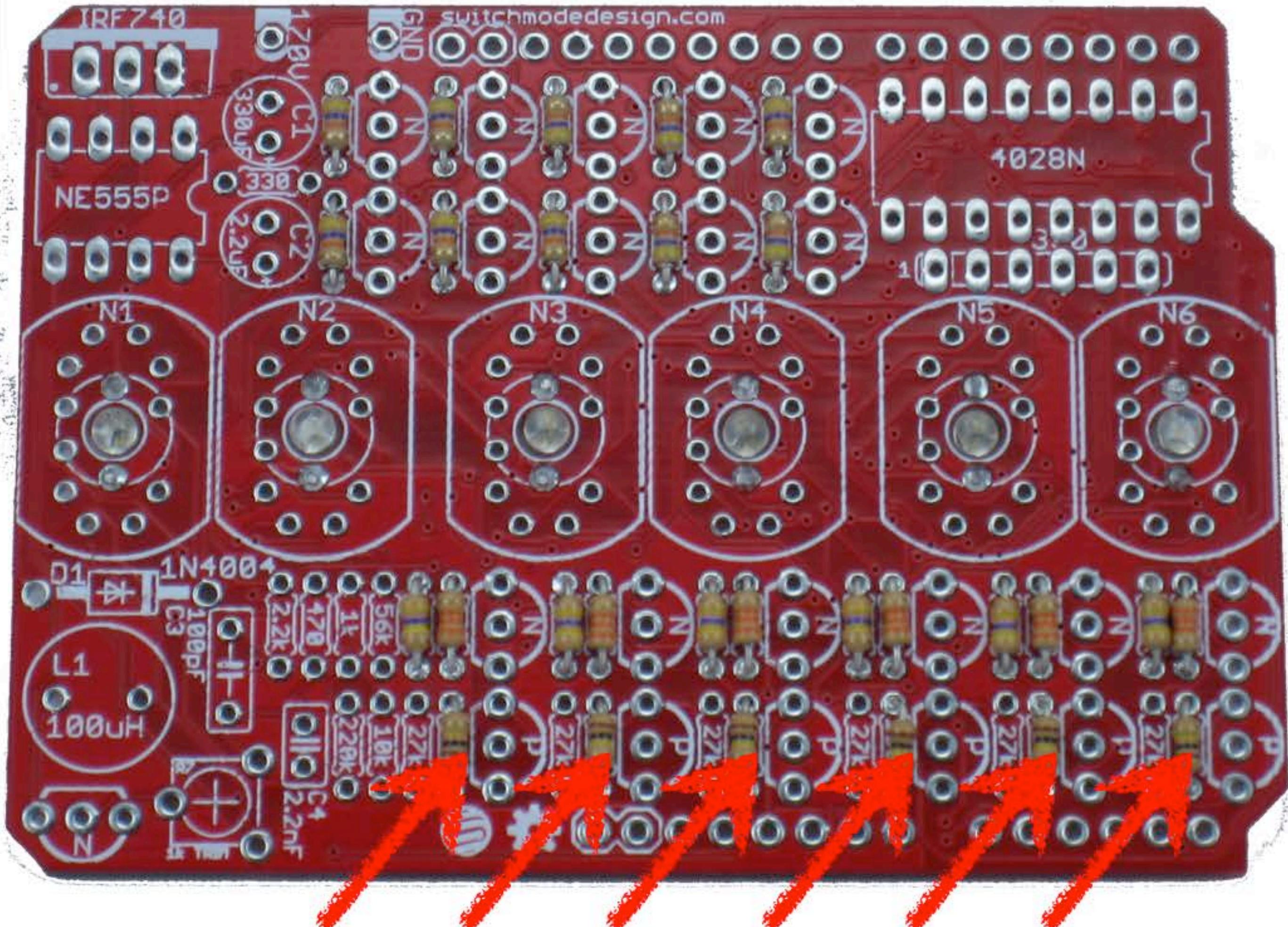
Add the 470kOhm Resistors

Solder the six 470kOhm resistors



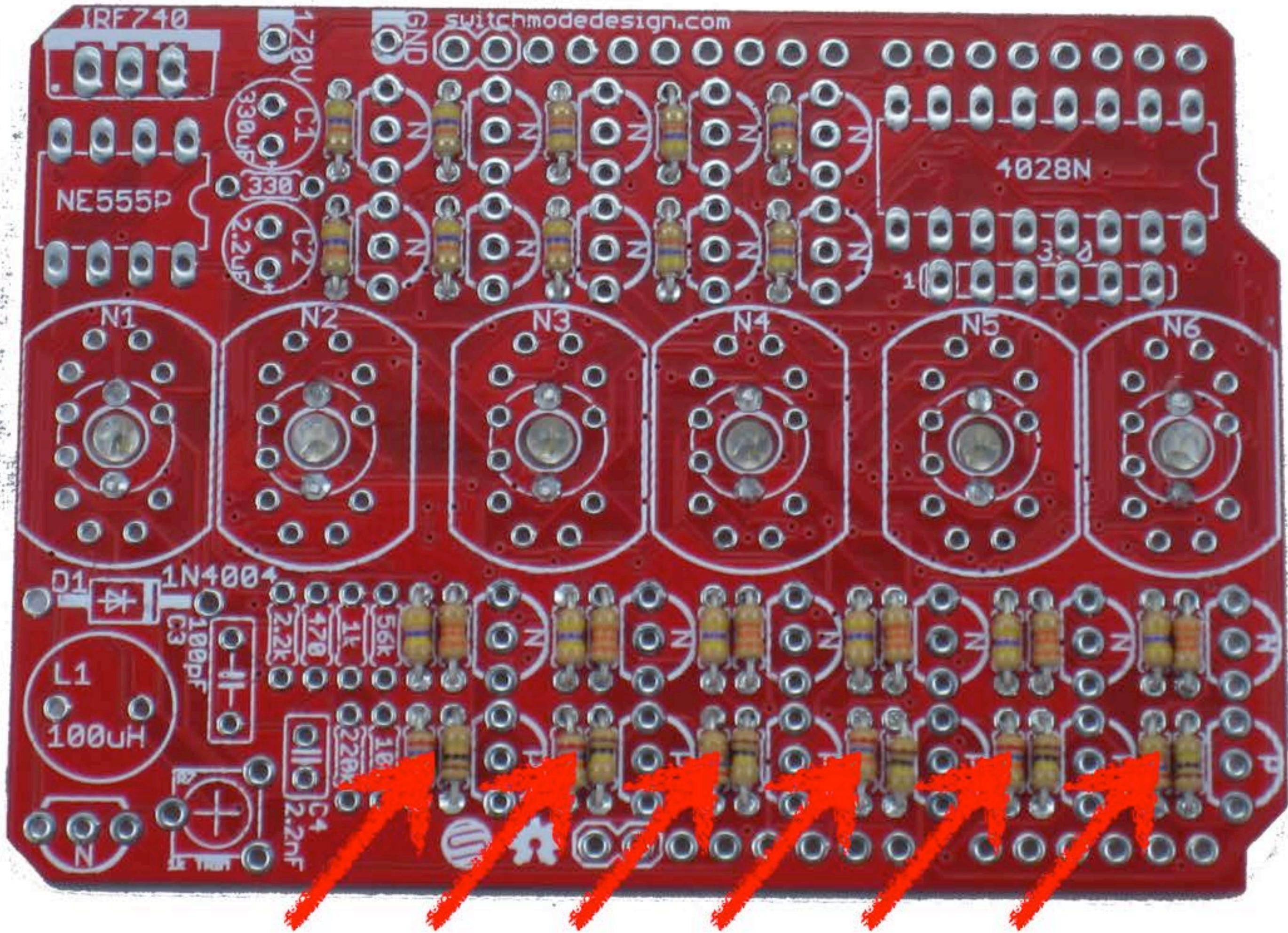
Add the 100kOhm Resistors

Solder the six 100kOhm resistors



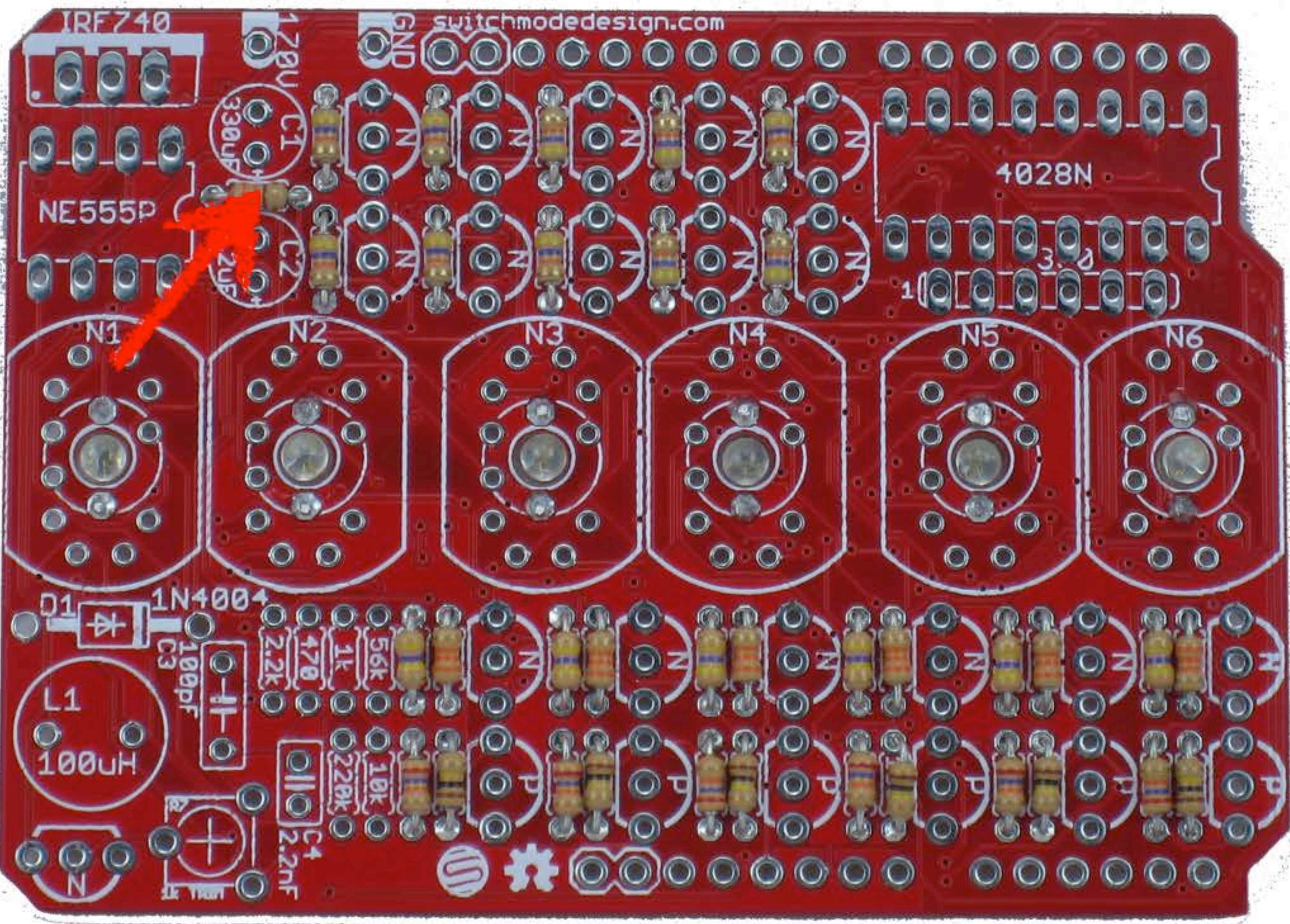
Add the 27kOhm Resistors

Solder the six 27kOhm resistors



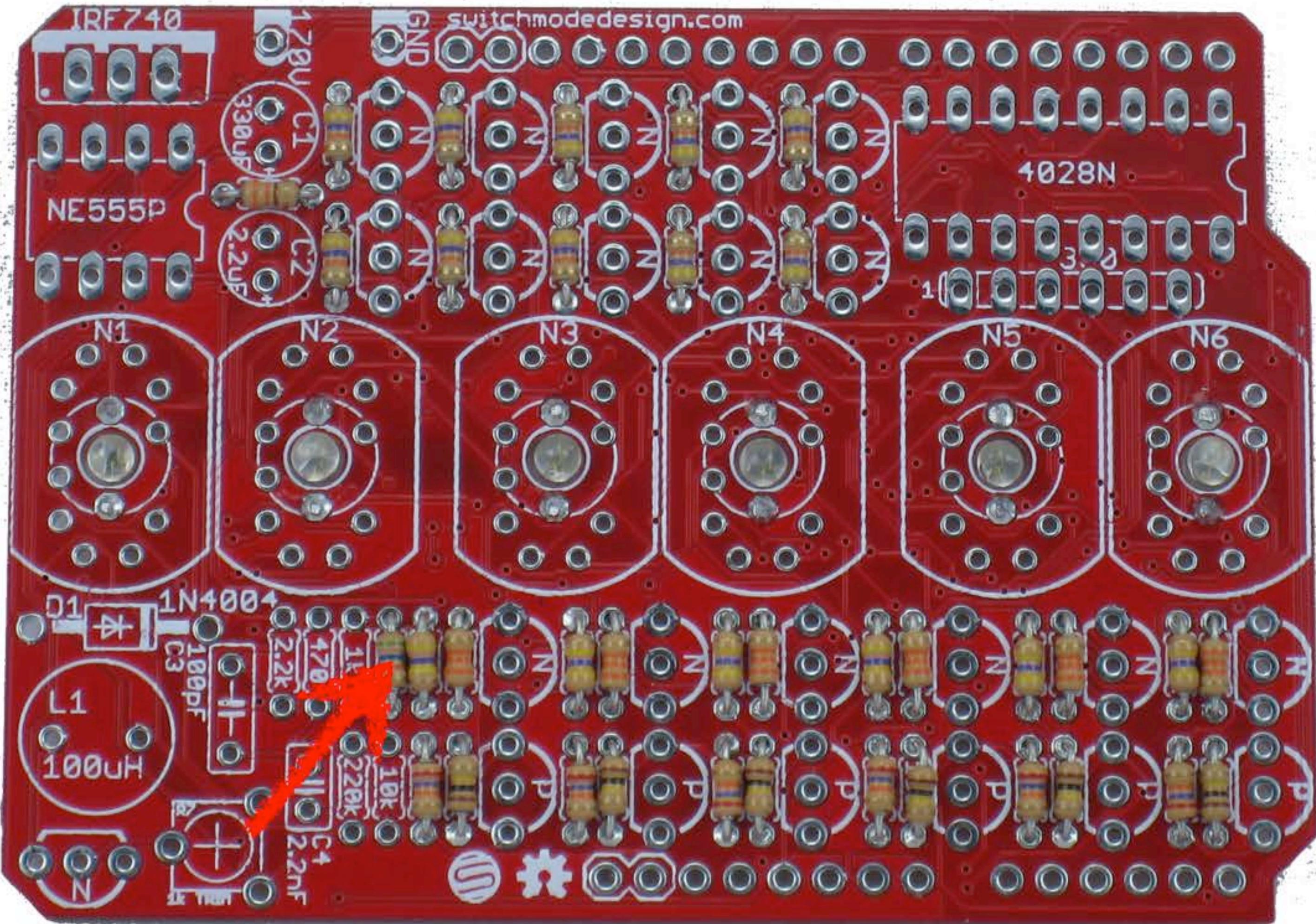
Add the 330Ohm Resistor

Solder the one 330Ohm resistor



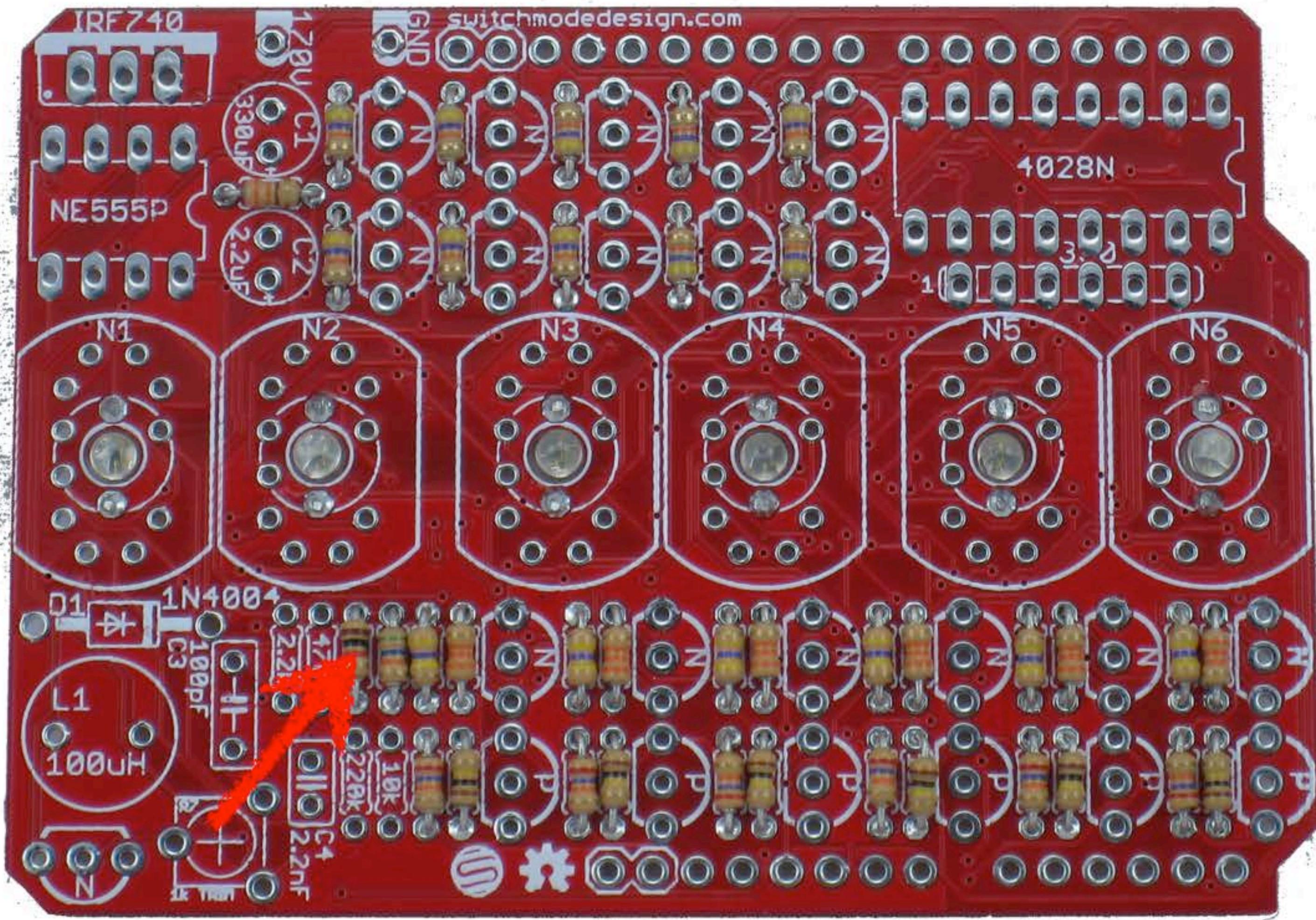
Add the 56kOhm Resistor

Solder the one 56kOhm resistor



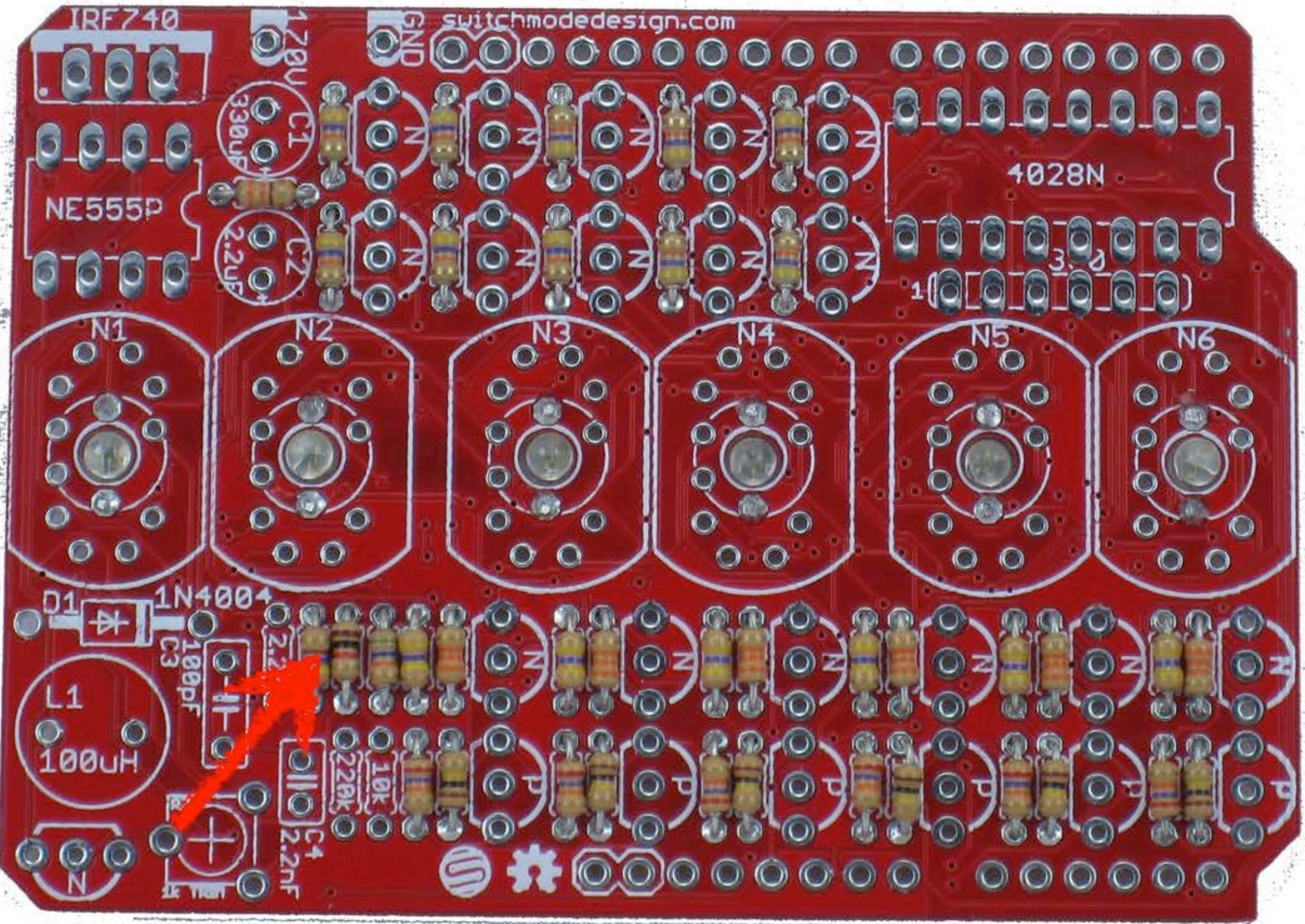
Add the 1kOhm Resistor

Solder the one 1kOhm resistor



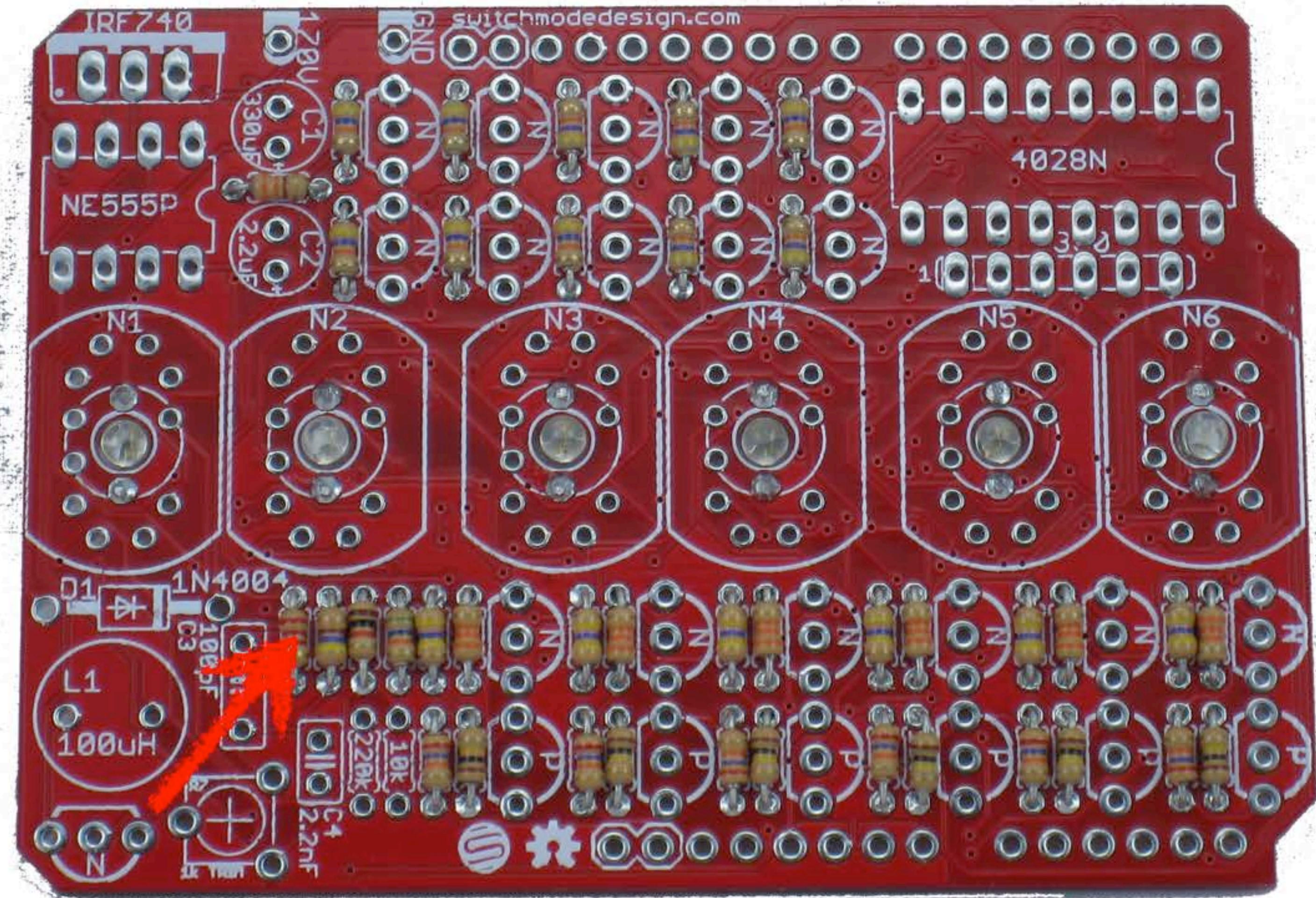
Add the 470Ohm Resistor

Solder the one 470Ohm resistor



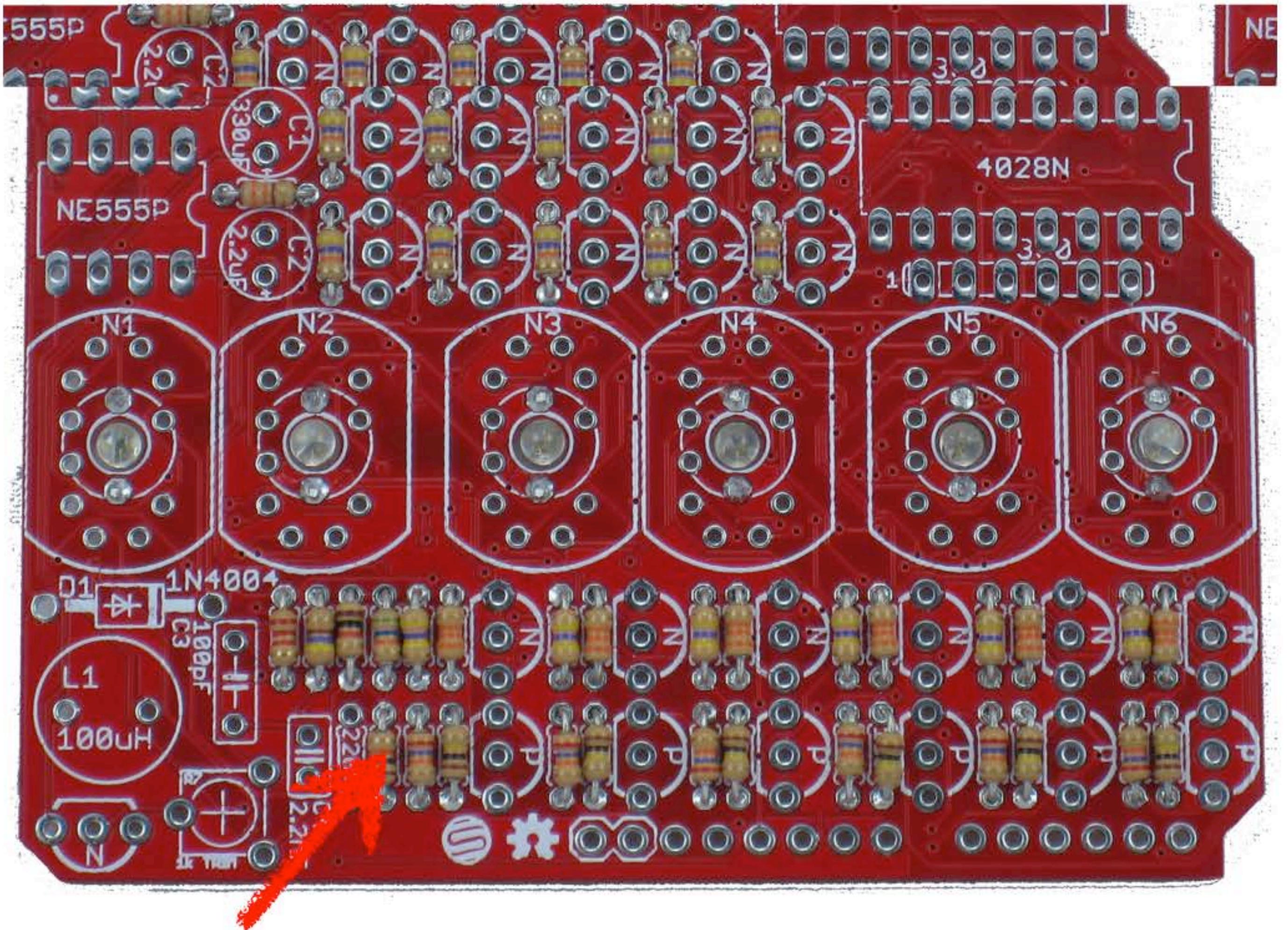
Add the 2.2kOhm Resistor

Solder the one 2.2kOhm resistor



Add the 10kOhm Resistor

Solder the one 10kOhm resistor

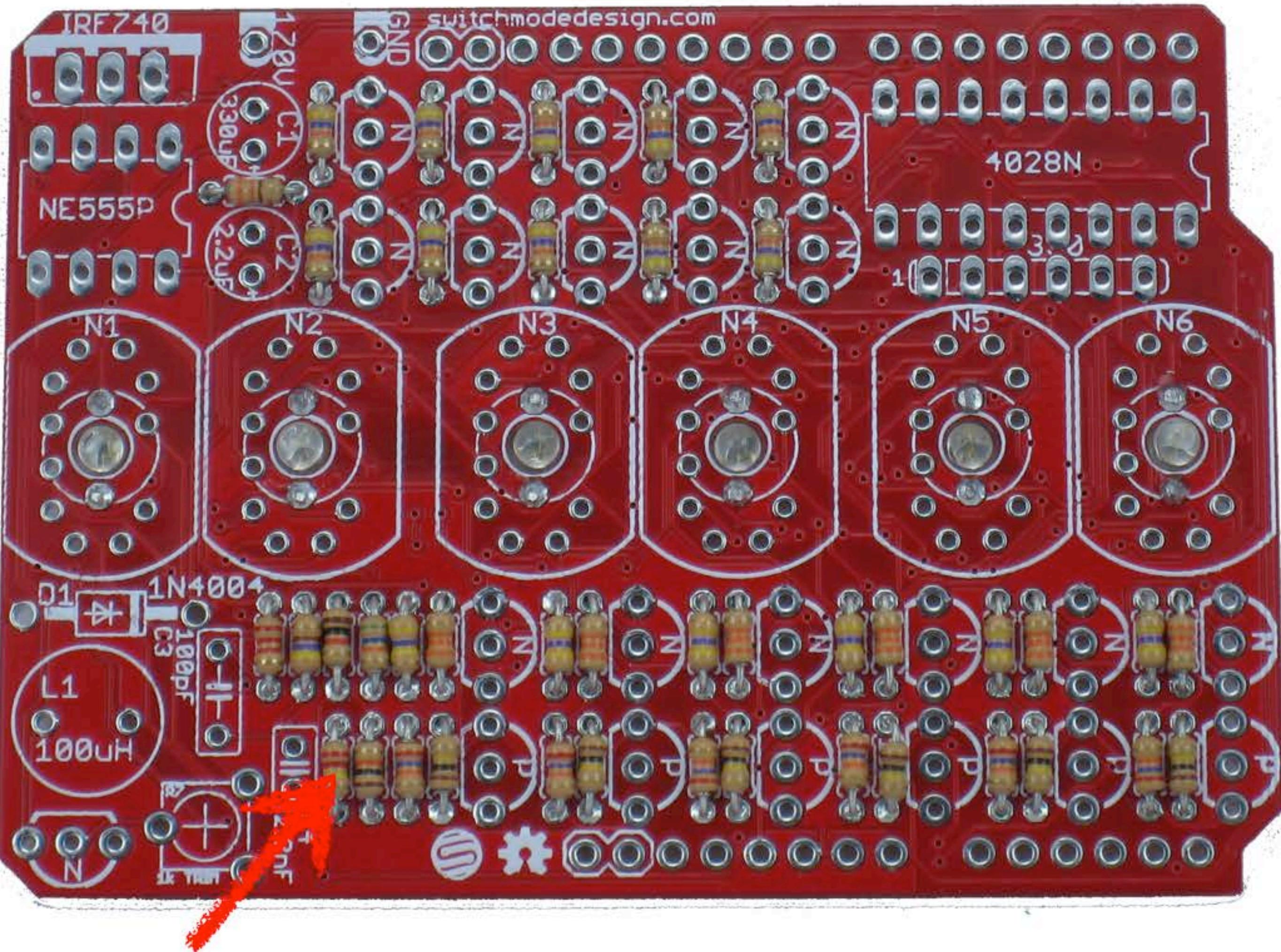


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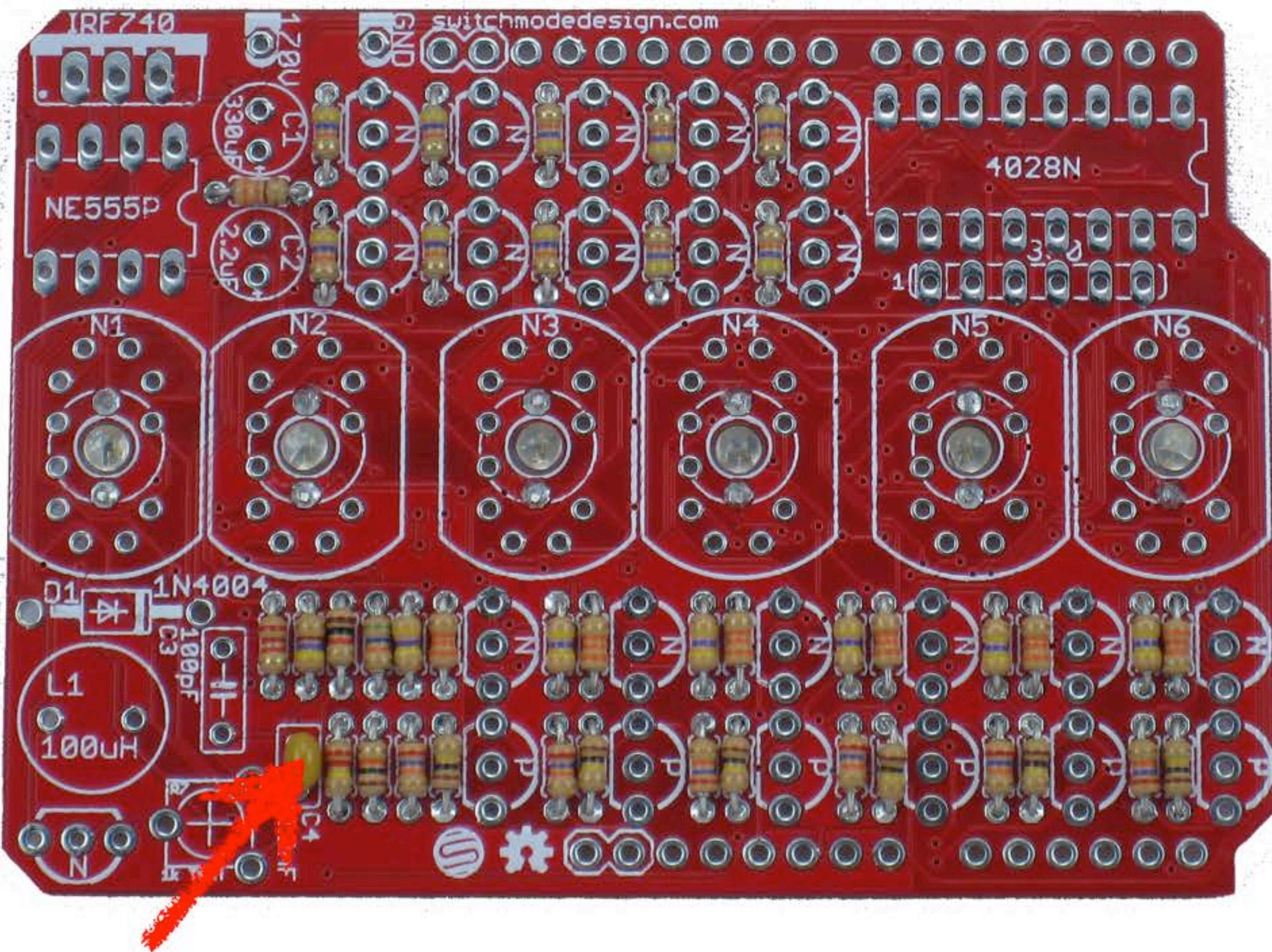
Add the 220kOhm Resistor

Solder the one 220kOhm resistor



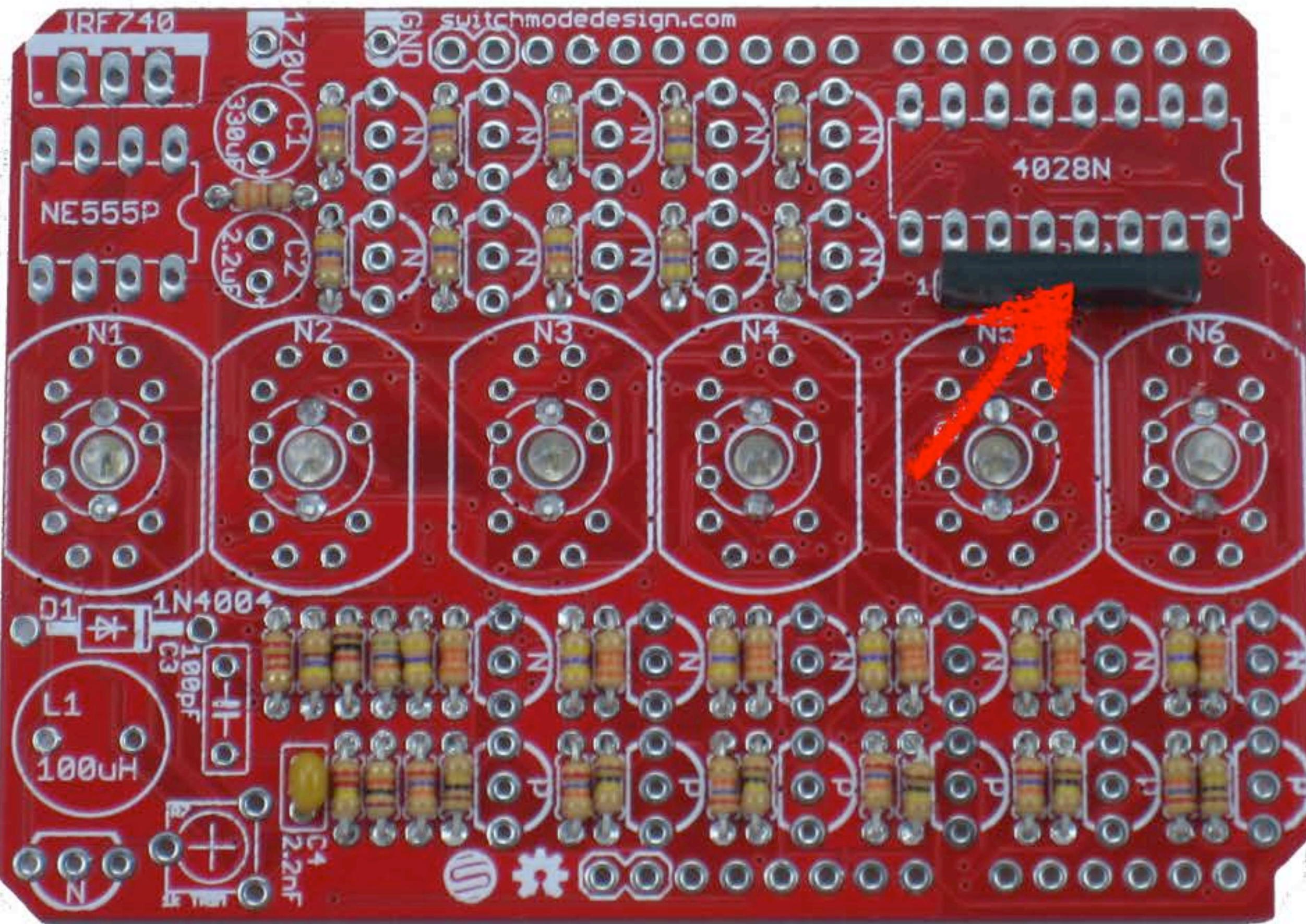
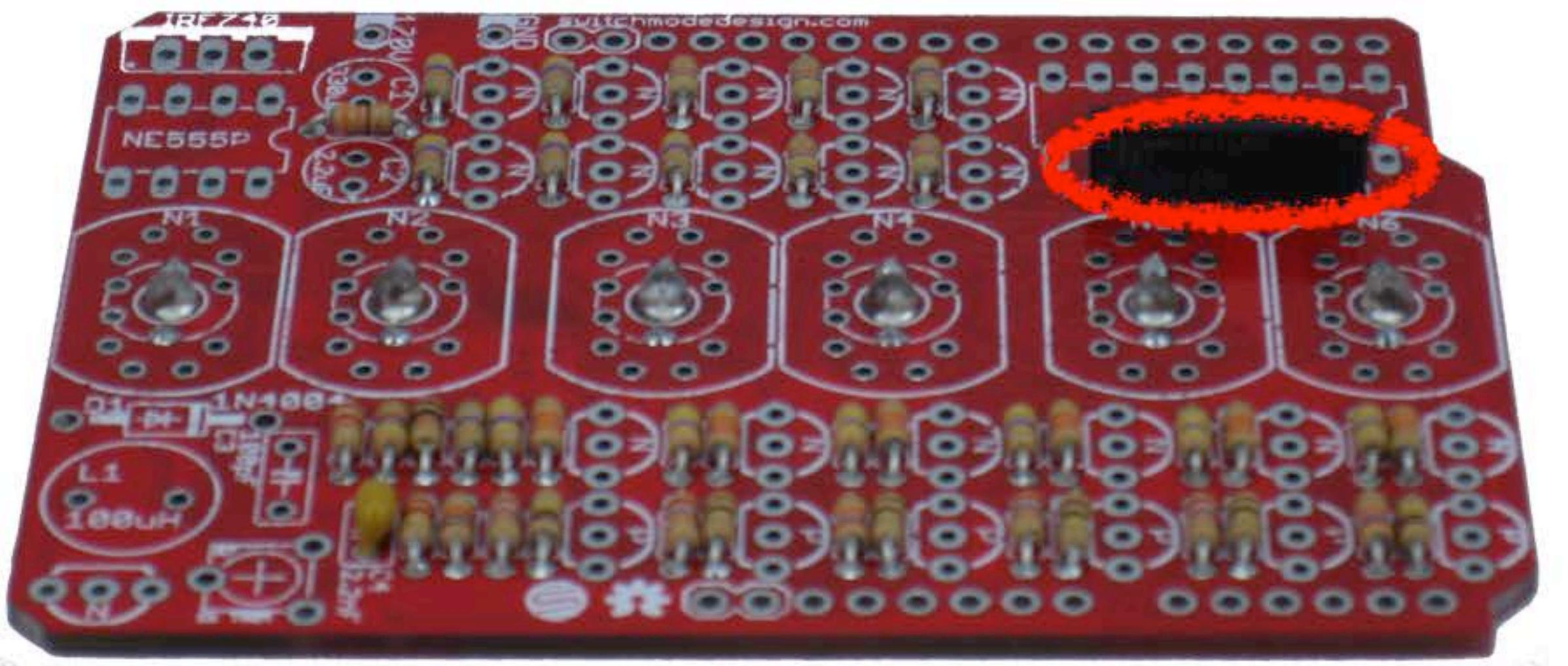
Add the 2.2nF Capacitor

The 2.2nF capacitor has no polarity
and can be soldered either way



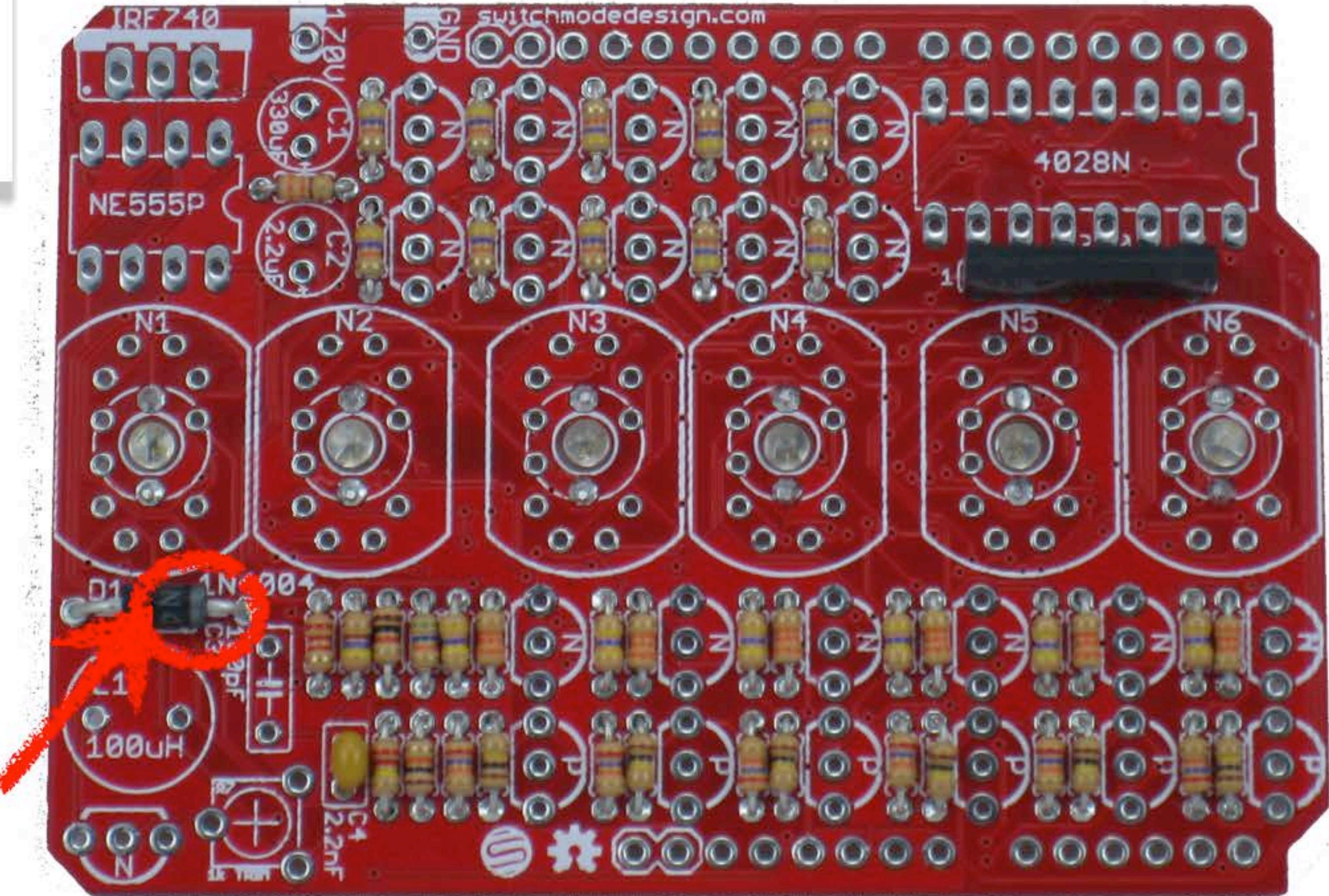
Add the 330Ohm Resistor Network

Solder the resistor network with the text facing towards the LEDs



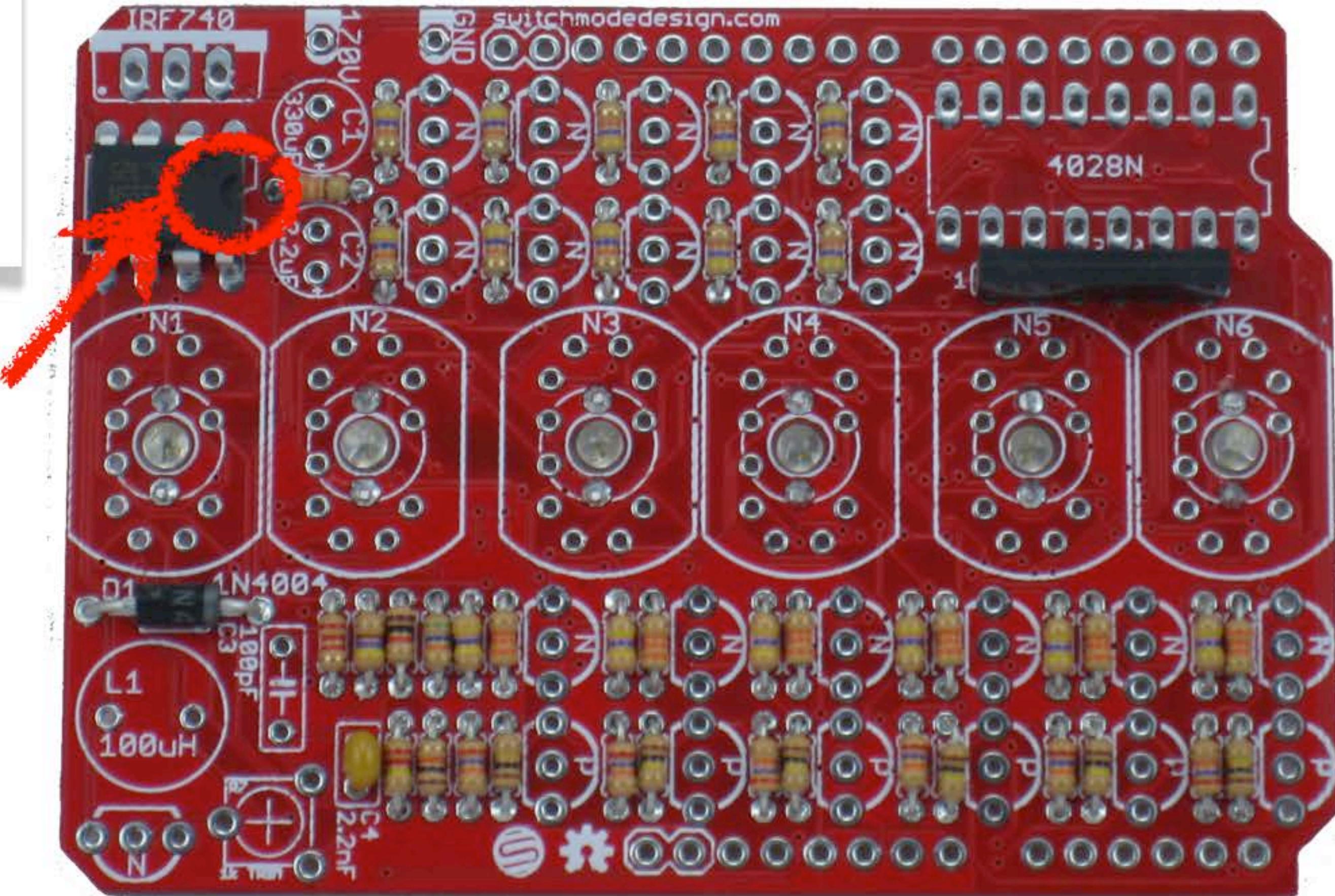
Add the IN4004 Diode

Solder the diode matching the band
with the printed circuit board



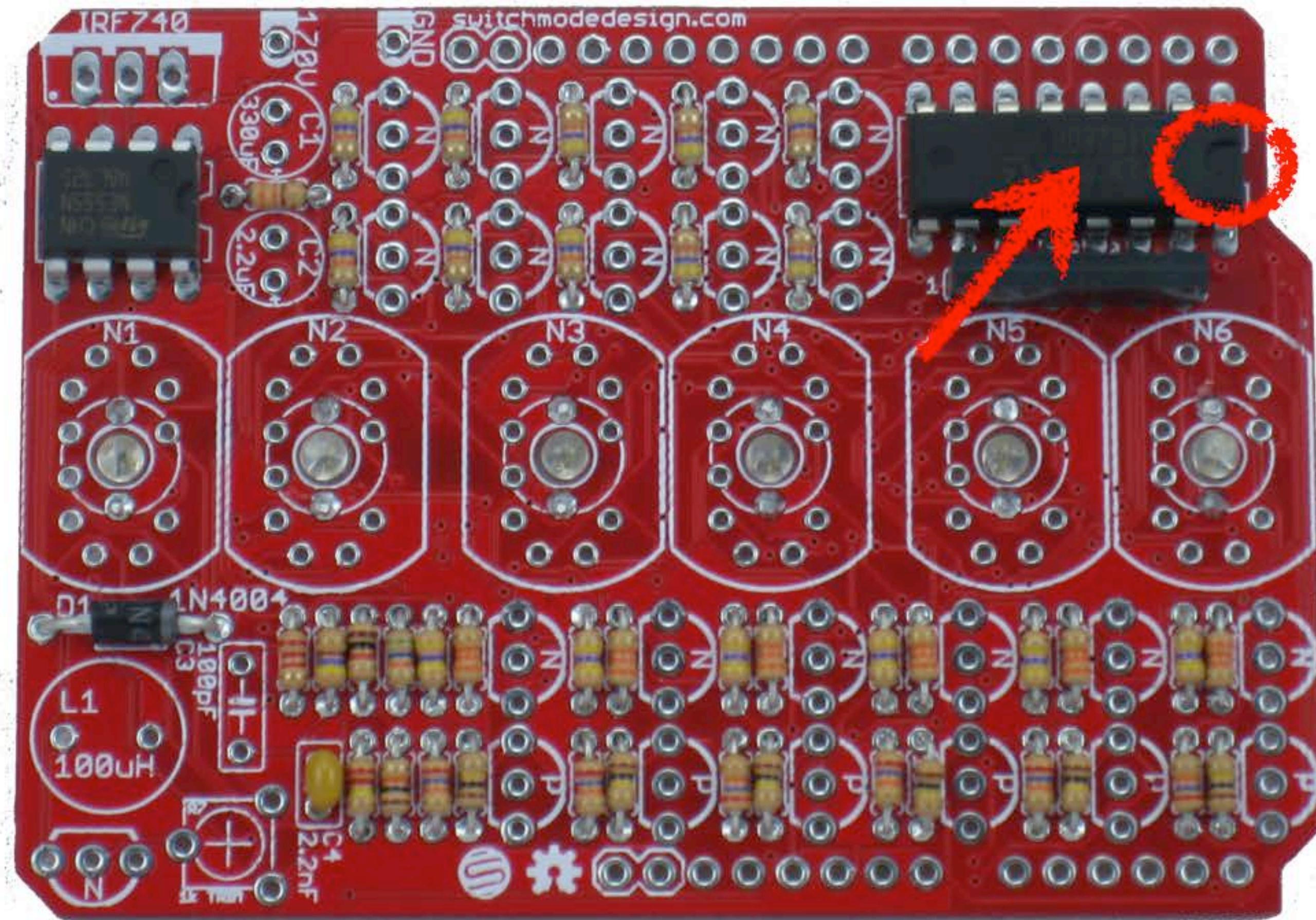
Add the NE555P IC

Solder the 555 timer IC
matching the arc on the IC to the
mark on the printed circuit board



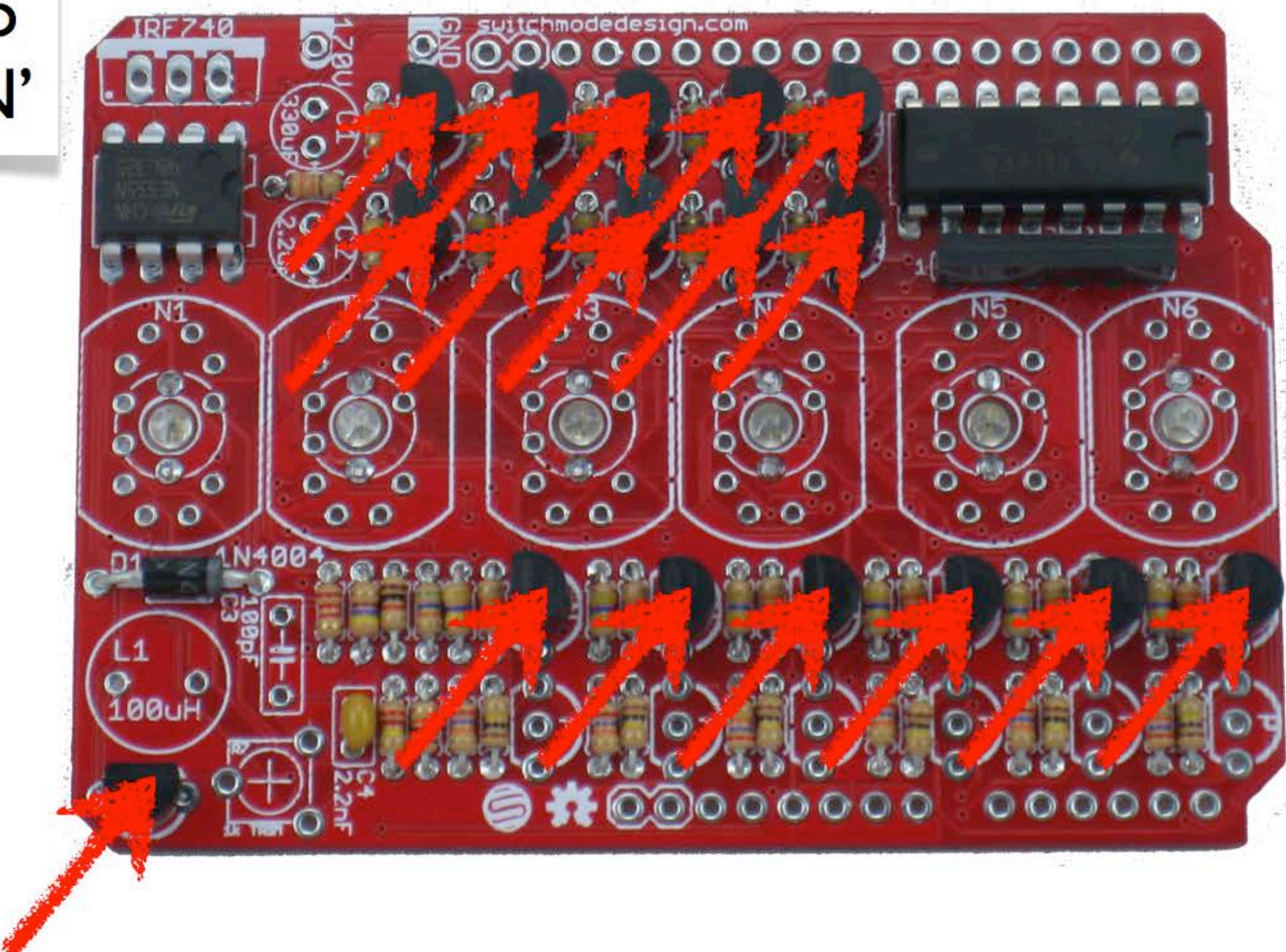
Add the 4028N IC

Solder the 4028N IC
matching the arc on the IC to the
mark on the printed circuit board



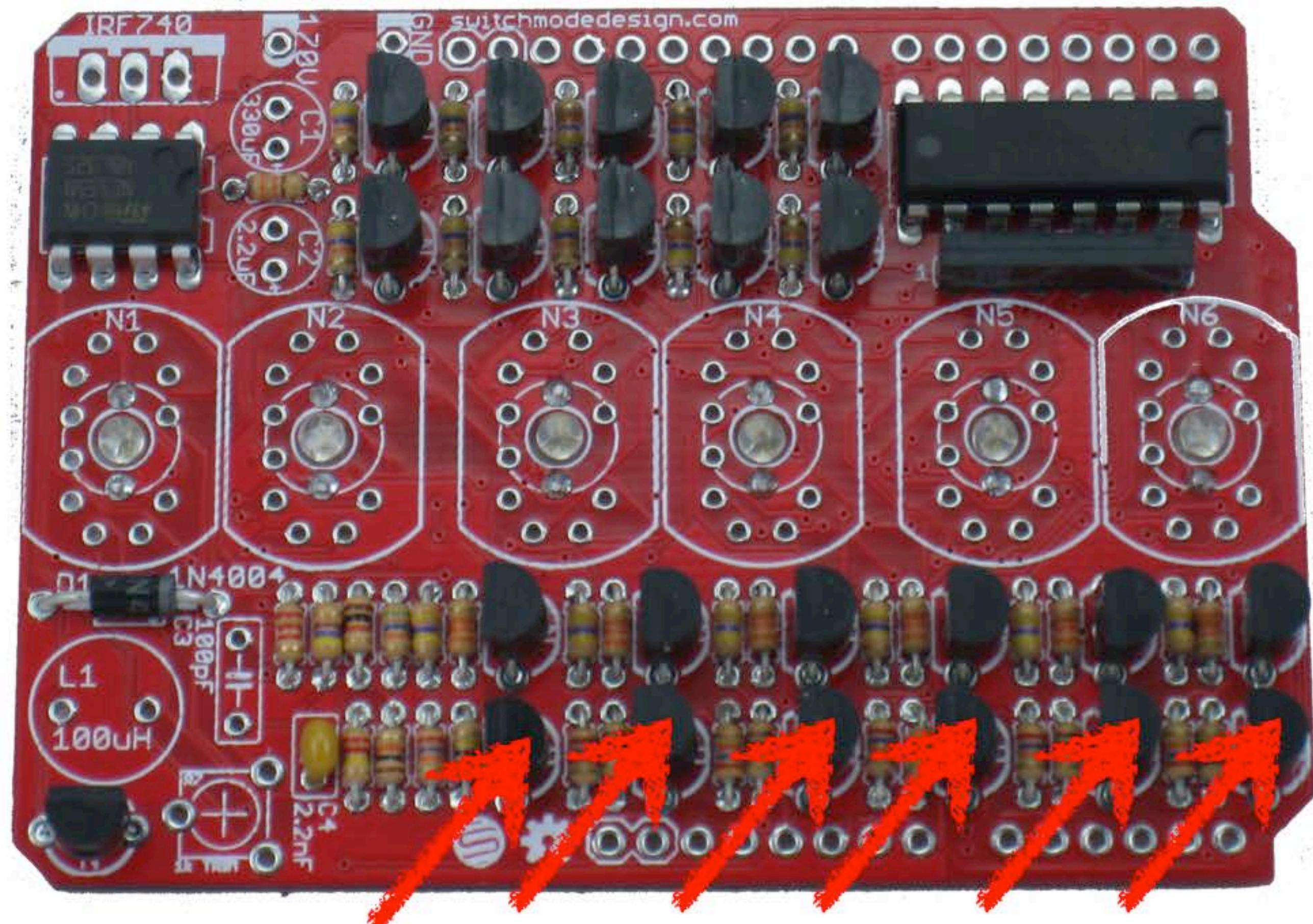
Add the NPN Transistors

Solder seventeen NPN transistors to all of the places designated with an 'N'



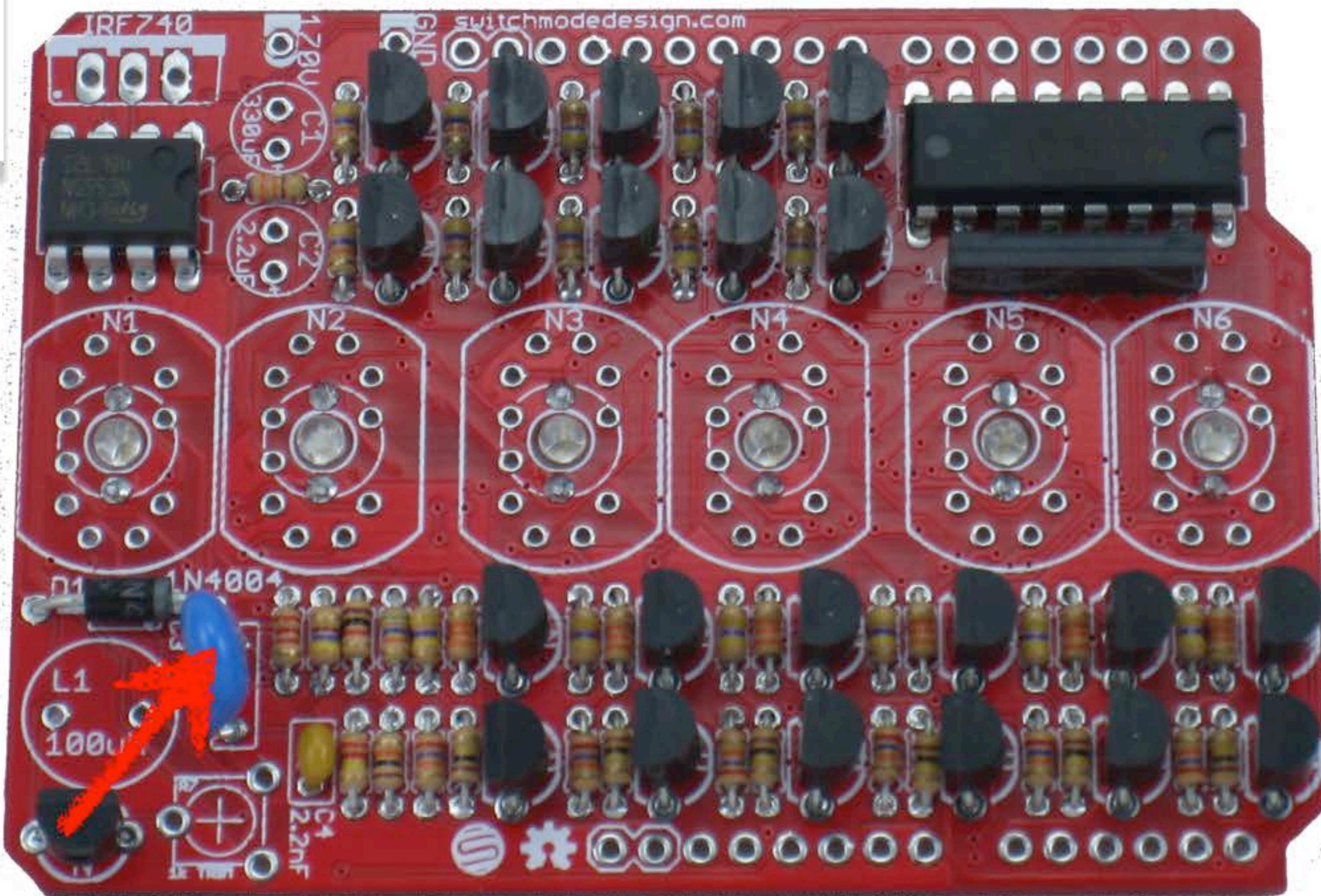
Add the PNP Transistors

Solder six PNP transistors to all of the places designated with an 'P'



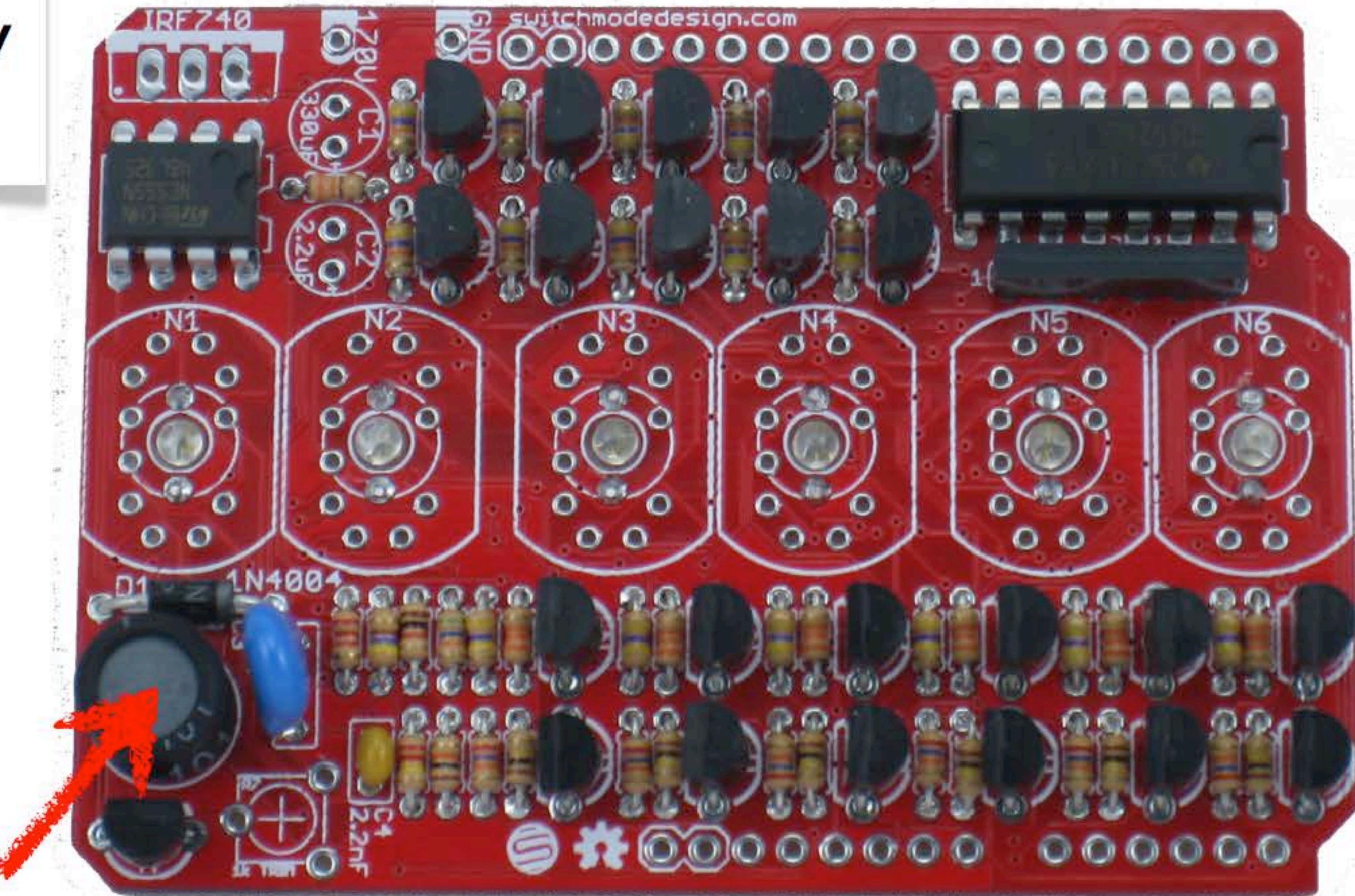
Add the 100pF Capacitor

The 100pF capacitor has no polarity
and can be soldered either way



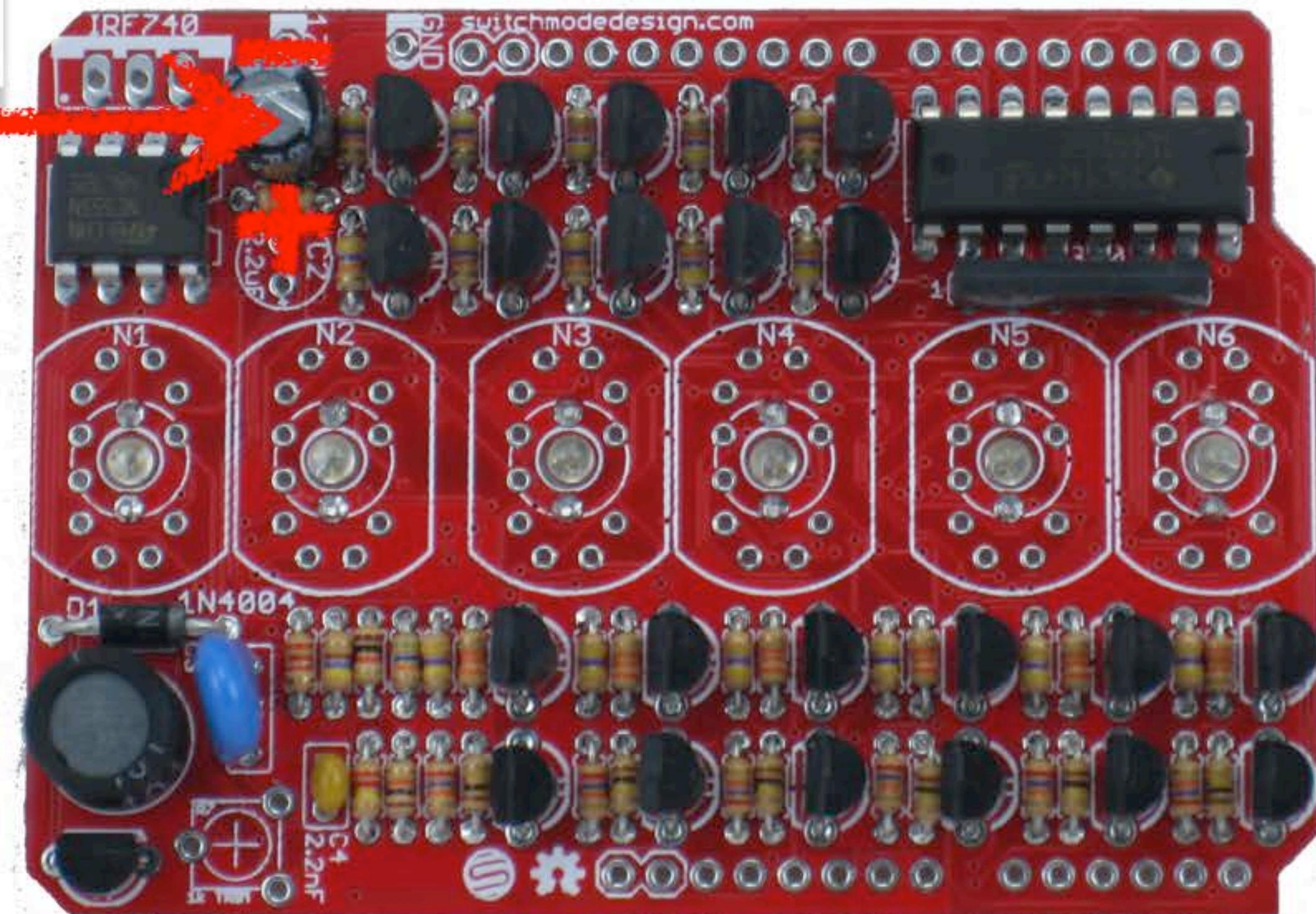
Add the 100uH Inductor

The 100uH inductor has no polarity
and can be soldered either way



Add the 330uF Capacitor

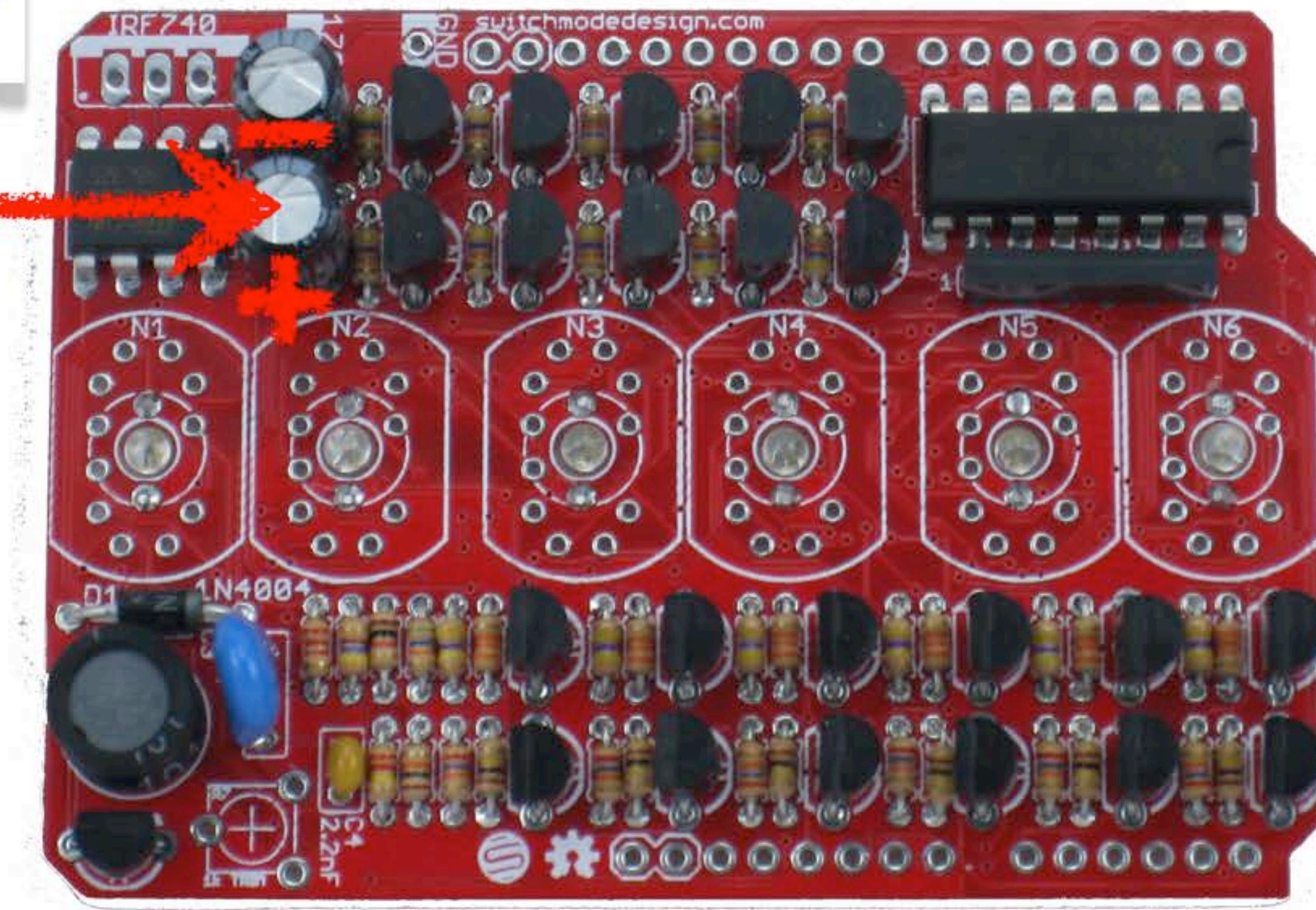
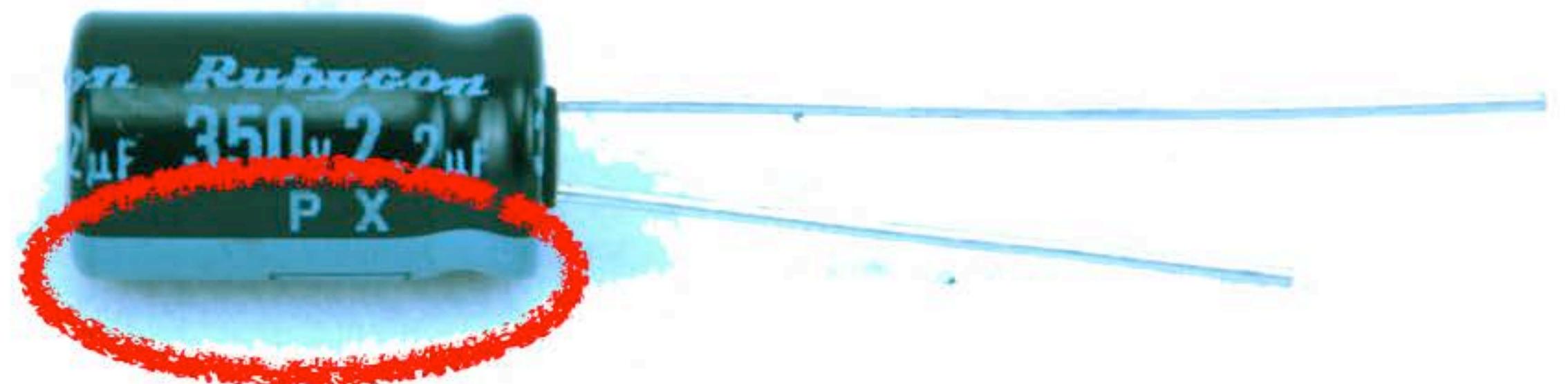
Find the negative signs on the 330uF capacitor



Solder the **OPPOSITE** lead into the terminal
designated with a + sign on the printed circuit board

Add the 2.2uF Capacitor

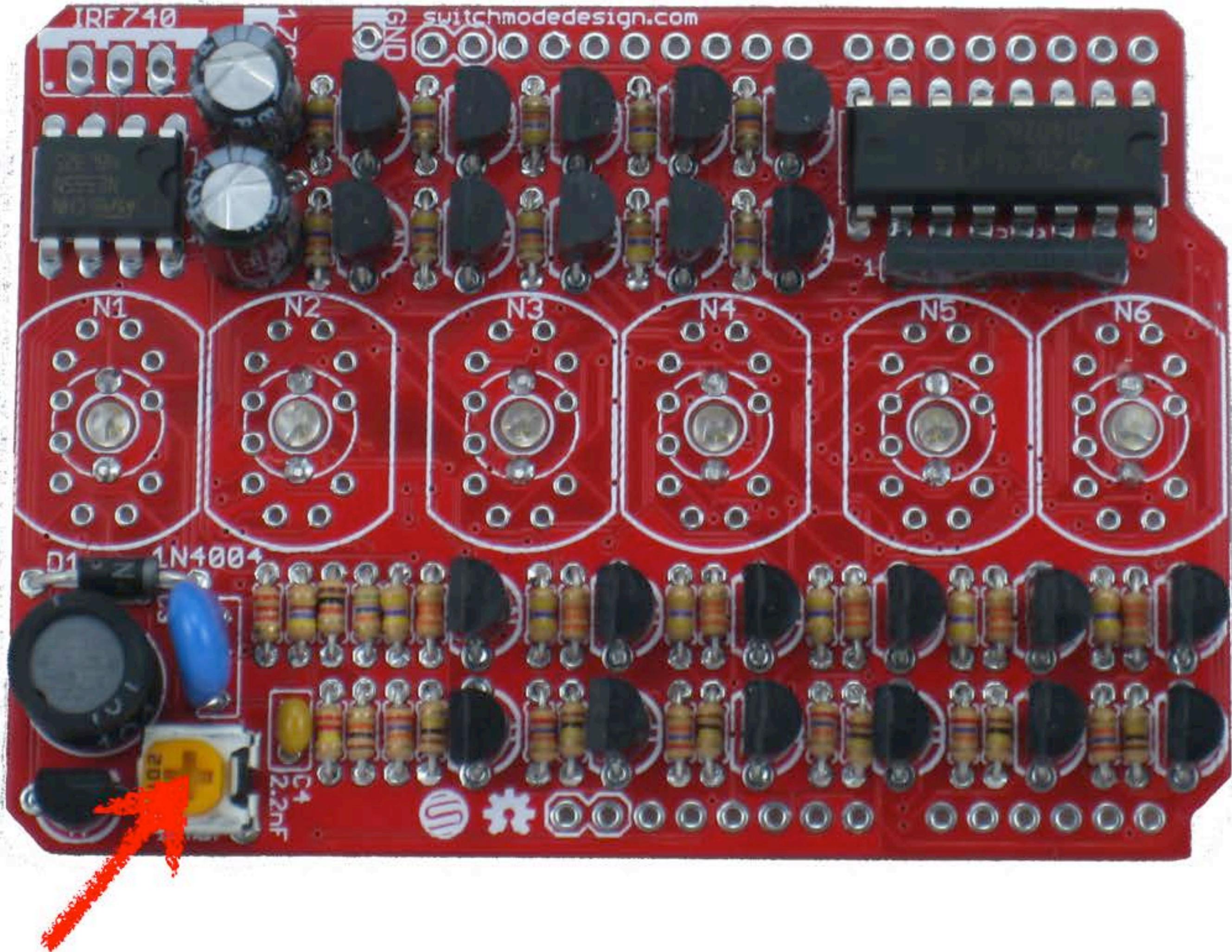
Find the negative signs on the 2.2uF capacitor



Solder the OPPOSITE lead into the terminal
designated with a + sign on the printed circuit board

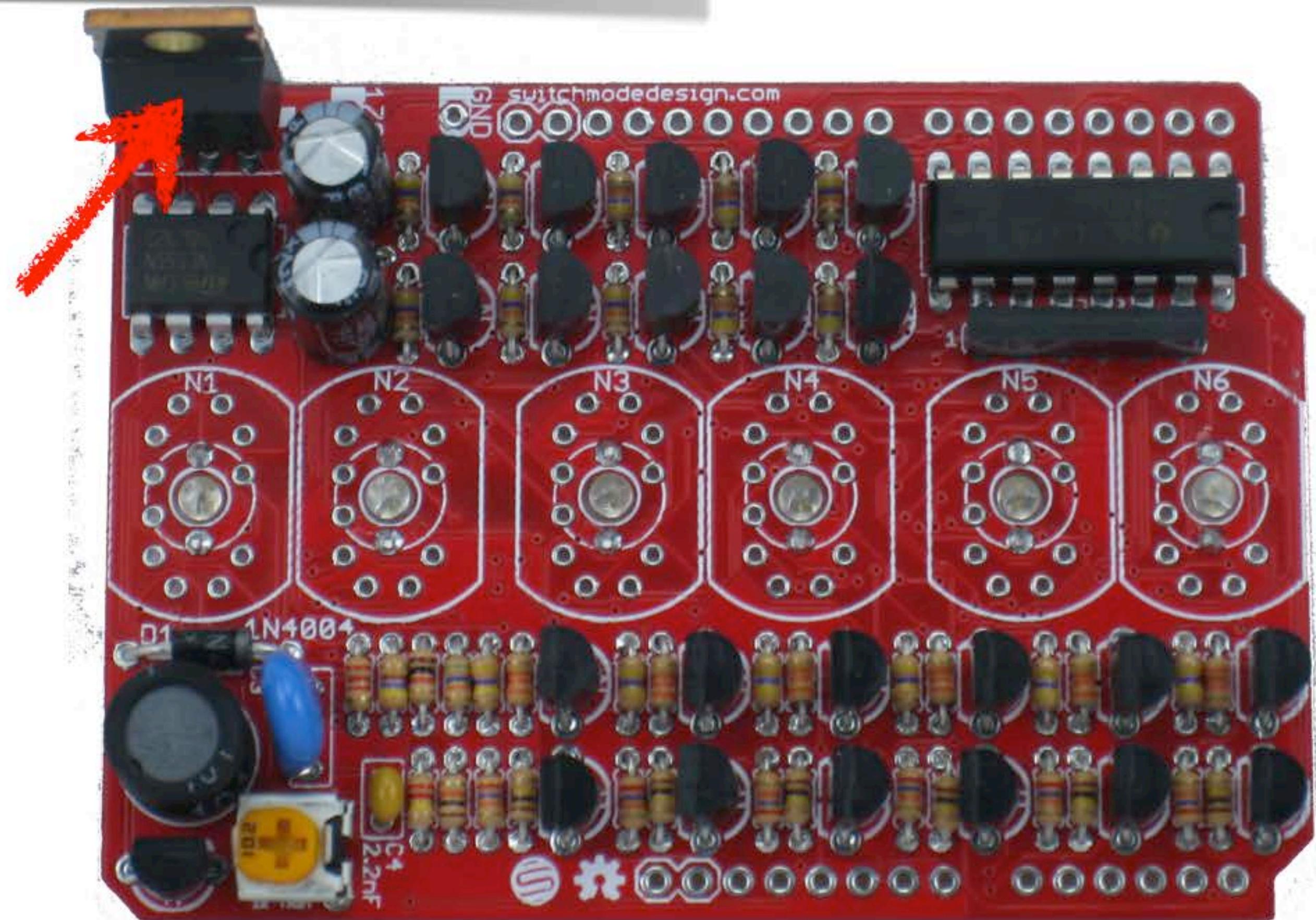
Add the 1kOhm Potentiometer

Solder the 1kOhm potentiometer



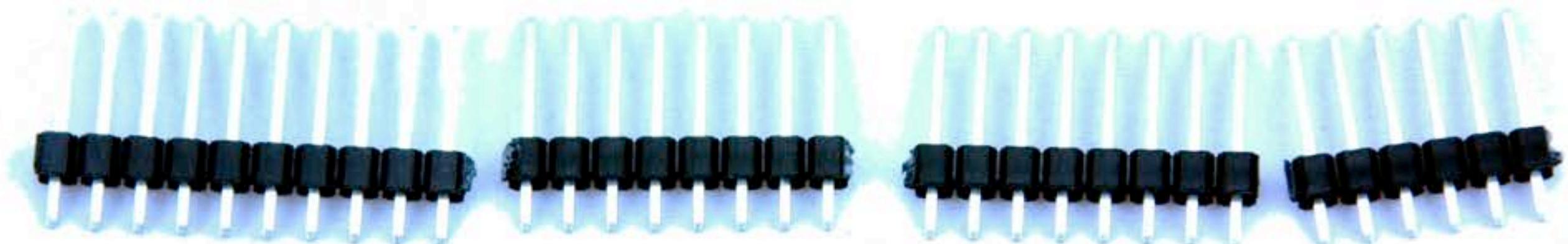
Add the IRF740 MOSFET

Solder the IRF740 MOSFET making sure the metal post
matches the marking on the printed circuit board

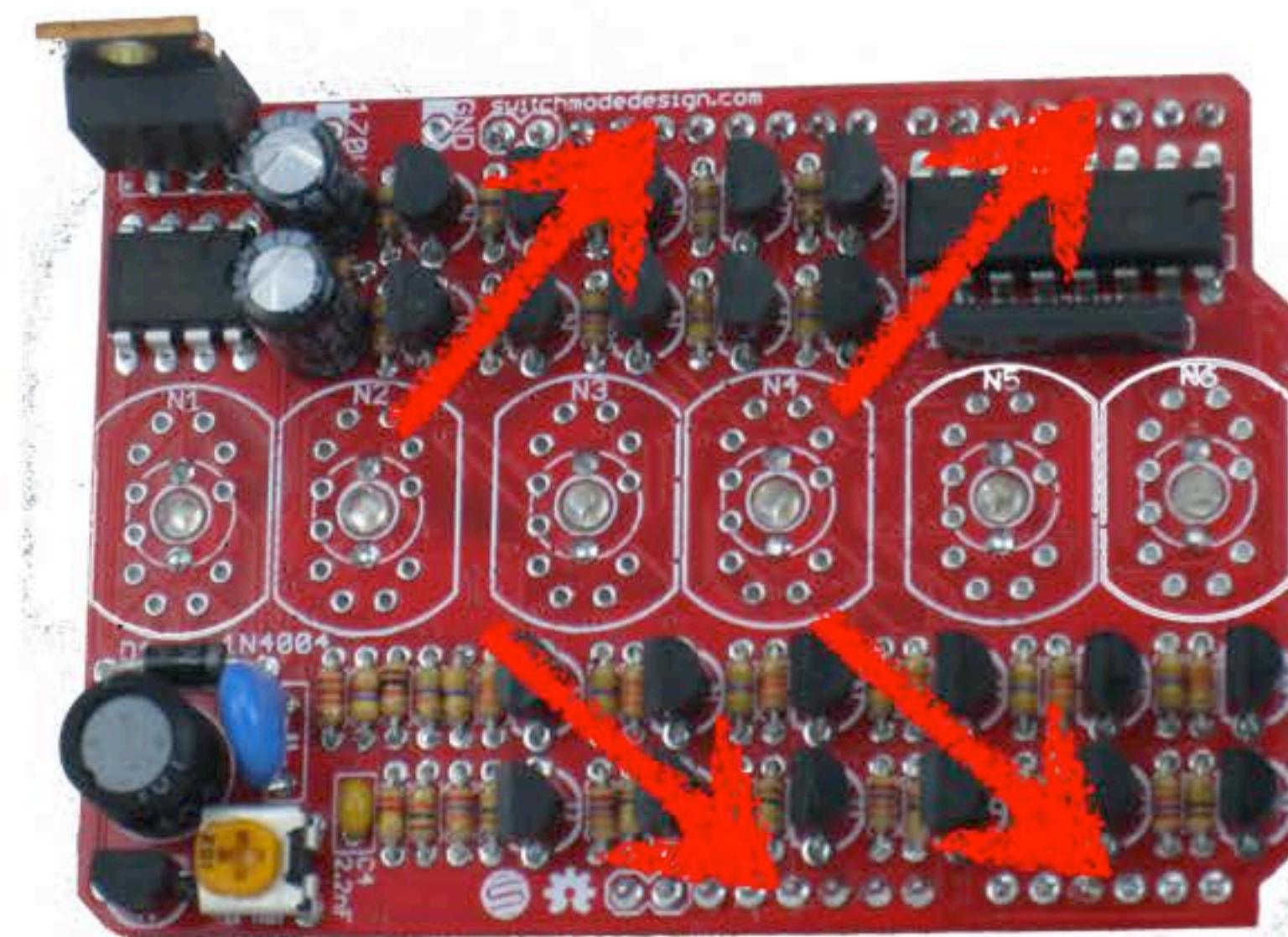


Add the Headers

Cut the 40 pin header into sections of six, eight and ten pins (depending on the model of the Arduino compatible board you're going to plug into)



Solder the headers to the shield



TIP: Insert the headers into the Arduino compatible board first for alignment

Visually Inspect Solder Joints

Look for any solder bridges or cold solder joints



Test the LEDs

Turn the potentiometer fully counter-clockwise

Plug the shield into an Arduino compatible board

Load the 'Blink' sketch and modify
the output pin from 13 to 12

Compile and Download the sketch to verify
that the LED closest to the USB port blinks
and that the rest of the LEDs are solid on



Test the Boost Circuit

If you have a digital multi-meter,
set it to read DC voltages up to 200V

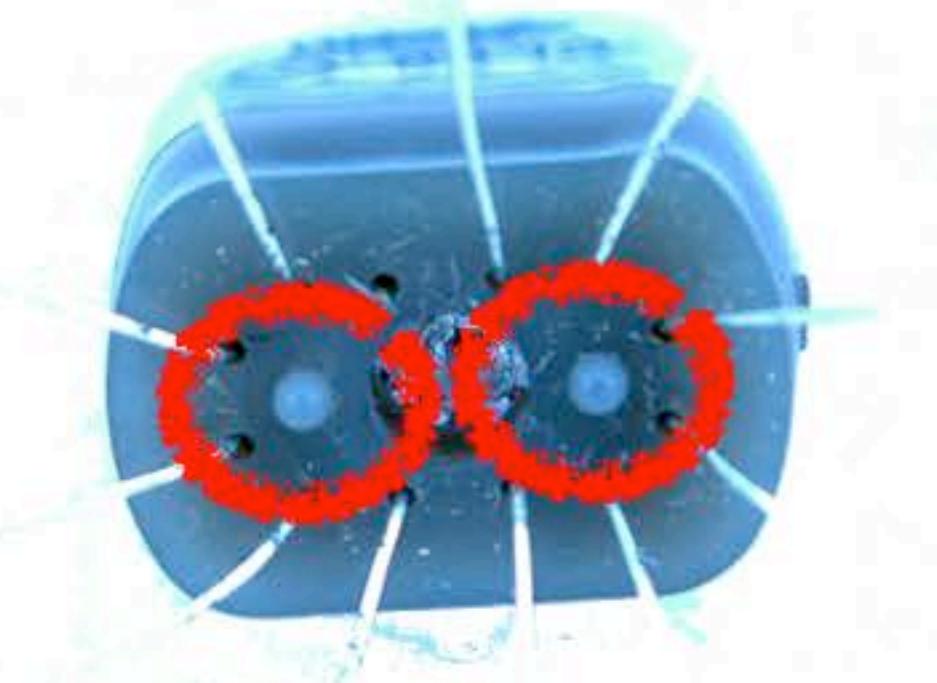
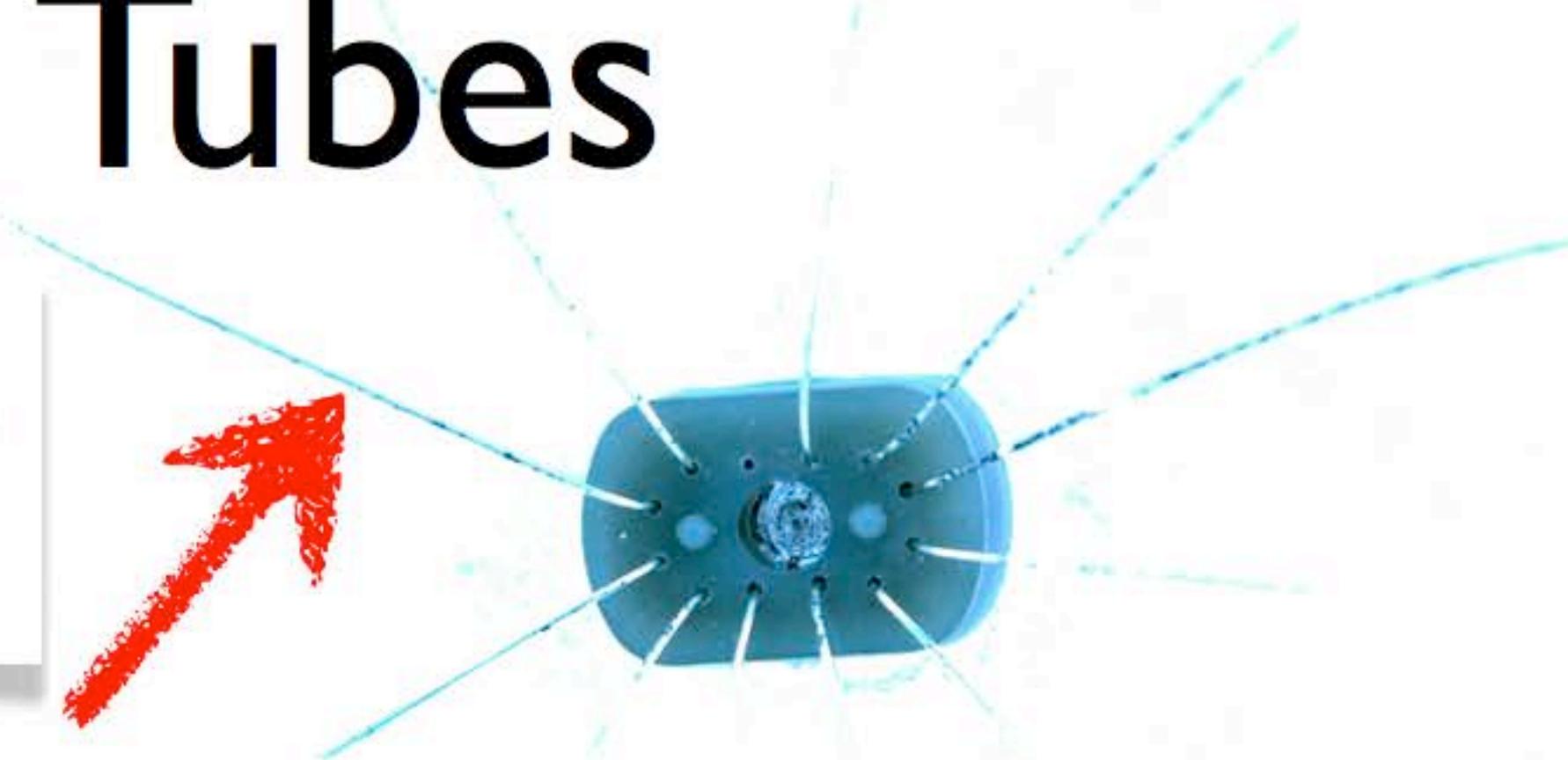


Put the positive lead on the 170V test point;
put the negative lead on the GND test point

Adjust the potentiometer clockwise until the
voltage is approximately 170V.

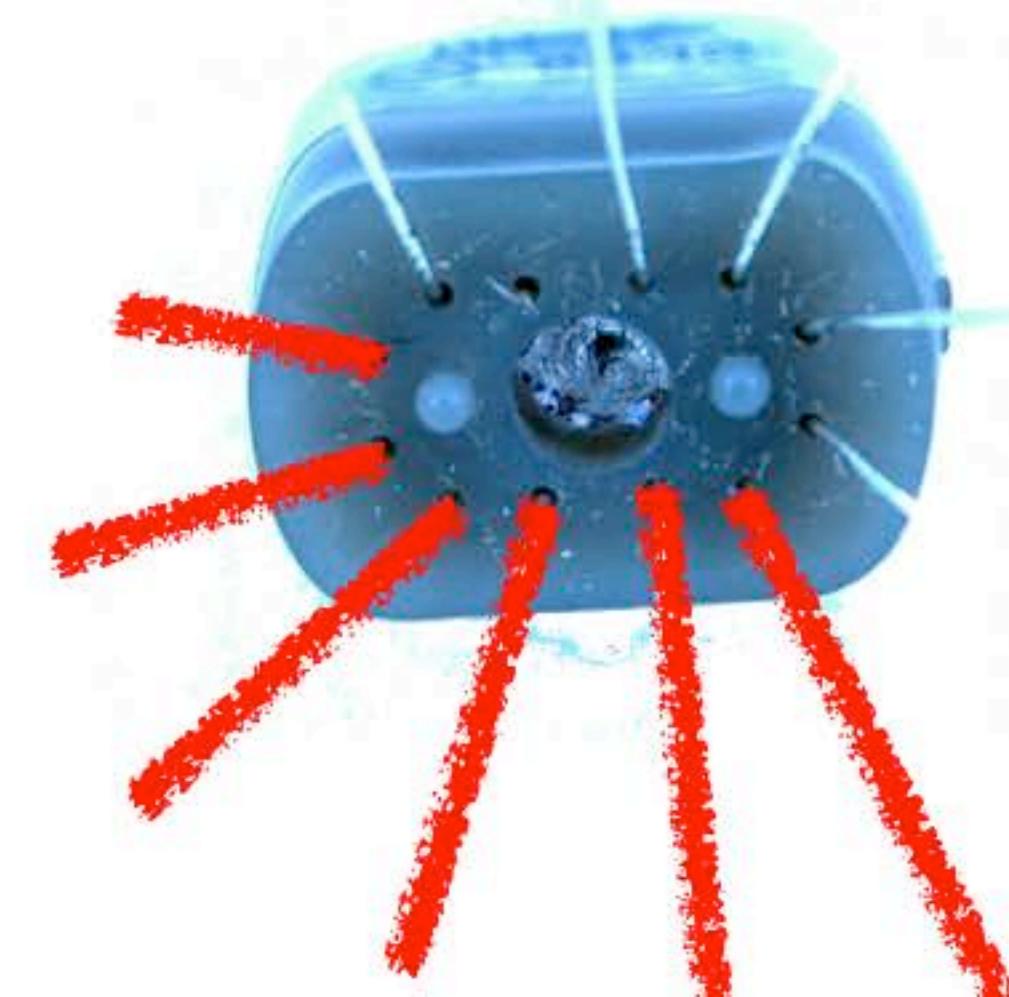
Prepare the Nixie Tubes

Bend the leads 90 degrees so that they make a circle when viewed from the bottom of the Nixie Tube



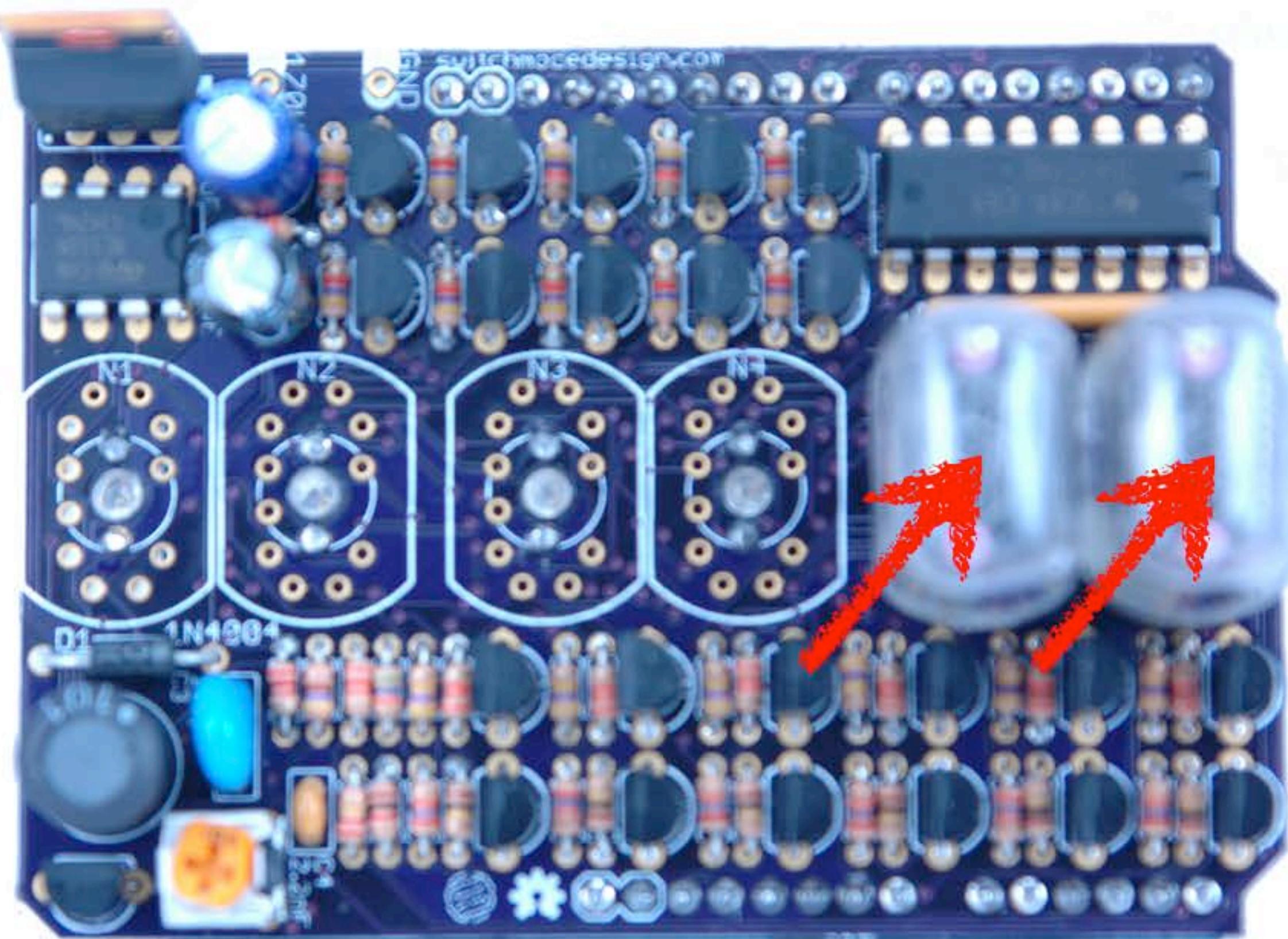
Using a utility knife, cut off the small bumps on the bottom of the spacer, allowing the Nixie Tube to be soldered closer to the printed circuit board

Trim the leads of the Nixie Tubes such that each lead is a different length. This will make installation of the Nixie Tubes much easier



Add the Nixie Tubes

Insert two Nixie Tubes at a time before soldering both. This allows for fine adjustments of the Nixie Tubes before they're soldered into place



Download the Firmware

The latest firmware can be found on the website:

<http://switchmodedesign.com>



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Thank You and Enjoy!

Thank you for purchasing the Open Source Nixie Tube Shield, I hope you enjoyed putting the kit together and can enjoy the beauty of the Nixie Tube's glow for years to come.

