

SAV MAKER I – Assembly Guide

Materials

- Solder iron (temperature adjustable).
- Solder 63/37 or 60/40 with Rosin core.
- Flux (paste or fluid).
- Tweezers
- Clippers

Assembly

Assembly process description of the SAV MAKER I. Assembled by students of Creative Electronics, a BEng Electronic Engineering 4th year module at the University of Malaga, School of Telecommunication (<http://etsit.uma.es/>).

PCB layout

The first is to present original PCB like this one:



As you can see, there isn't any component on the PCB. Set your soldering iron to about 300°C.

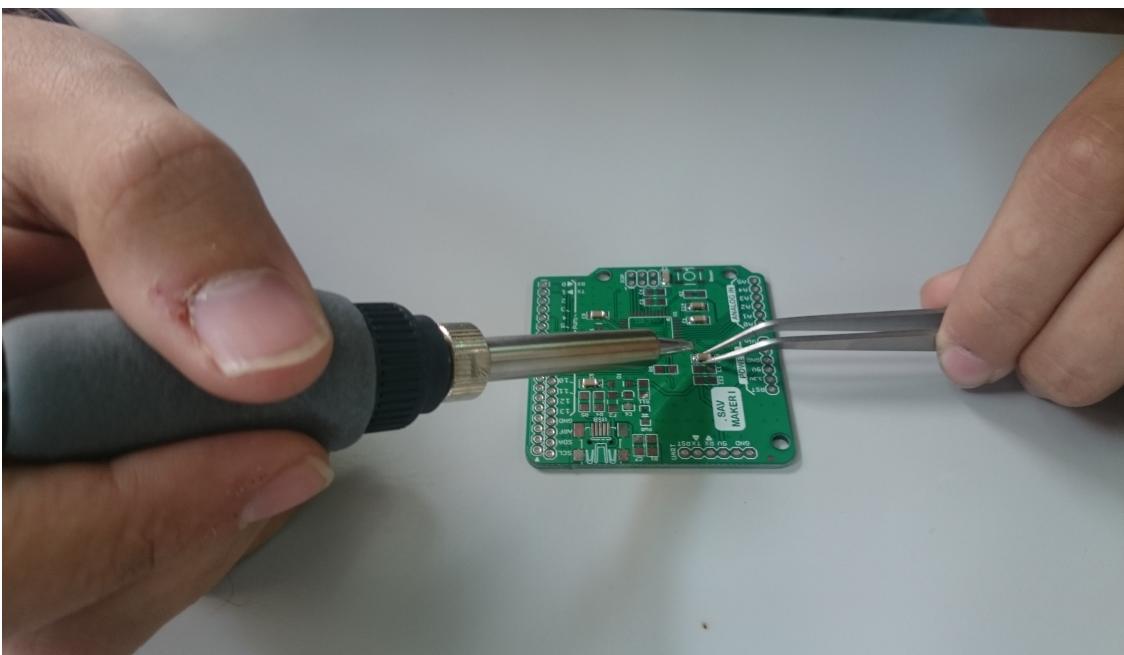
Capacitors

The first step is to place 7 capacitors of $0.1\mu\text{F}$ value, without polarize, on their respective places (C1, C2, C5, C9, C10, C13 and C14).

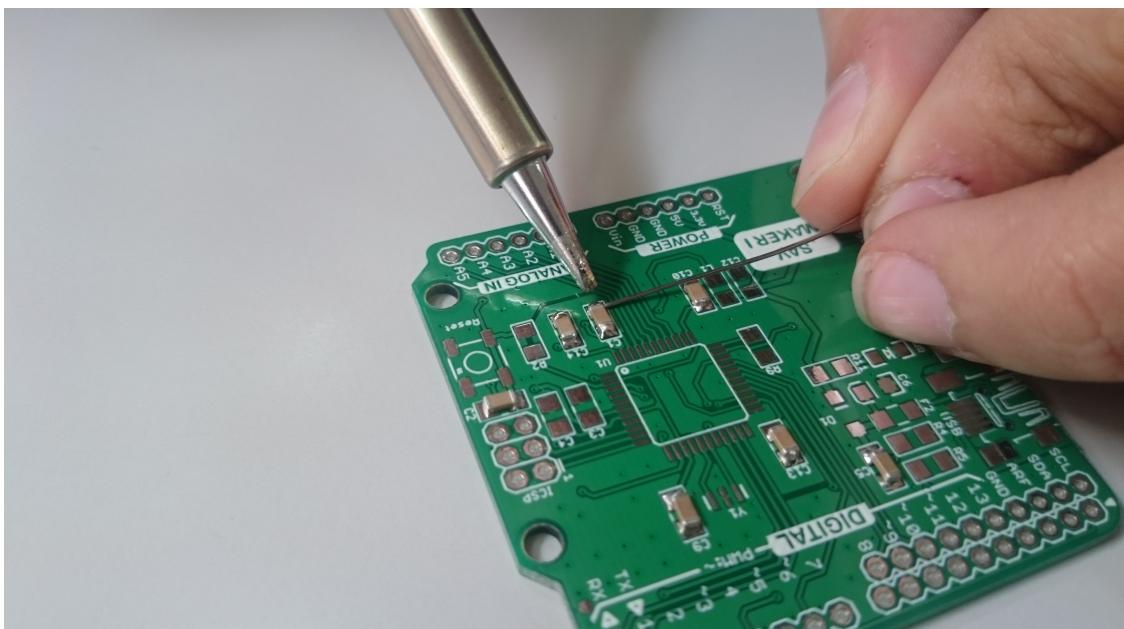
To do this, the first thing that you must do is to find their references on the PCB and to place the capacitors there.

Most of components will be placed using the same way as this capacitors, so we are going to explain how you can do it:

1. Heat a pad (metallic square) with the soldering iron and put a point of tin on top of it.
2. Take a component with the tweezers, you put it near the point of tin of the PCB, heat again the tin with the soldering iron and press the component until it place correctly.

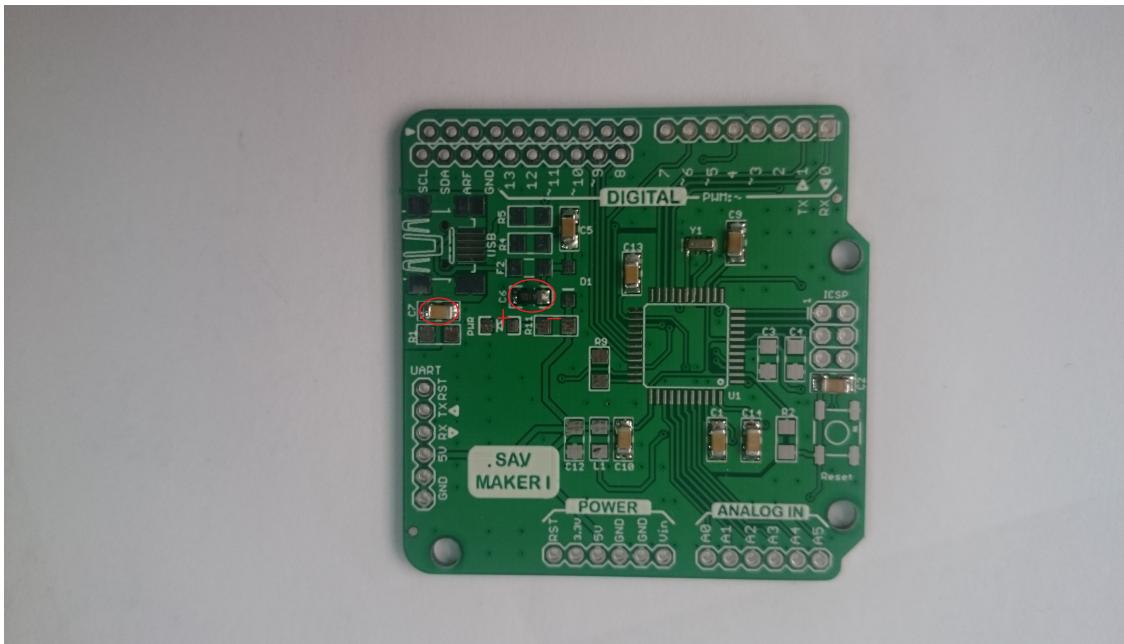


3. Put some tin on the other component's side and heat it.



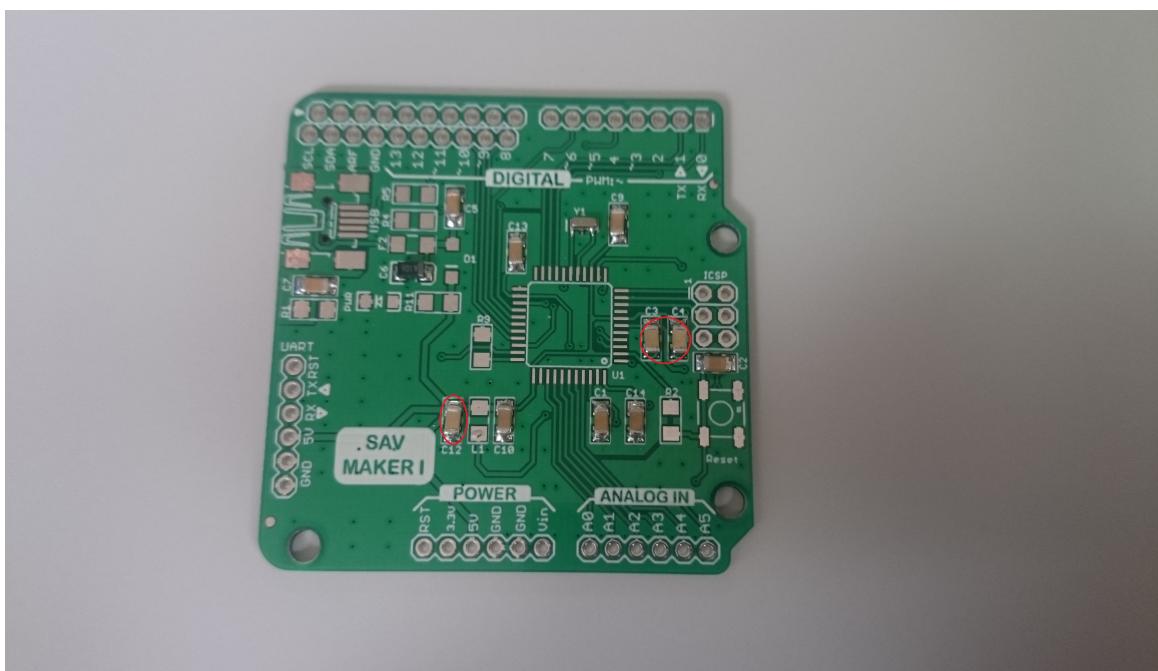
4. For a better tin's fixation, put some flux and heat again the two sides of component where you have put the tin.

Next step is to place a $10\mu F$ capacitor, this one is polarized (positive side of it with the curve part of the PCB), on this position (C6). You can see it in the next photo (the capacitor is inside of a red circle and the positive and negative sides are painted in red too). Also, we are going to place a $4.7nF$, without polarize, on this position. (C7). **Observer the polarity.**



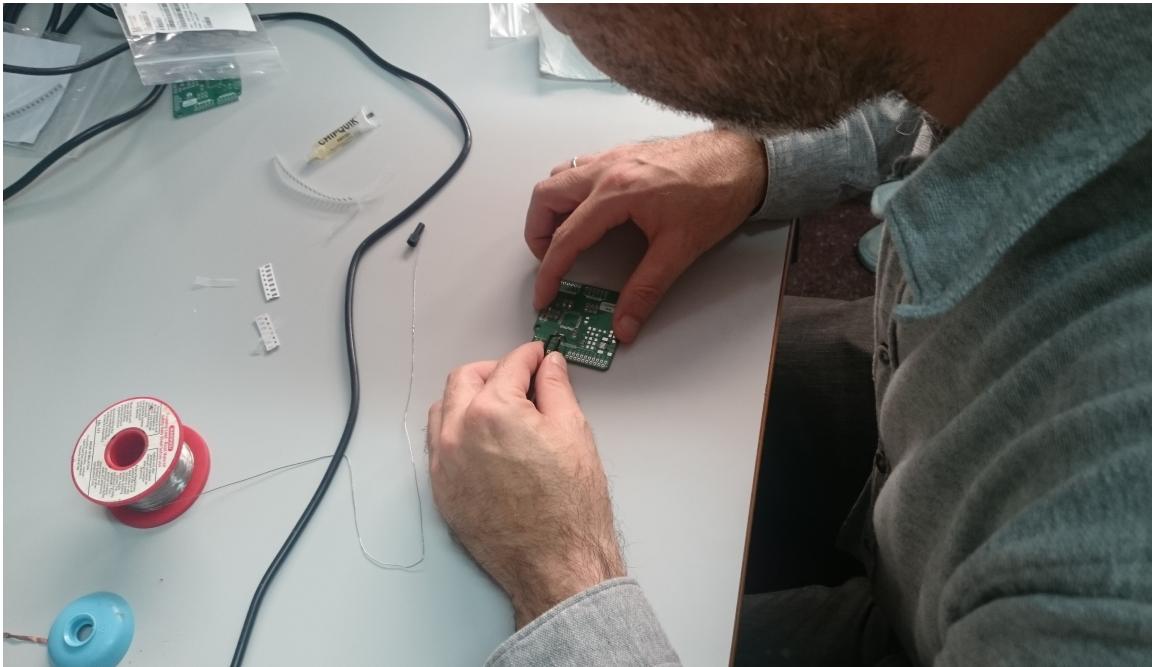
This is a photo of the PCB after the first components are placed.

Then you have to place 3 no polarized capacitors of $1\mu F$ value on their PCB references (C3, C4, and C12).



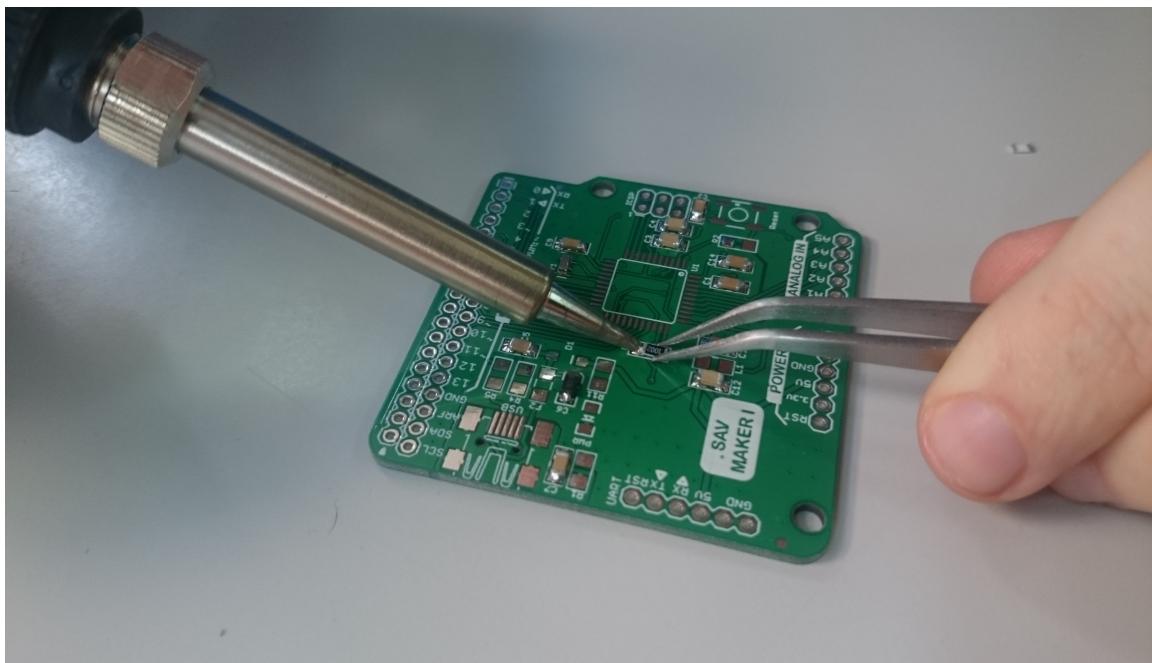
Resonator

When the capacitors are placed, the next thing to do is to place the resonator (Y1). This component is very small and we have to be careful because it is very difficult to place it.

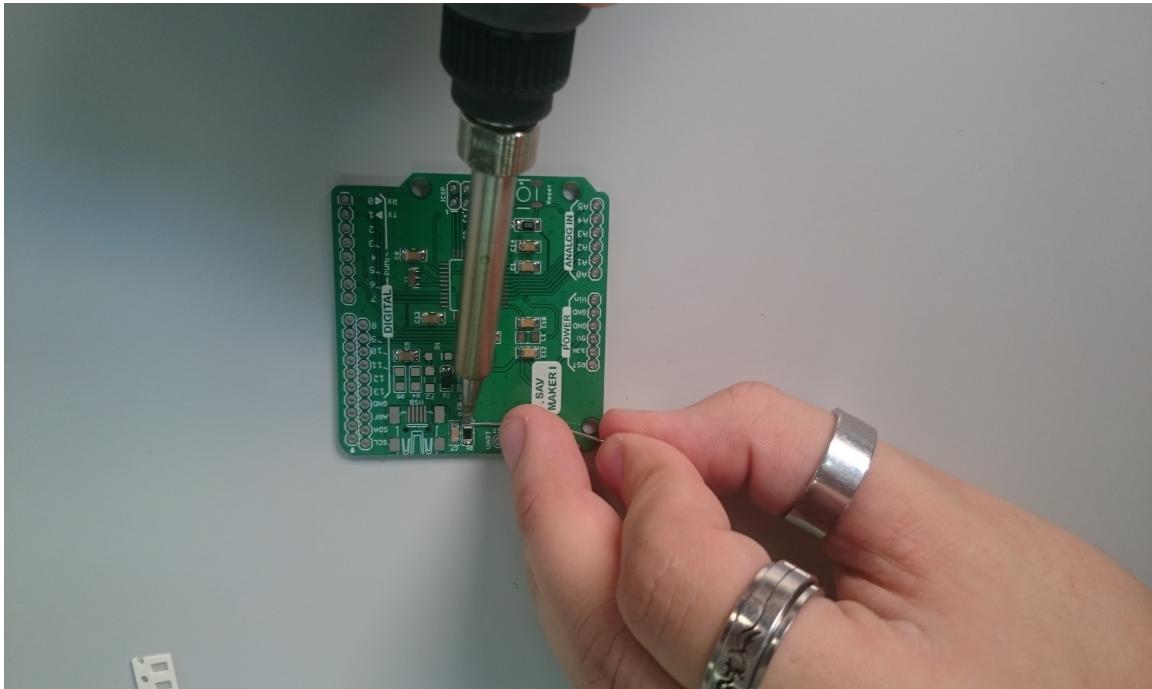


Resistors

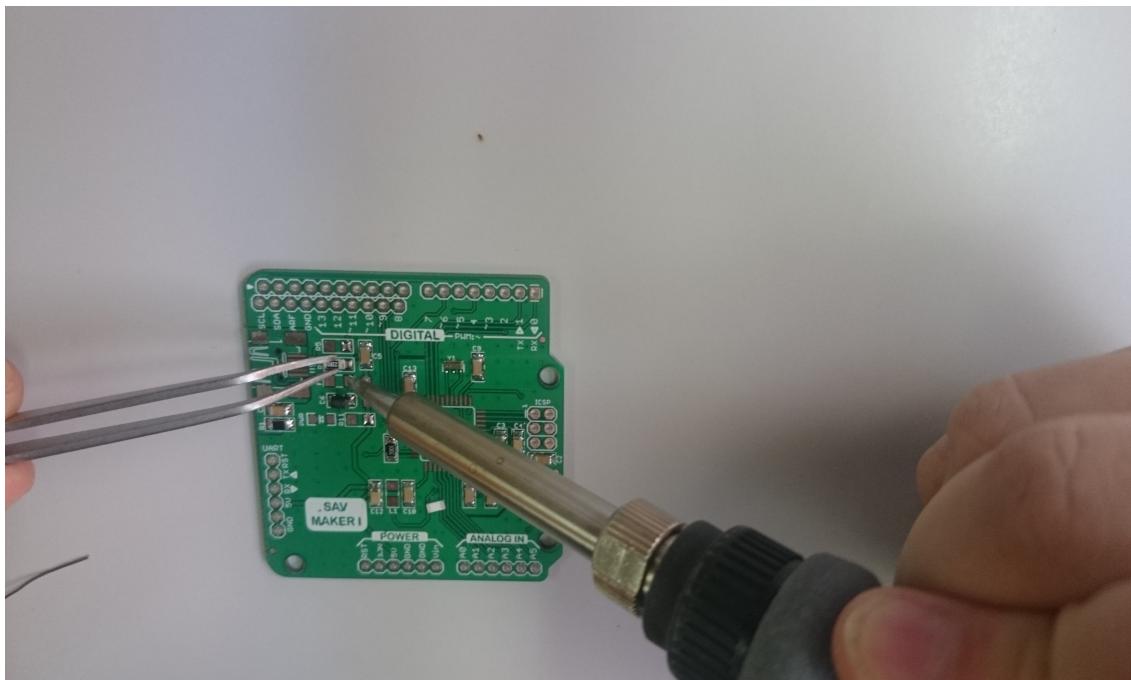
Next components will be 2 resistances of $10\text{K}\Omega$ value, on their established places (R2 and R9). The process to place this component is the same process that we have used to place the capacitors as we have explained previously.



Resistance of $1M\Omega$ on their position (R1):



Last resistances to place are 2 of 22Ω value, and they are placed on their positions (R4 and R5). Also, we are going to place 1 resistance of $2.2K\Omega$ value in this position (R11).



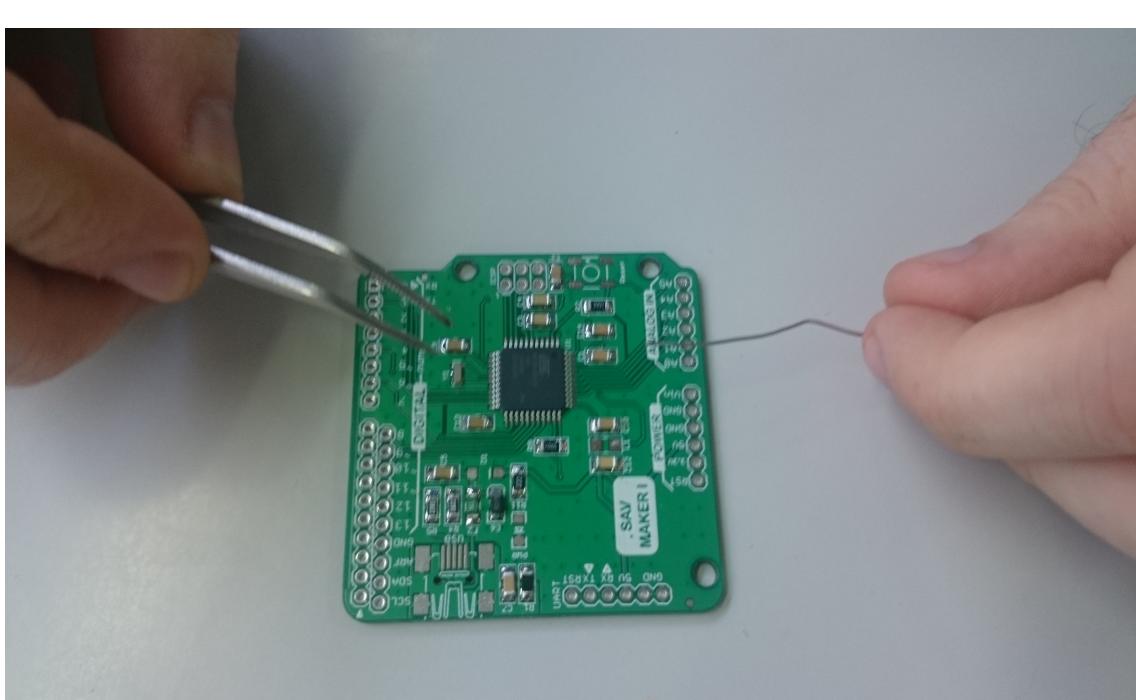
Microcontroller

The next component is probably the most difficult to place on the PCB: the microprocessor (“micro”), because of the quantity of side-whiskers that it has and the fixation process.

Because the process of fixation of the microprocessor is not the same as the process to place the capacitors, we are going to explain it:

1. Find the position, and the most important thing, the orientation of the micro. Notice that the circle of the micro and the PCB has to stay in the same position. Be careful with this.
2. Take the micro with the tweezers, and you put it on the PCB.
3. Take a point of tin with the soldering iron and fix only one of the side-whiskers of the microprocessor’s corner.
4. Take other tin’s point and you fix the opposite side-whisker that you have fixed in the last instruction (point 3).
5. Put some flux (you must be generous with this) on the micro side-whiskers, it will be easier to work.
6. Take a drop of tin with the soldering iron and you drag it carefully through the side-whiskers of one side of the micro to fix them to the PCB. Be careful with not to do bridges between the side-whiskers because this produces short-circuits.
7. Repeat with the other sides of the micro.

When the process has finished, the microprocessor will be on his correct position.



USB Connector

The next is to put the USB, he has two parts: the four normal solder's pin (4 corners), and the other hand, the pins like the microprocessor that they follow the steps of the last explication.



Fuse and filter ferrite

Coming up next, two components more are placed in their positions (F2 & L1) with superficial solder like we have explicated previously.



LEDs

The following component placed is the LED (PWR), we must take into account his polarization. You can place it easily if you look below the LED.



Rectifying Diode

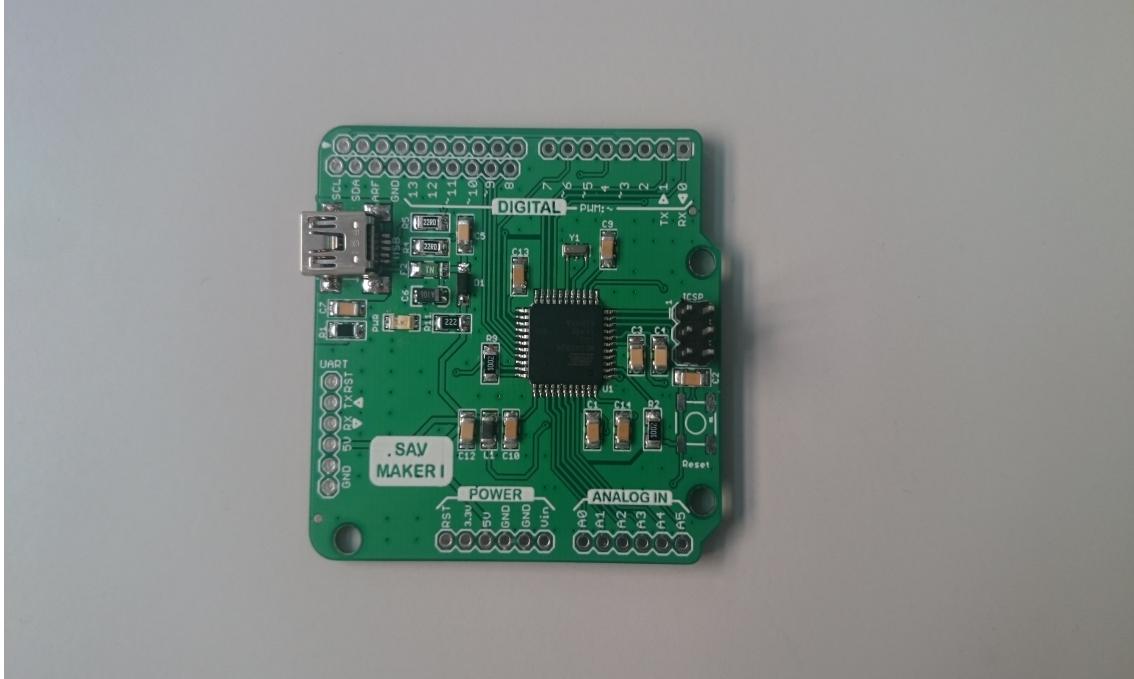
After, we place the diode, be carefully, it must place the diode's line in the same position of the PCB's line (D1), this is because the diodes have polarity. **Observe the polarity of the diode**, a line normally indicates the cathode.



Connectors

Leave these till the end since with them fitted, it will be difficult to manipulate the board to place the SMD components.

The last component placed is a connector (pins).



PCB will stay this way after that the students have placed all components.

Finished this process, we performed a test with the oscilloscope for see that all connections are good, because it can have errors. In addition, it places the push-button of reset. Also, we download the firmware boot loader necessary for the correct operation.

The final appearance to present the SAV MAKER I is the following:



Finally, we have to place lines of pins near of the perimeter of the PCB, in order to facilitate the connection thereof with circuits created to use it.

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