Sesame Ergo build guide

Very quick and dirty build guide.
If you need further help DM me on Reddit (u/_vastrox_) or on Discord (elmo#0101).

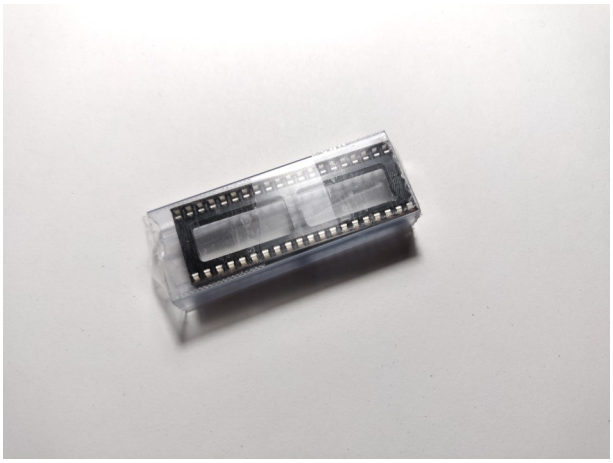
Parts included:

1	Sesame PCB
1	Sesame Backplate (Logo on the back)
1	Sesame FR4 switchplate
1	Acrylic cover window
1	Backplate foam
8	M2 screws
8	M2 nuts
6	M2x4 standoffs for the backplate
2	M2x10 standoffs for the acrylic window
1	ATmega32A controller
1	40 pin DIP socket (optional but highly recommended)
1	USB Type-C socket (USB4085-GF-A)
1	500 mA polyfuse
2	6mm momentary push buttons
1	16 MHz quartz crystal
1	4.7 uF electrolytic capacitor
2	100 nF ceramic disk capacitor
2	22 pF ceramic disk capacitor
1	10 kΩ resistor
1	1.5 kΩ resistor
2	68 Ω resistor
2	5.1 kΩ resistor
2	3.6 V zener diode (DO-35 BZX55C3V6)
80	universal switching diode (DO-35 1N4148)

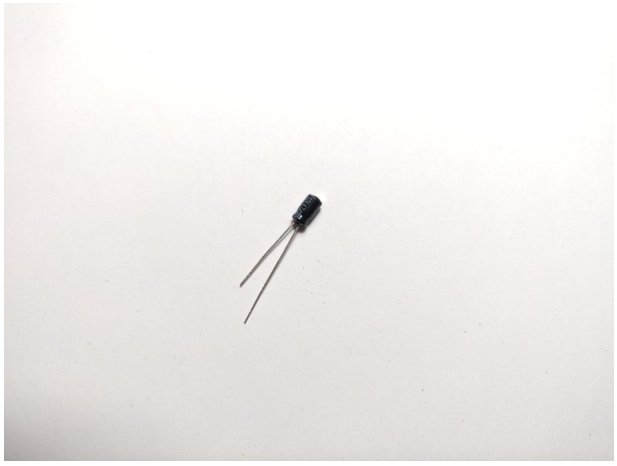
You only need 66 of the switching diodes for the board. The rest are replacements in case one gets damaged during soldering.

Parts:

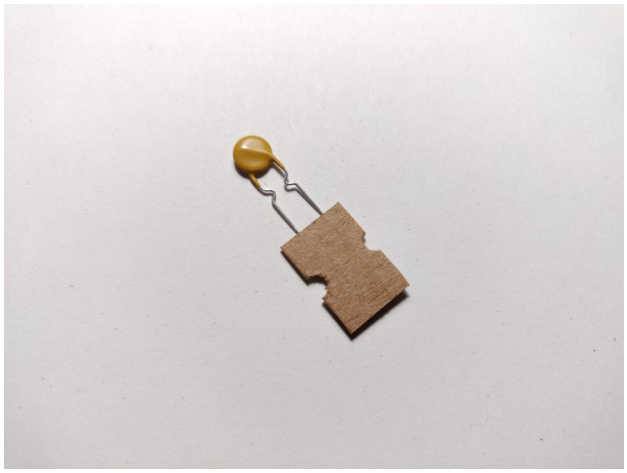
ATMega32A controller
(preflashed with bootloader)



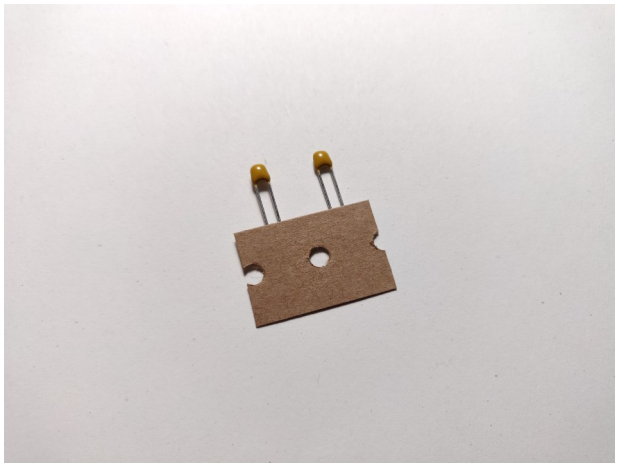
40-Pin DIP socket for the controller



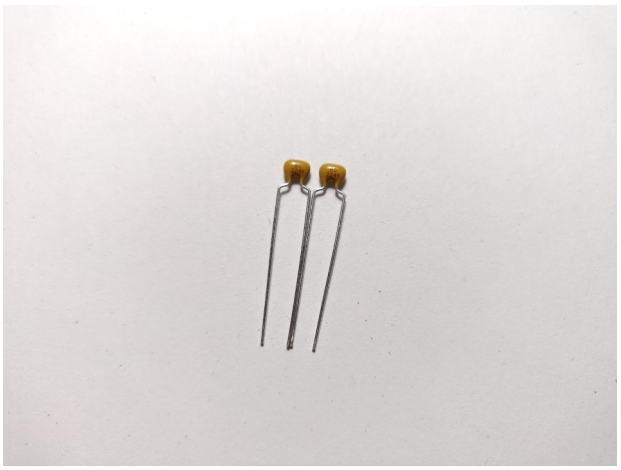
4.7uF ELKO capacitor (C1)



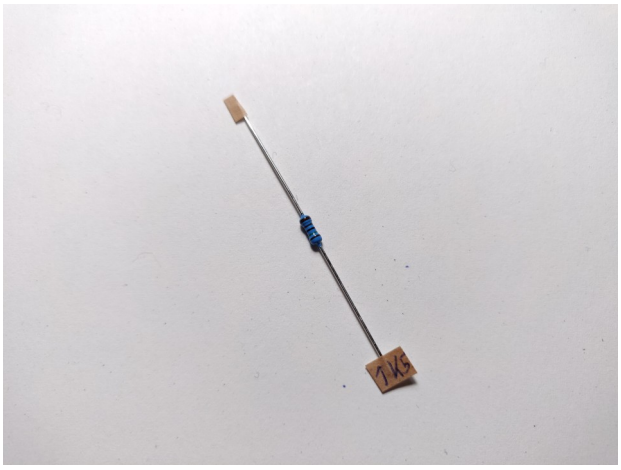
500mA resettable fuse (F1)



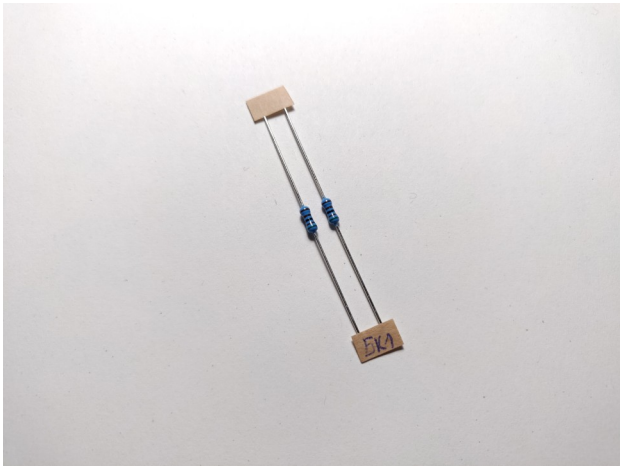
100nF ceramic disk capacitors (C2 & C3)



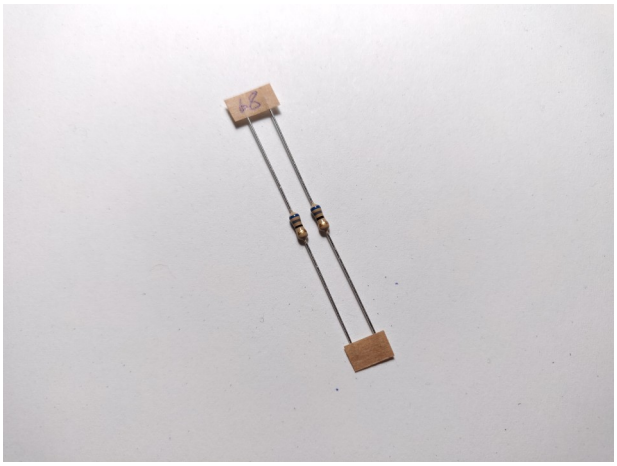
22pF ceramic disk capacitors (C4 & C5)



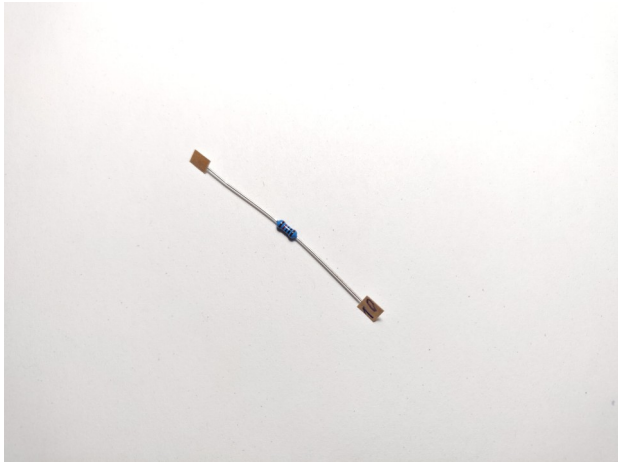
1.5kΩ resistor (R1)



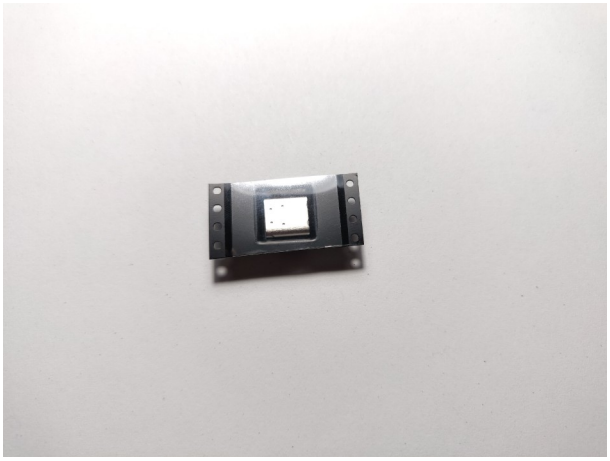
5.1kΩ restistors (R4 & R5)



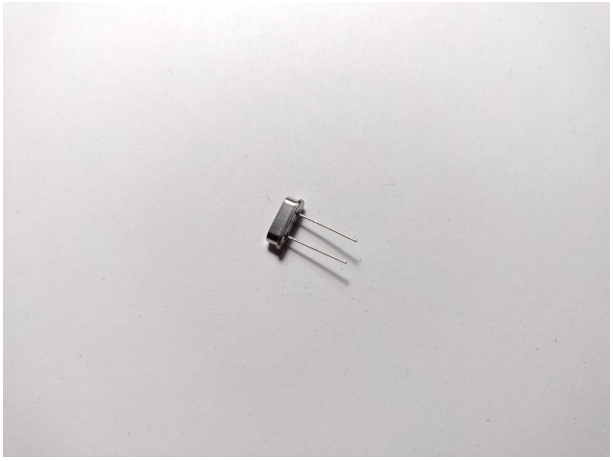
68 Ω restistors (R2 & R3)



10kΩ resistor (R6)



USB Type-C socket (USB4085-GF-A)



16 MHz quartz crystal

6mm pushbuttons (reset & boot)

universal switching diodes (80x)

Building the PCB:

1. Start with the USB-C port as this is the most complicated part to solder in this kit.
Put in the port and secure it in place with some electrical tape.
Next put on some flux over the pins on the bottom of the PCB.
Melt some solder on the tip of your iron and carefully drag the iron tip with the solder over the pins. The solder should stick to the pins without creating any bridges between them if you used enough flux.
If you don‘t get it right on the first try remove the solder with some whick and try it again.
It‘s important that there are absolutely no shorts between the contacts. Otherwise the board will not work.

2. Next should be the controller socket. Put it in with the cutout nose like it‘s shown on the PCB silkscreen. Hold it in place with some electrical tape on top of the board. Solder every second pin on the board to prevent overheating the plastic. Then do the rest of the pins.

3. Solder in the quartz crystal into it‘s spot next to the controller (XTAL1). Polarity doesn‘t matter here. Do not pull hard on the parts legs as this can damage the part.

4. Solder in the capacitors. The values are as follows:
- C1 (ELKO! Watch the polarity! white side = negative) = 4.7uF
- C2 & C3 (next to the controller socket) = 100nF
- C4 & C5 (left and right of the crystal) = 22pF

5. Next up are the two 3.6V Zener diodes. They go into the spots D1 and D2. Watch the polarity! The white line on the silkscreen has to match with the black or white line on the diode.
These are special diodes! They can not be exchanged with the standard switching diodes! Make sure that you are using the correct ones.
They are labeled 3V6 on their side. The switching diodes don‘t have that label.

6. Now come the resistors. Their values are as follows:
- R1 = 1.5kΩ
- R2 & R3 = 68Ω
- R4 & R5 = 5.1kΩ
- R6 (next to the buttons) = 10kΩ

7. Solder in the rest of the parts:
- the 500mA polyfuse (spot F1)
- the boot and reset pushbuttons
- the contacts labeled „AVR“ above the controller are left empty

8. Finish the board by soldering in all 66 diodes. Watch the polarity (white stripe)!

9. Lastly put the controller into the socket. Make sure that the indentation on the controller matches with the indentation in the socket! If you put it in the wrong way round it can destroy the controller.
Press it down firmly so that it sits flush with the socket. Take care to not bend any legs.

Assembly guide:

1. Start with the standoffs for the backplate.
Put in the standoffs (M2x4) from the bottom through the PCB and screw them in place with the M2 nuts.

2. Screw in the standoffs for the acrylic window.
Put the standoffs (M2x10) in from the front of the PCB and screw them in place with the M2 nuts on the back side.

3. Next put the included foam on the back of the PCB. The holes should align with the standoffs. If it doesn‘t fit turn it around. It only fits on one way because the PCB is not perfectly symmetrical (even though it might look like it is).

4. Attach the backplate to the standoffs using the M2 screws.
(On this revision the topmost screw, the one below the controller, won‘t fit unfortunately due to a stupid change that I only made to the PCB and not to the backplate)

5. Screw on the acrylic window. Remove the protective foil on both sides first.

Building and flashing the bootloader:

If you bought the kit from me the controller is already flashed with the bootloader. You can skip this step!

Download the bootloader firmware from here:
https://github.com/kb-elmo/sesame/tree/master/firmware/bootloader

You need either a Linux system or MingW on Windows for this as this requires compiling some stuff.

The firmware is already set up and you don‘t need to change anything in the configuration files for this board.

1. Build the bootloader firmware by running „make“ on your console

2. Make sure that you can reach the controller by executing a chip erase with „avrude -c usbasp -p m32 -e“ (you have to run these commands as root in Linux)

3. Flash the firmware on the controller with „make flash“

4. Set the controller fuses to the correct values „make fuse“

5. Finally lock the controller bootloader in place with „make lock“

The avrdude tool should show a „success“ after each operation. If the flashing process was successful you can unplug the ASP flasher and plug in the USB now.

Building and flashing QMK:

The keyboard can be found on https://config.qmk.fm if you want to configure a static keymap or you can use VIA. I recommend the latter.

For VIA download the firmware for the board and the client from:
https://caniusevia.com

Flash the firmware on the board using the QMK Toolbox which can be found here:
https://github.com/qmk/qmk_toolbox/releases

To put the board into controller into bootloader mode press and hold down the boot button and tap the reset button once. Then let loose of the boot button.
The board should show up in your OS as a „USBasp“ device (or similar).
After the flashing process was successfull hit the reset button once to get into normal keyboard mode again.

You can of course also build the firmware yourself if you prefer that.
The code for this can be found in the QMK repository in keyboards/kb-elmo/sesame.
I‘m not going into the details of this here