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# **Muscle BioAmp Biscute**

**Upside Down Labs**

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Most affordable DIY Electromyography (EMG) sensor

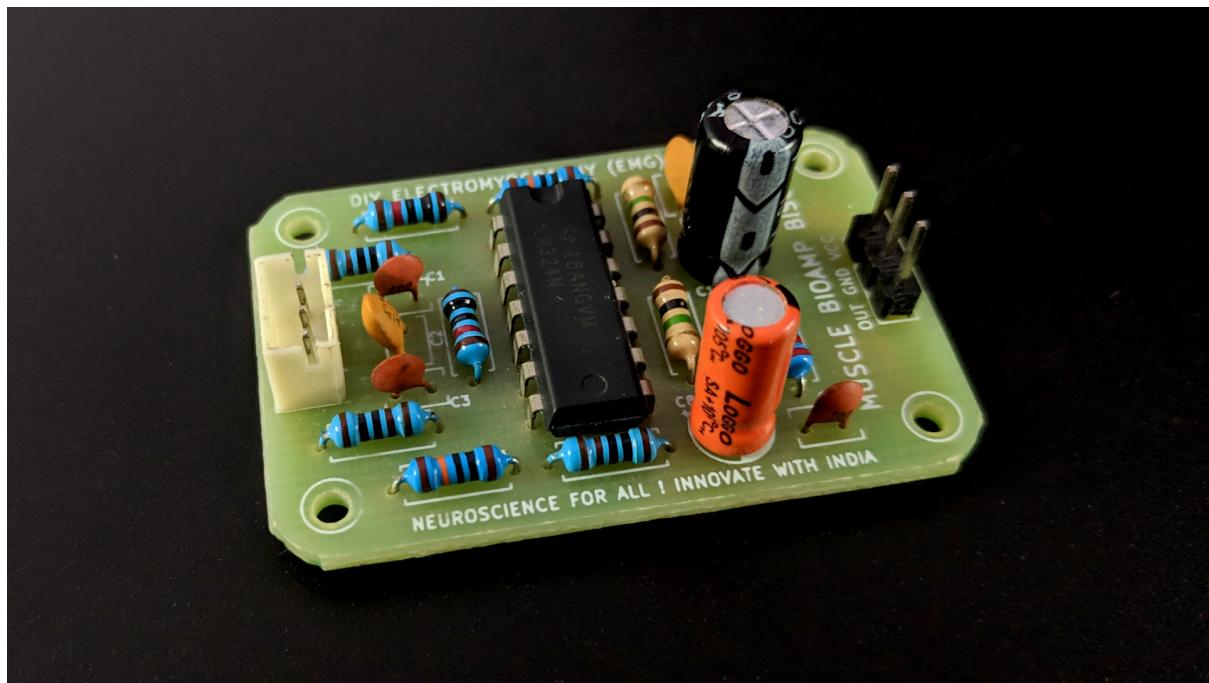
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**CHAPTER  
ONE**

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**OVERVIEW**

Muscle BioAmp BisCute is an ultra-affordable DIY ElectroMyography (EMG) sensor that allows you to create a Human-Computer Interface (HCI) with ease and in the process of building your own BisCute, you learn what goes into making a functional bipotential amplifier that can be used for amplifying sub mV signals created by muscles inside your body to a level a microcontroller unit (MCU) can understand. To record the EMG signals you can use any standalone ADC like ADS1115 or any microcontroller development board with an ADC of your choice like Arduino UNO/Nano.



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**CHAPTER  
TWO**

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## **FEATURES & SPECIFICATIONS**

Minimum Input Voltage	3.3-30 V
Input Impedance	$10^{11}$ ohm
Fixed Gain	x2420
Bandpass filter	72 – 720 Hz
Compatible Hardware	Any development board with an ADC (Arduino UNO & Nano, Espressif ESP32, Adafruit QtPy, STM32 Blue Pill, BeagleBone Black, Raspberry Pi Pico, to name just a few)
BioPotentials	EMG (Electromyography)
No. of channels	1
Electrodes	3 (Positive, Negative, and Reference)
Dimensions	3.0 x 4.5 cm
Open Source	Hardware + Software

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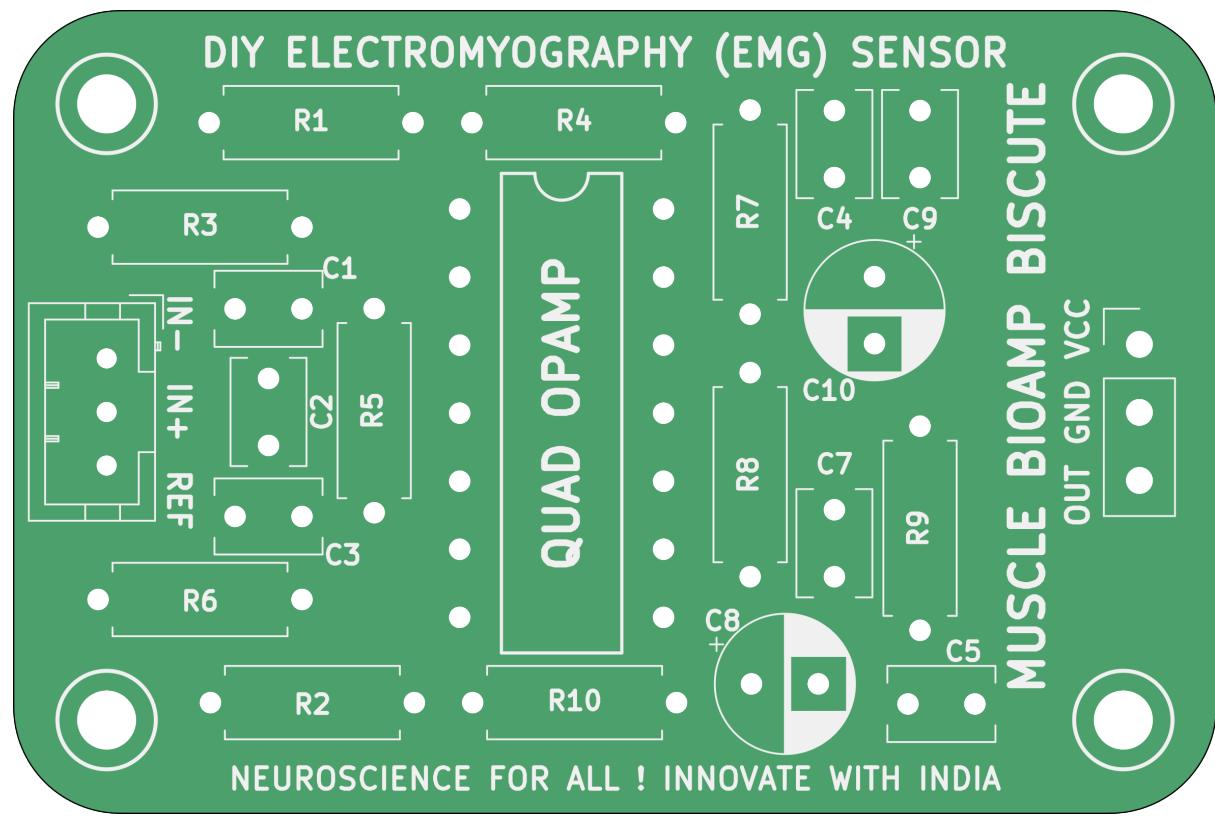
CHAPTER  
THREE

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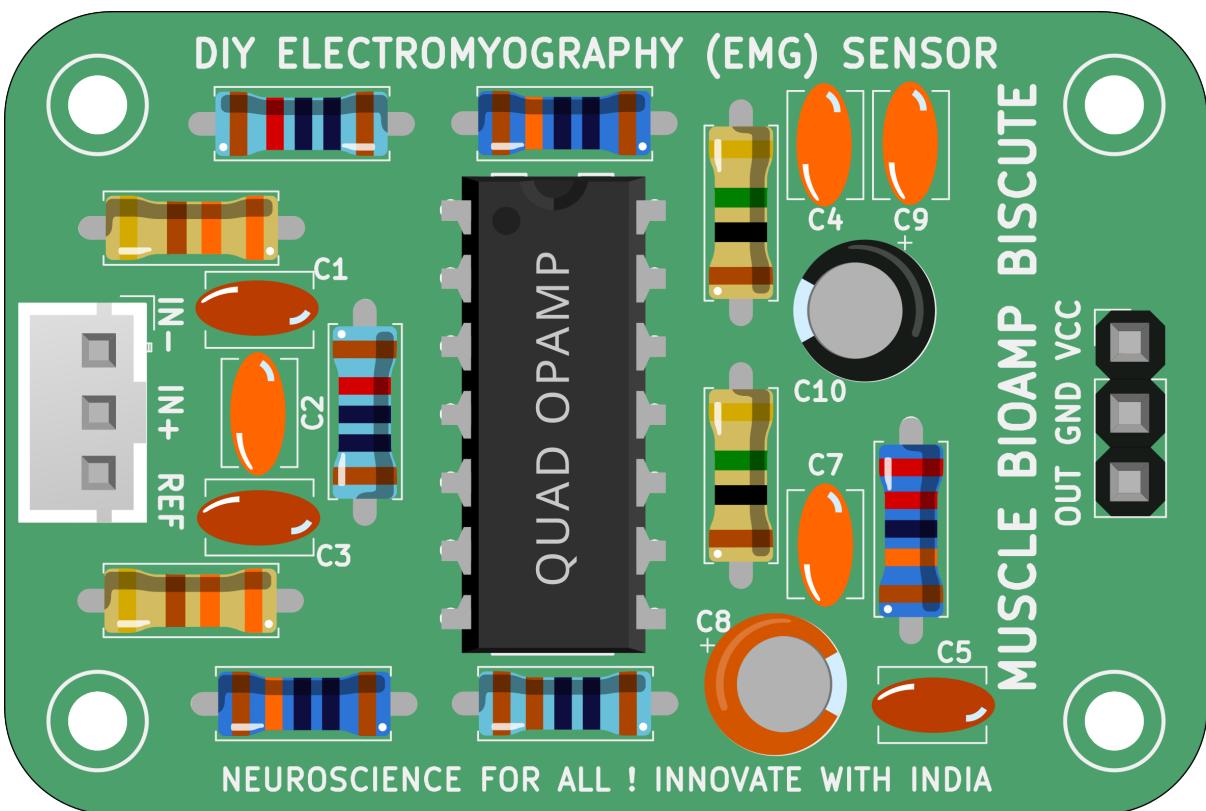
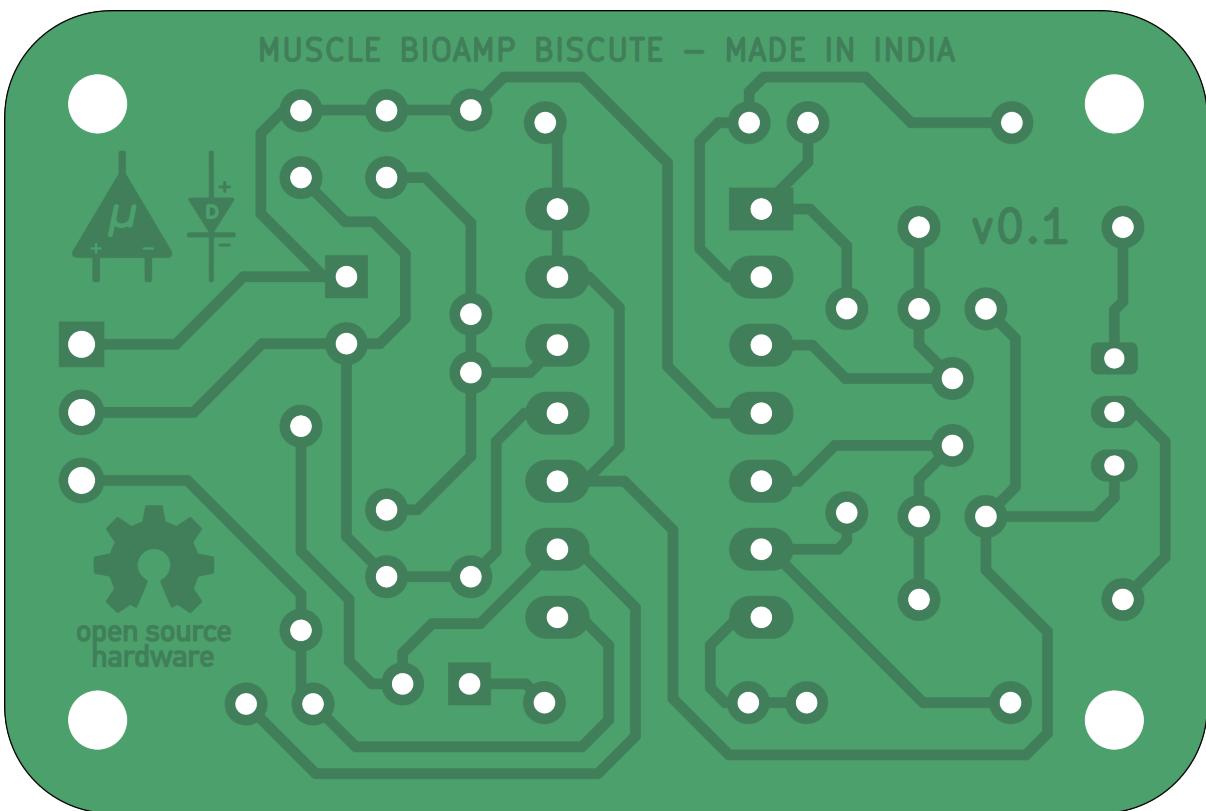
## HARDWARE

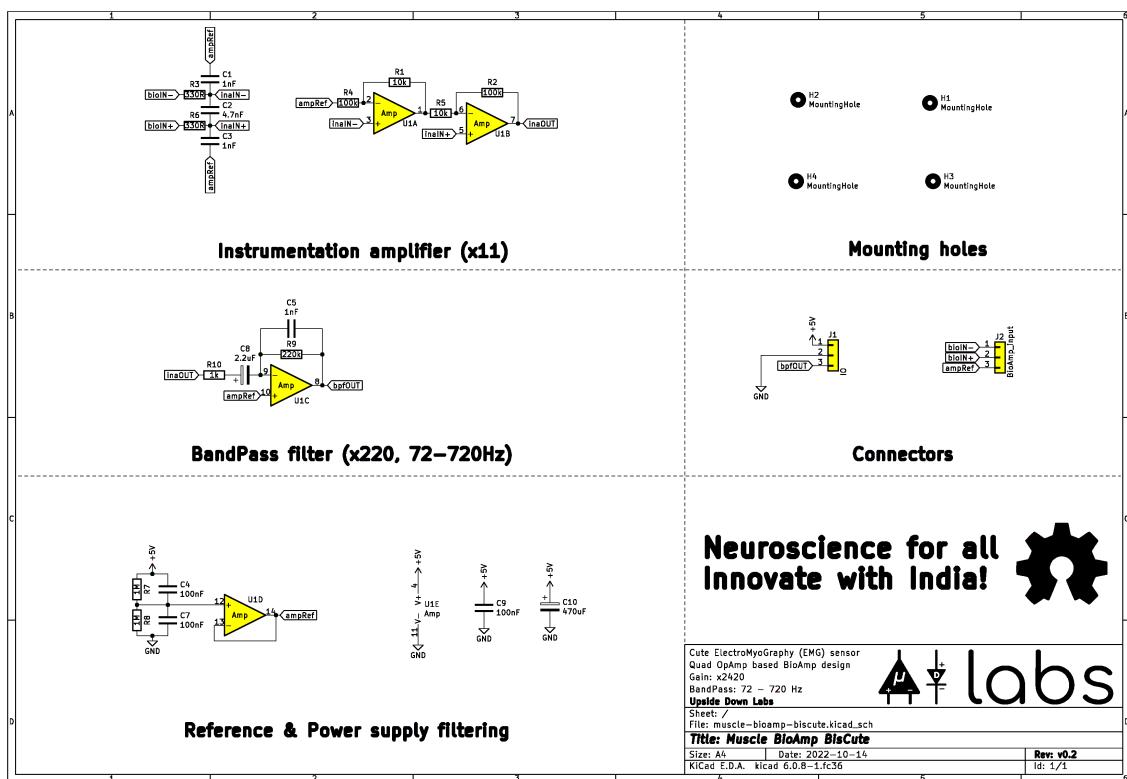
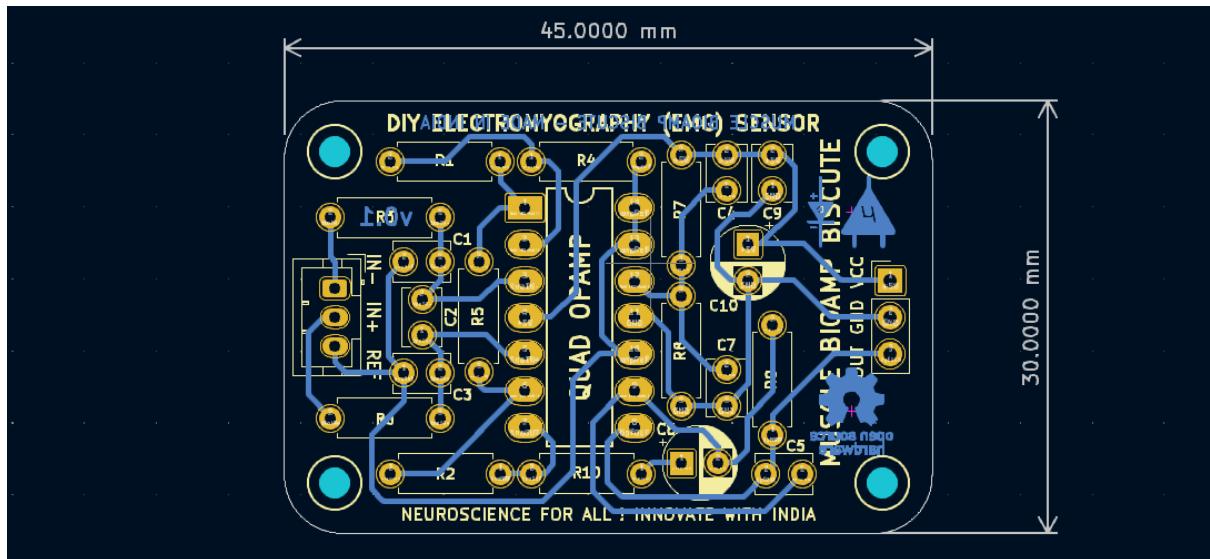
Images below shows a quick overview of the hardware design.

PCB Front



PCB Back





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**CHAPTER  
FOUR**

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## **ASSEMBLYING THE KIT**

You can get your own Muscle BioAmp BisCute bag of parts from [our store](#) or [Tindie](#) and for assembling your BisCute you can either take a look at [this interactive BOM](#) or the step by step guide below.

Still can't figure out the assembly? You can follow [this video](#) to assemble your BisCute.

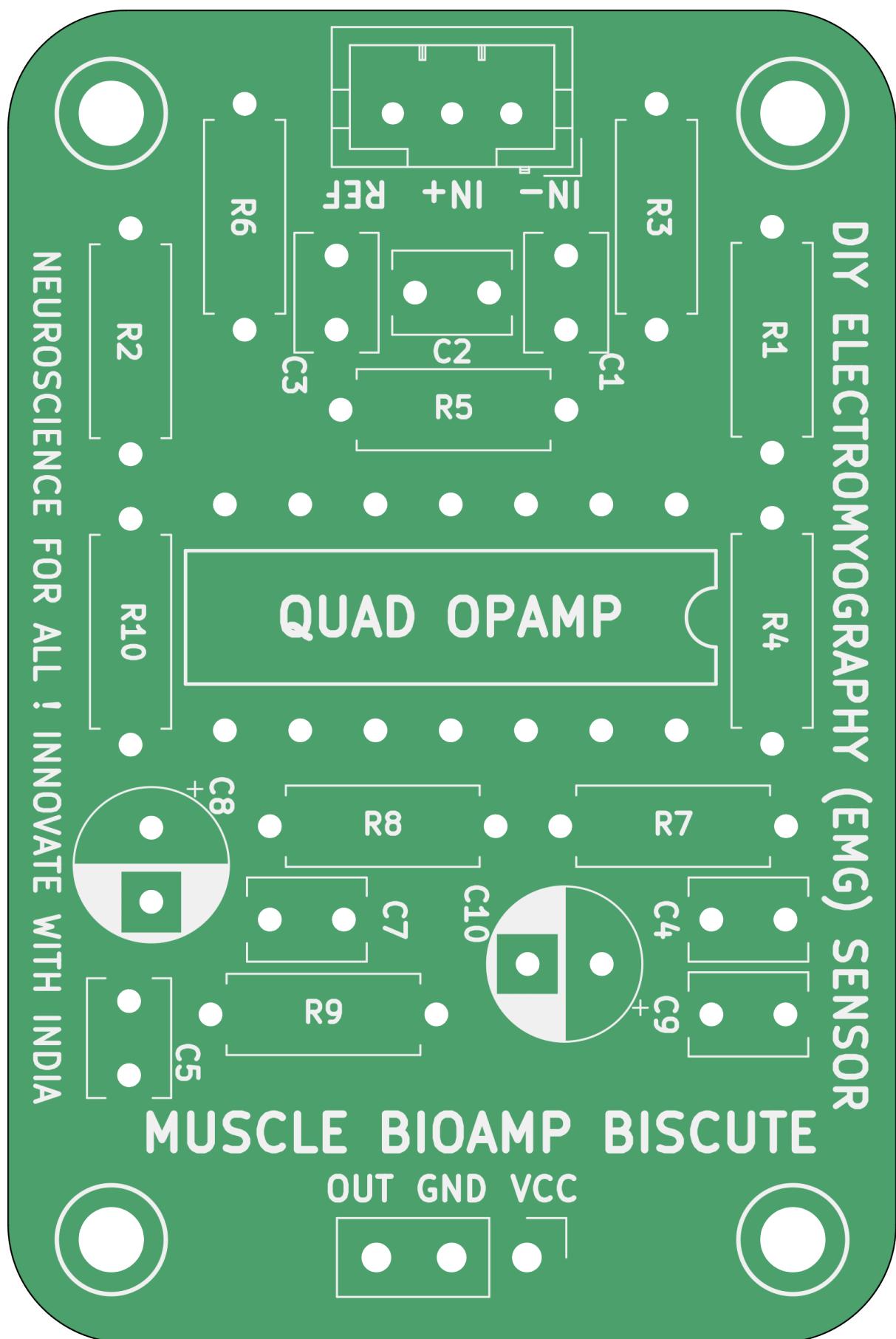


Fig. 1: Step 1 - Bare Board

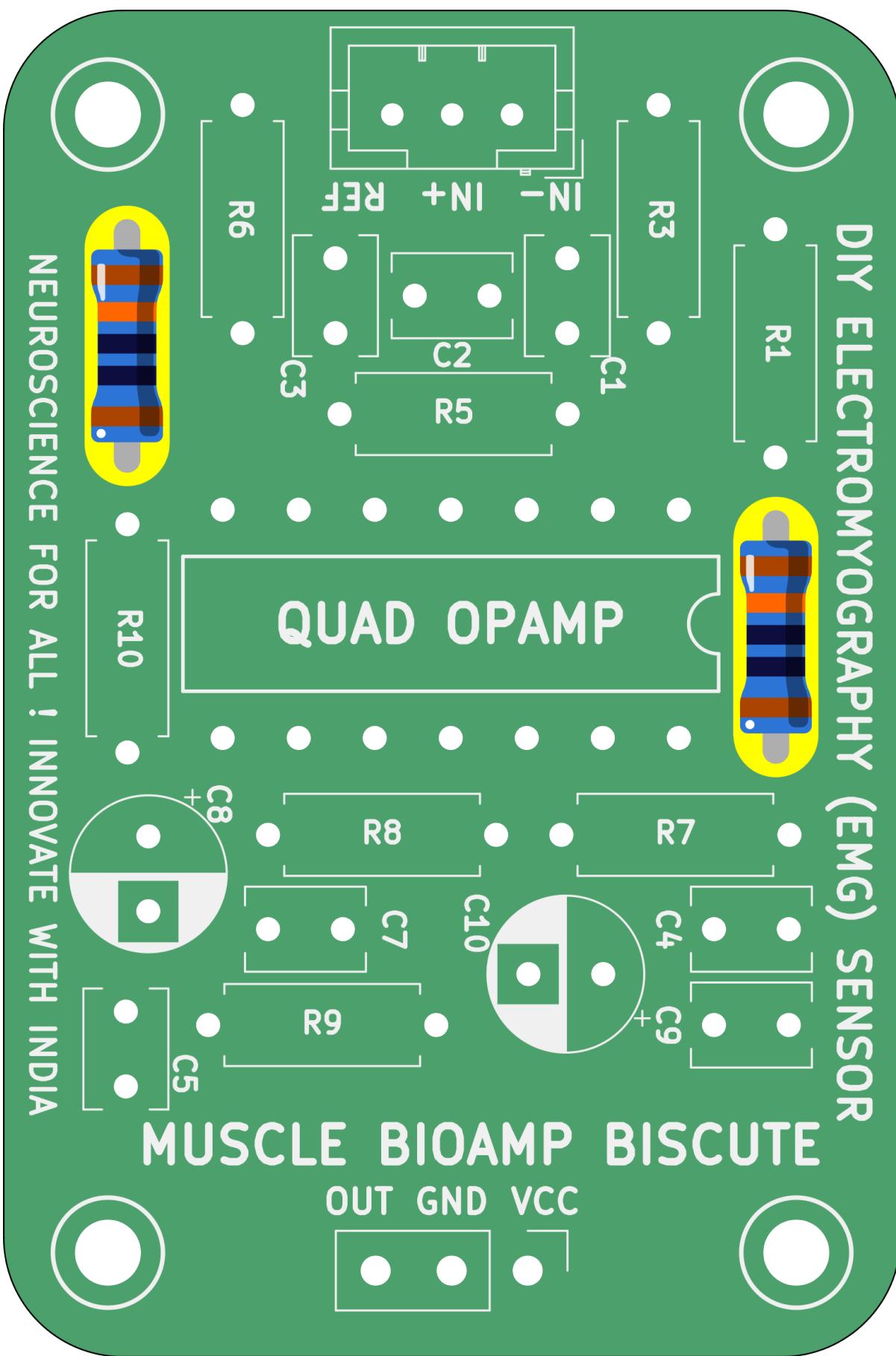


Fig. 2: Step 2 - 100K Resistors

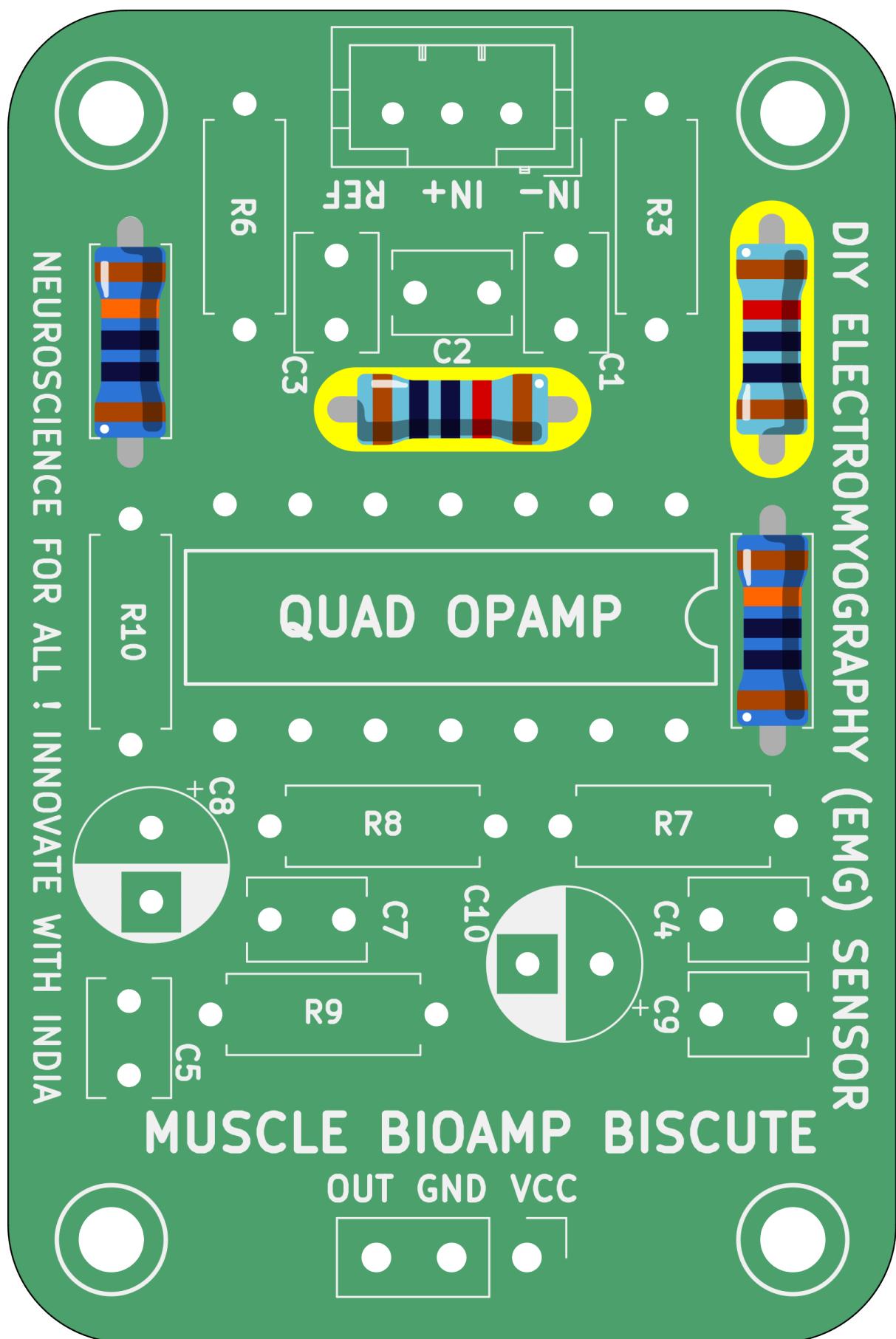


Fig. 3: Step 3 - 10K Resistors

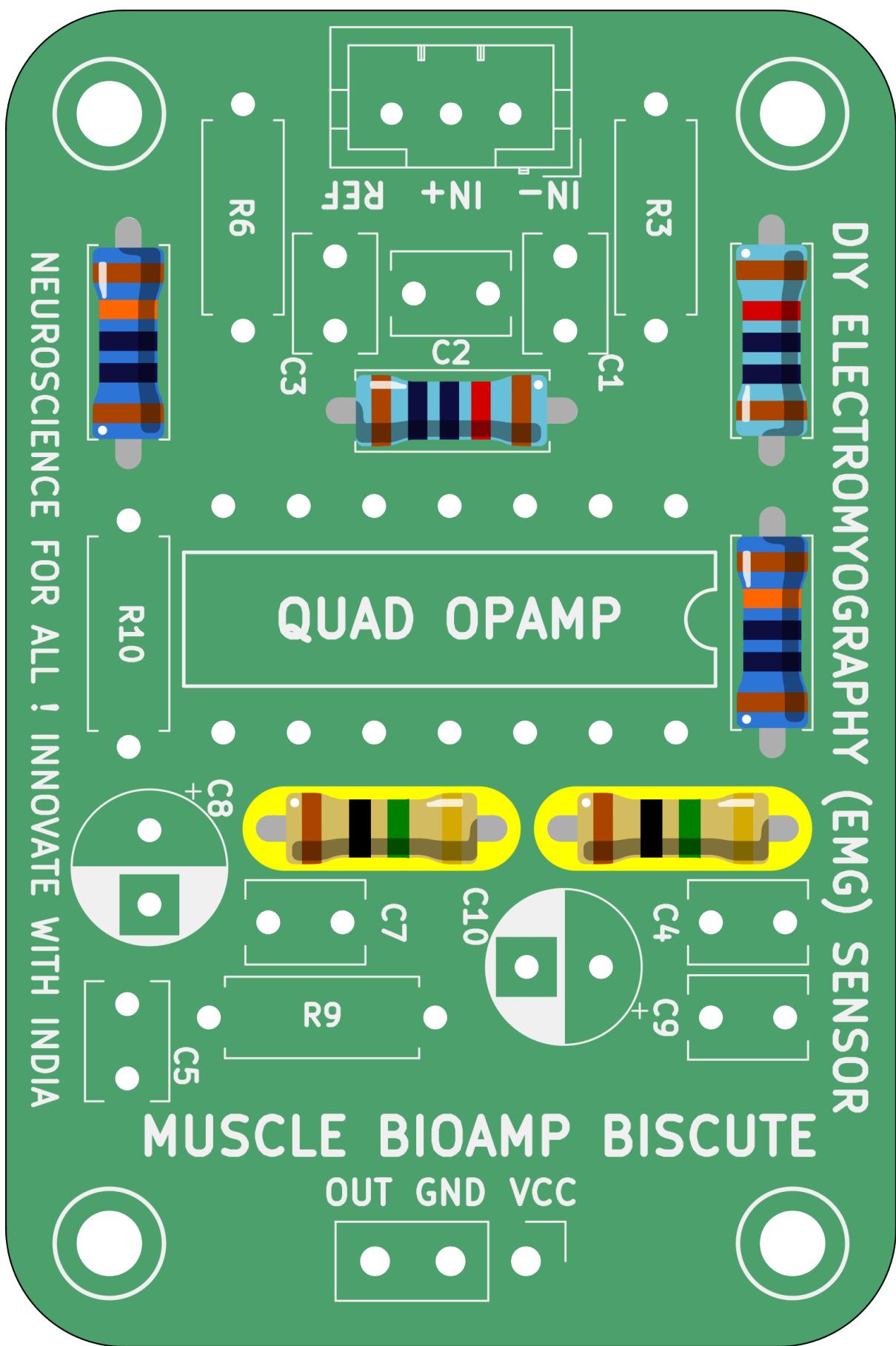


Fig. 4: Step 4 - 1M Resistors

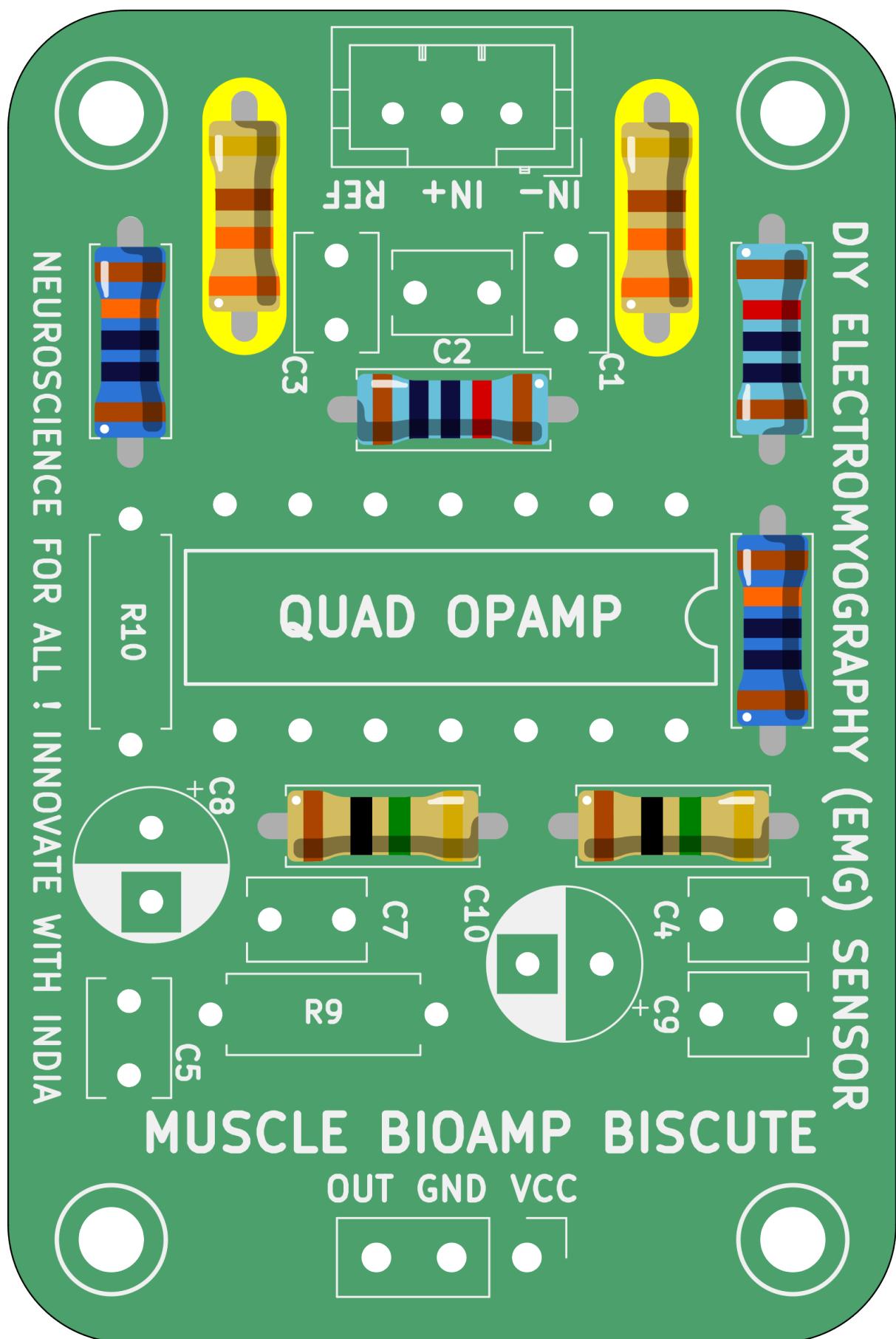


Fig. 5: Step 5 - 330R Resistors

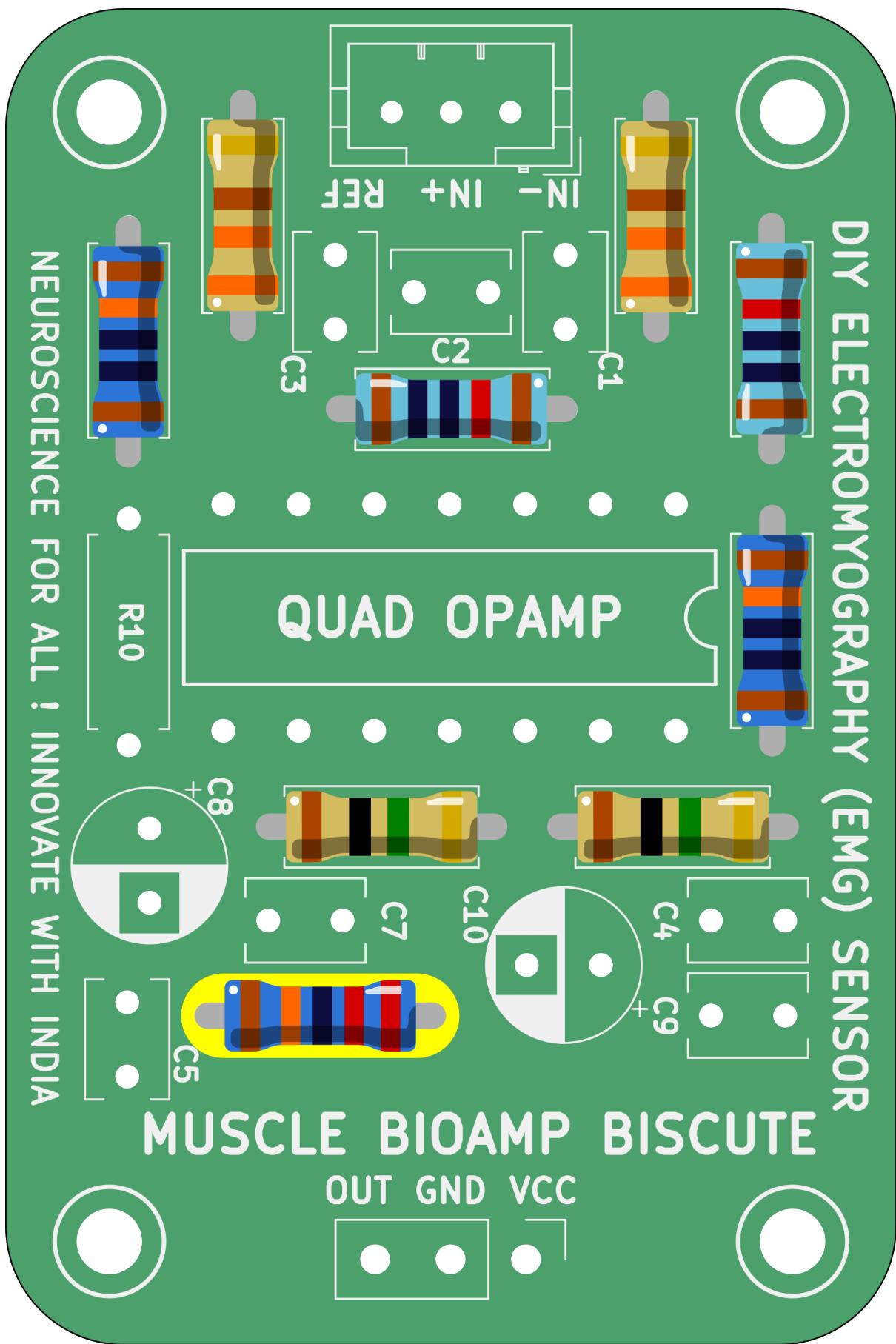


Fig. 6: Step 6 - 220K Resistor

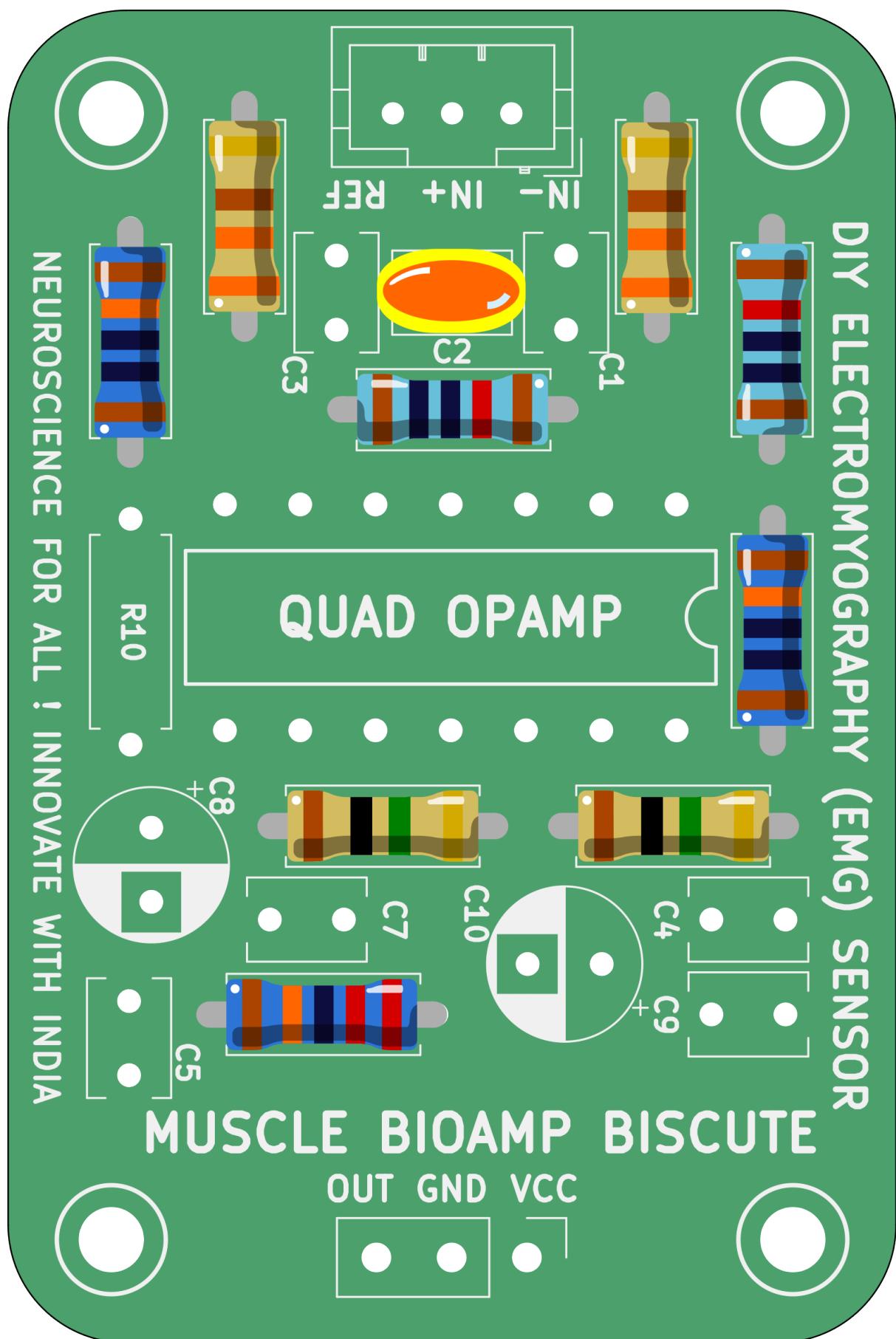


Fig. 7: Step 7 - 4.7nF Capacitor

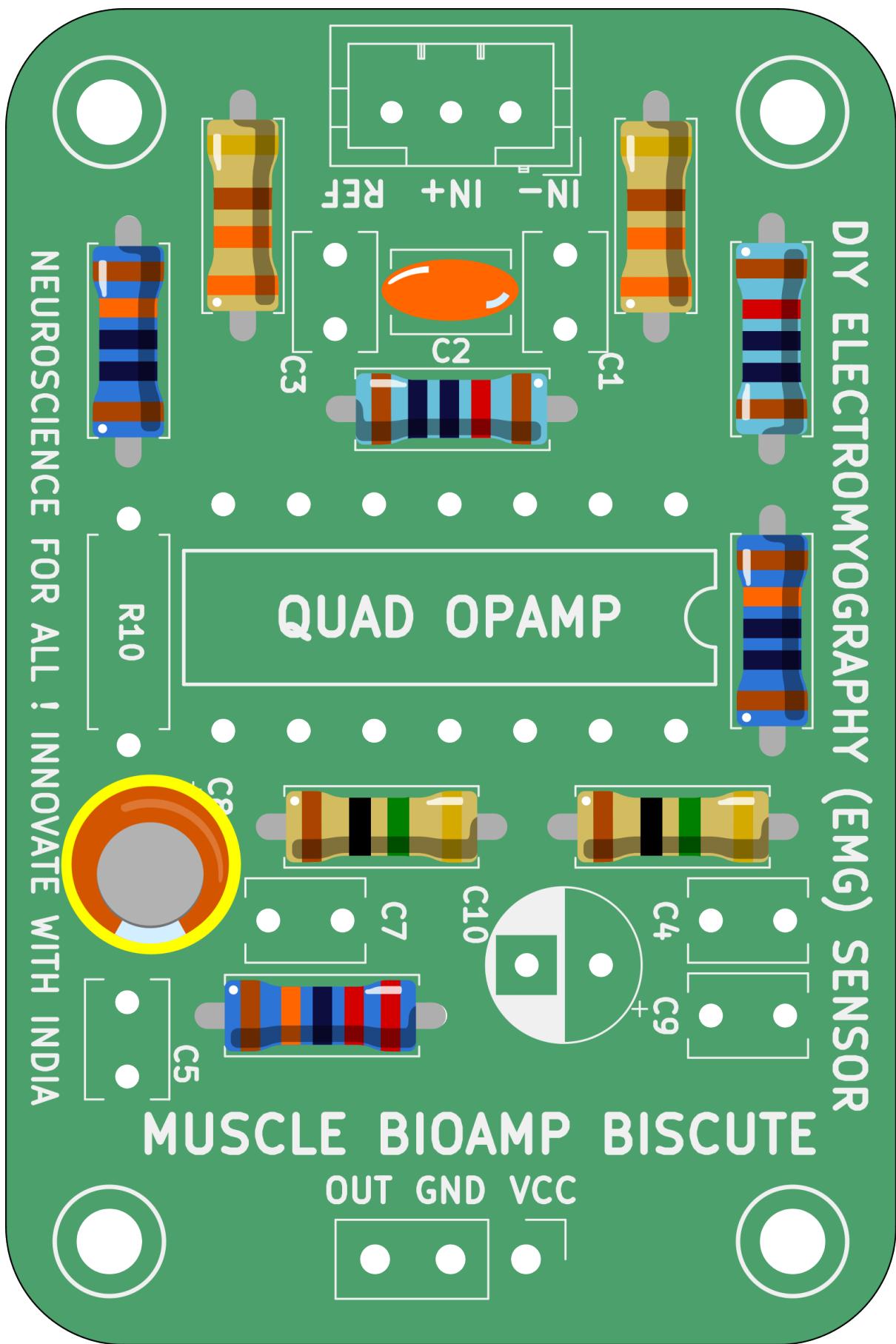


Fig. 8: Step 8 - 2.2uF Capacitor

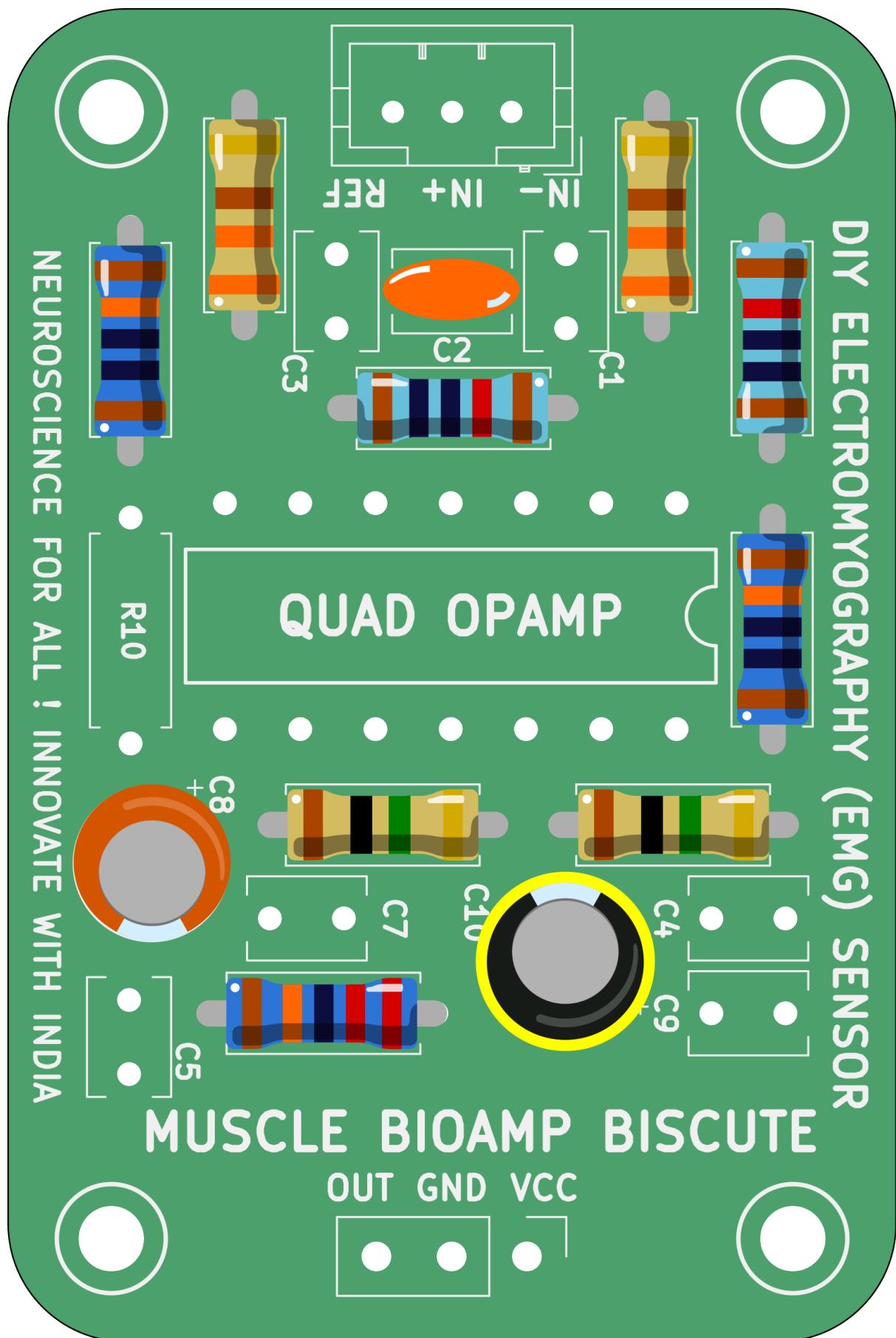


Fig. 9: Step 9 - 470uF Capacitor

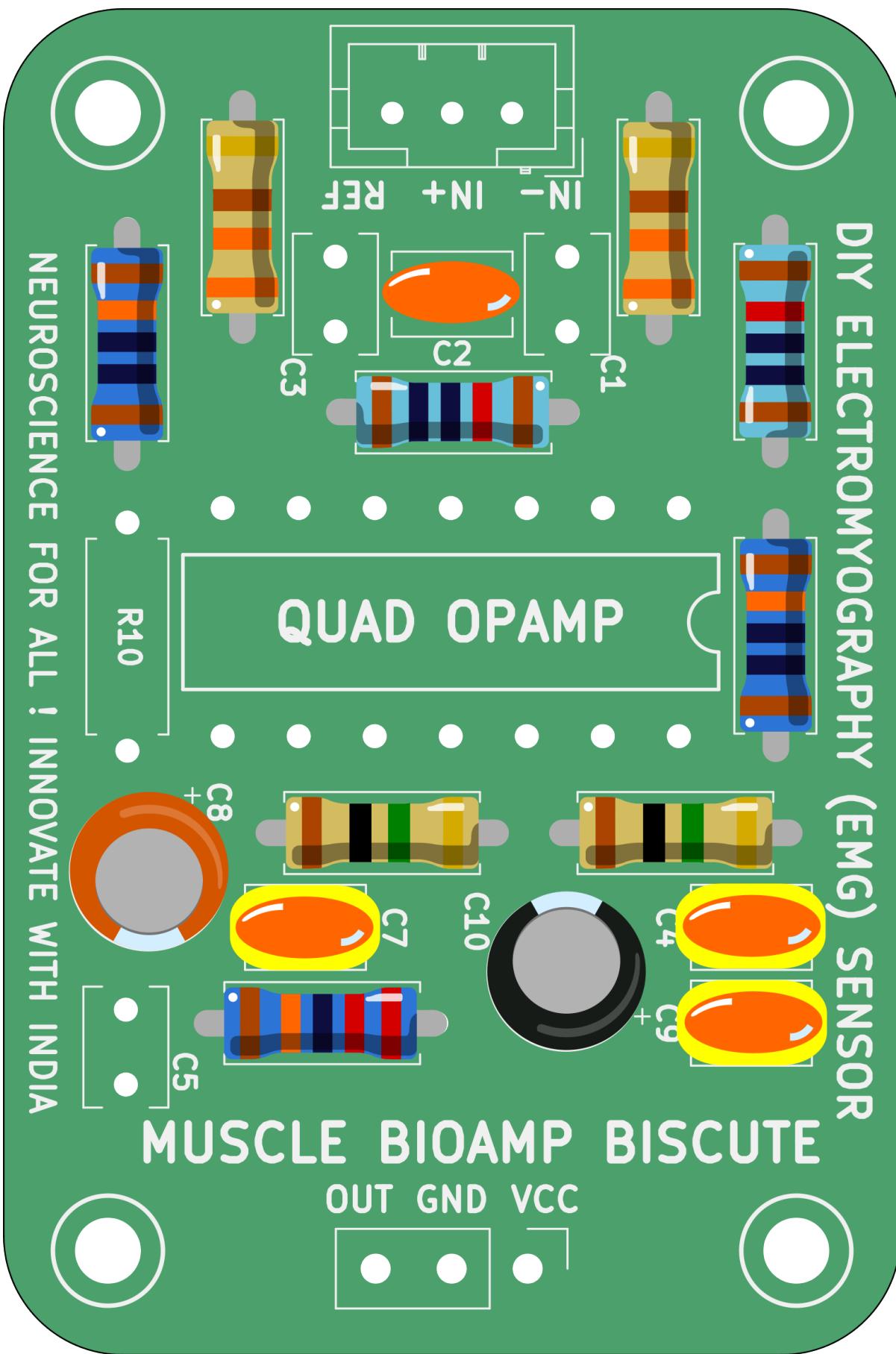


Fig. 10: Step 10 - 100nF Capacitors

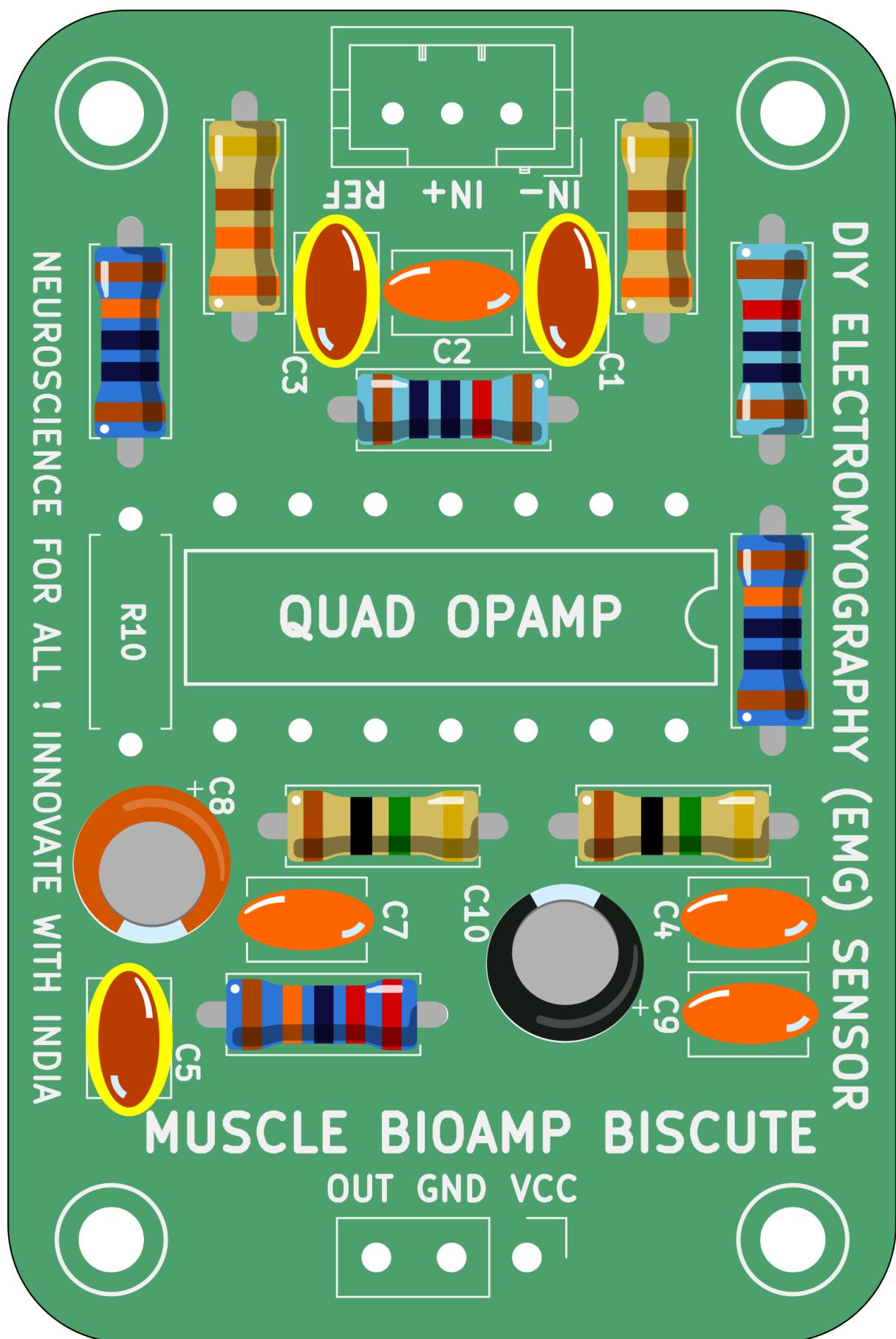


Fig. 11: Step 11 - 1nF Capacitors

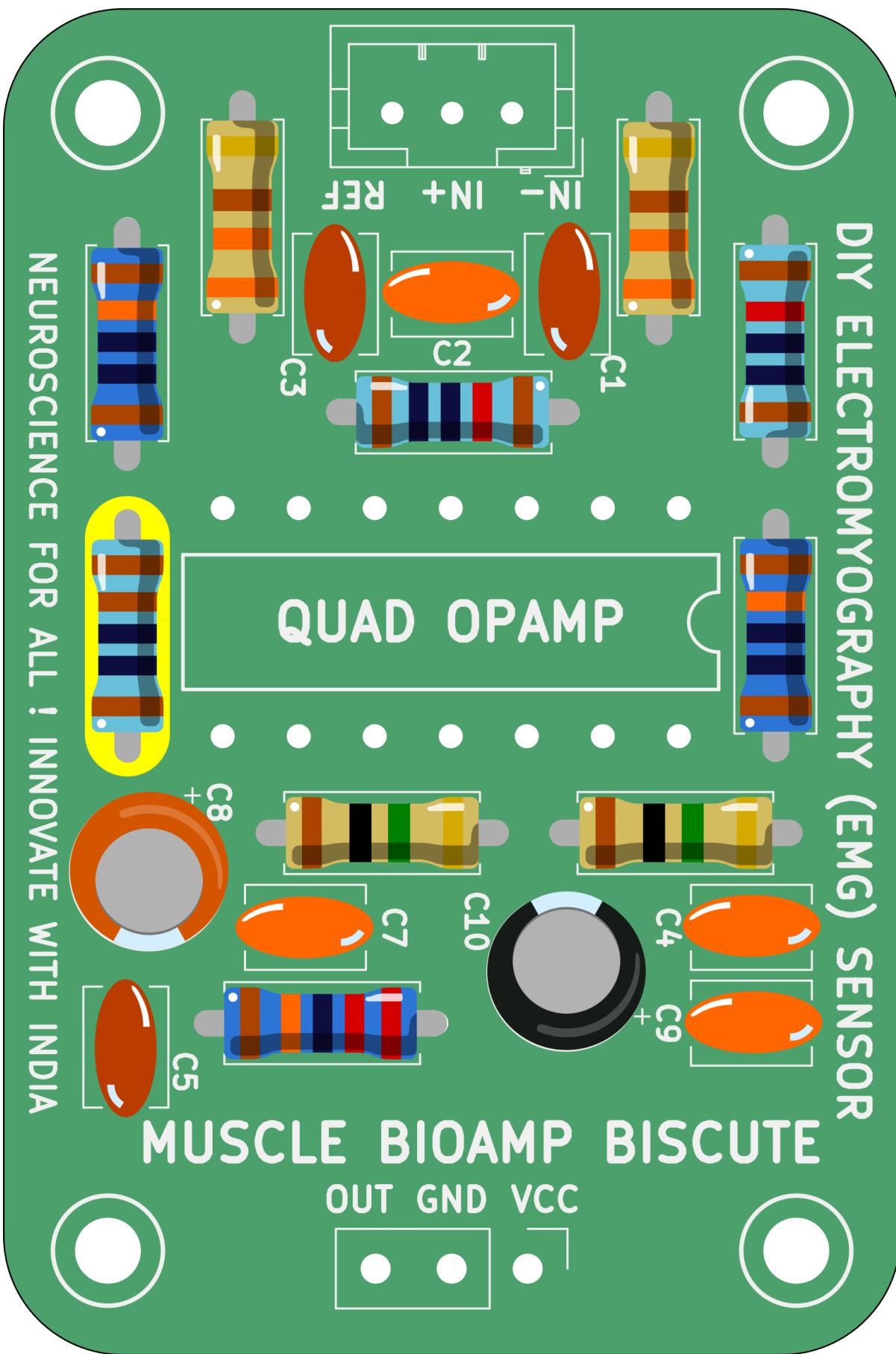


Fig. 12: Step 12 - 1K Resistor

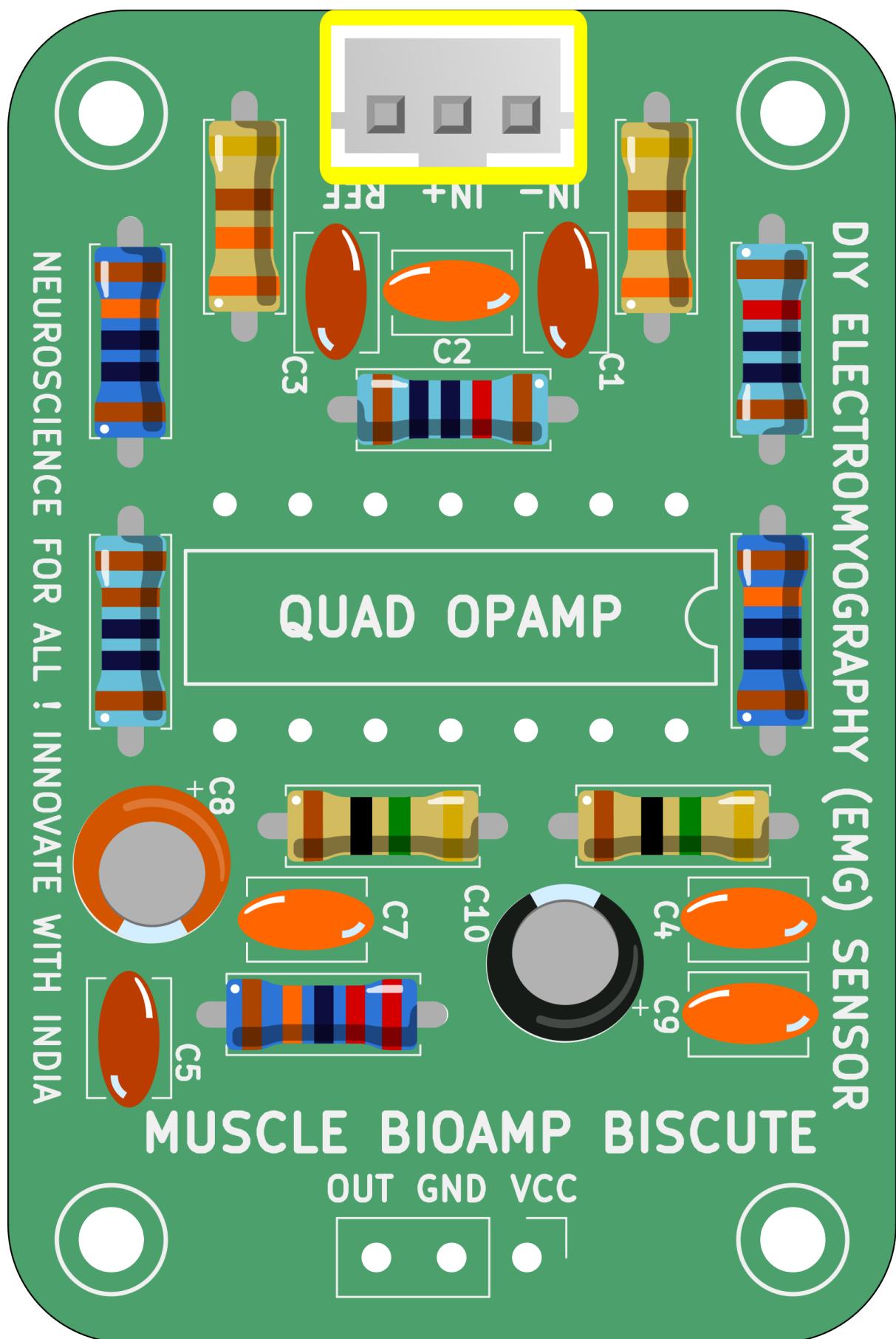


Fig. 13: Step 13 - BioAmp Connector

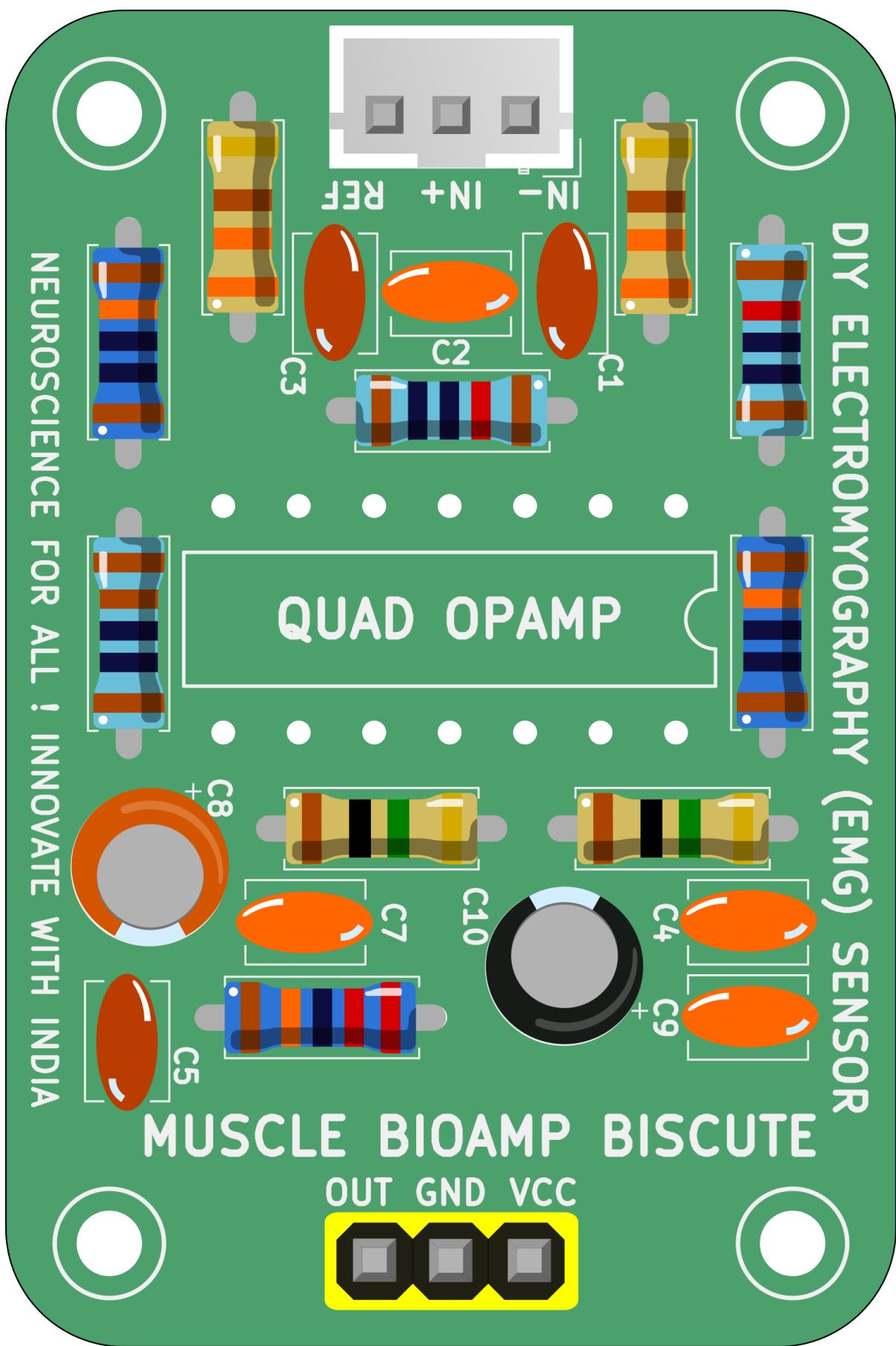


Fig. 14: Step 14 - Header Pins

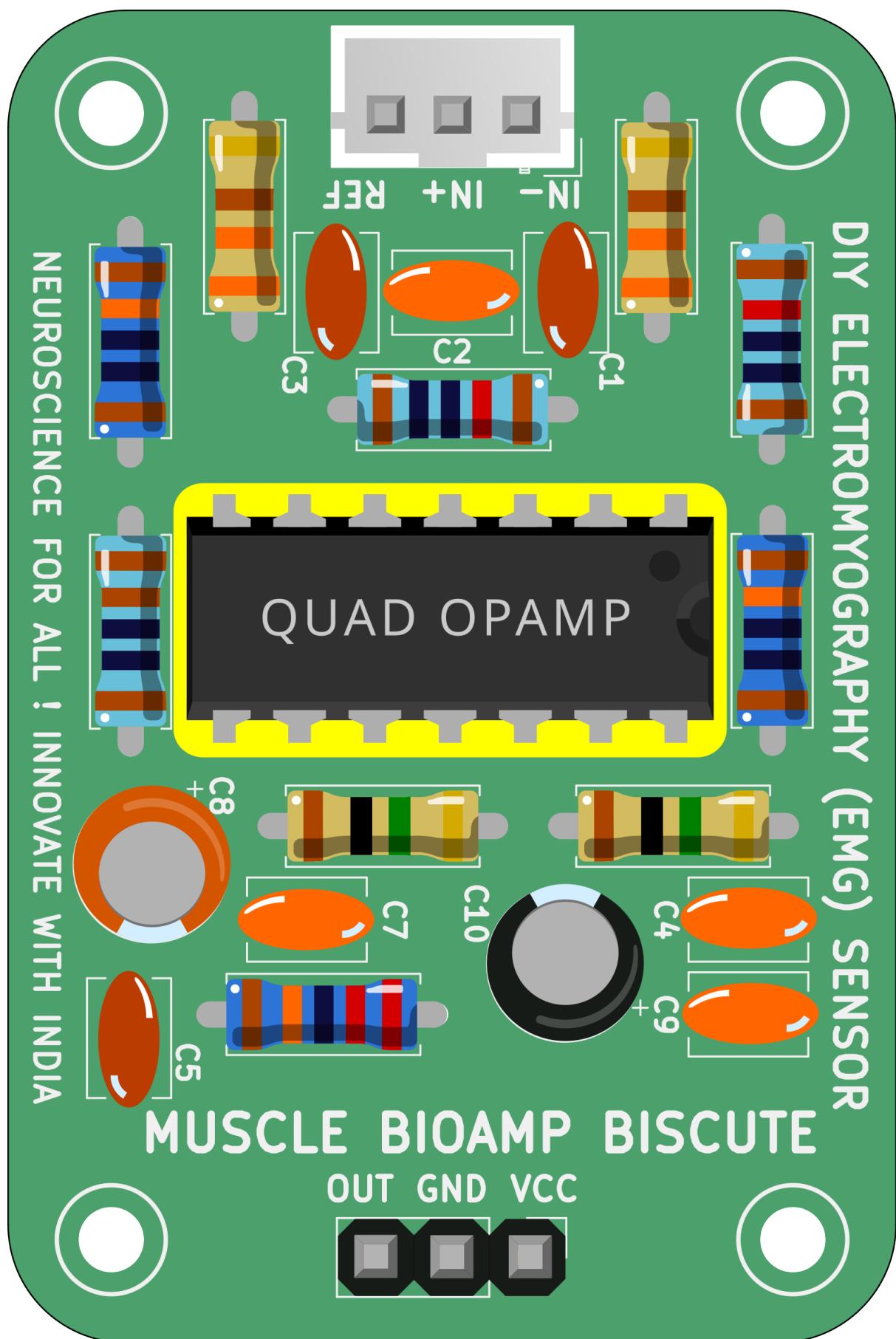
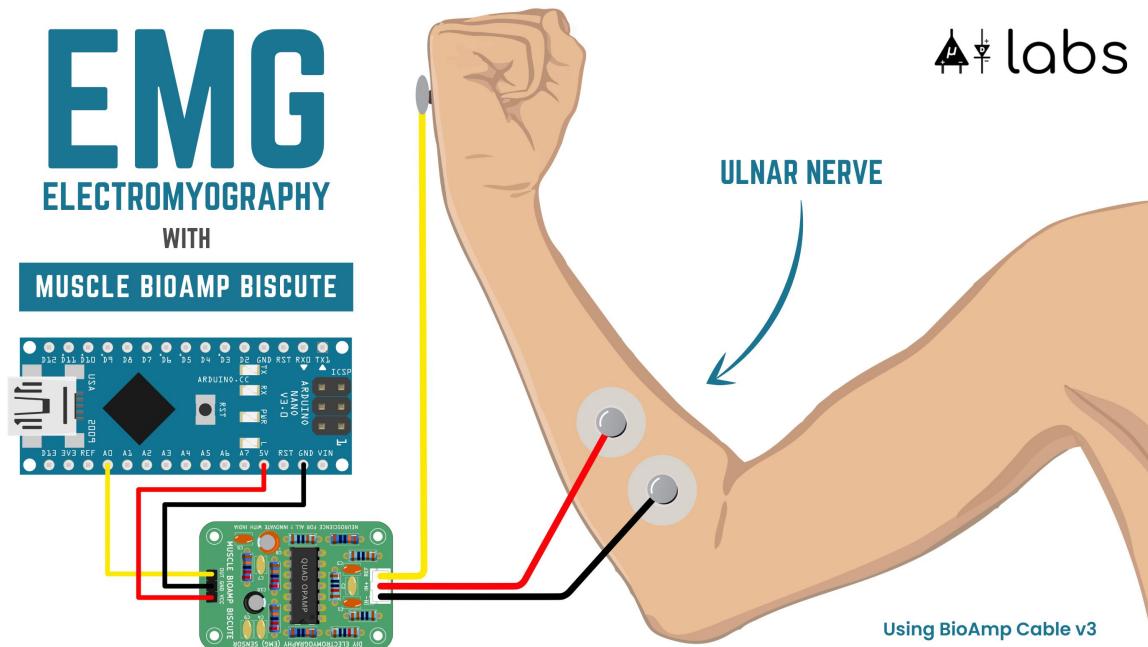


Fig. 15: Step 15 - IC

## CONNECTING WITH ARDUINO

After assembling the kit, you can pair it with any development board with an ADC (Arduino UNO & Nano, Espressif ESP32, Adafruit QtPy, STM32 Blue Pill, BeagleBone Black, Raspberry Pi Pico, to name just a few) or any standalone ADC of your choice.

To measure the EMG signals, just connect BioAmp Cable v3 with the Muscle BioAmp BisCute as shown in the image below, and get started.



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**CHAPTER  
SIX**

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## **USING THE SENSOR**

<https://youtu.be/ujFsAE0E0nk>

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**CHAPTER  
SEVEN**

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## **SOME PROJECT IDEAS**

We have curated a playlist for you which consists some awesome project ideas for you to get started with your next HCI project.