Switcher Assembly guide

Safety warning

The kits are main powered and use potentially lethal voltages. Under no circumstance should someone undertake the realisation of a kit unless he has full knowledge about safely handling main powered devices.

Please read the "DIY guide" before beginning.
Print or open the following documents :

- Switcher2 or Switcher3 Schematics
- Switcher2 or Switcher3 Components layout
- Switcher2 or Switcher3 Parts list

Follow this guide from item number 1 till the end, in this order. The assembly order is based on components height, from low to high profile, in order to ease the soldering process : The component you are soldering is always taller than the previously assembled ones and it is pressing nicely against the work area foam.

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1. Soldering

All the PCB holes are metallized. It means the connection between the top and bottom pads is already done. The parts must be soldered only from below (unless differently stated).

Use only small diameter solder, 0.5 or 0.7 mm, 1 mm maximum. Use the minimum possible amount of solder. Bad joints are almost always caused by too much solder.

Here are two excellent introduction to soldering videos:
http://www.eevblog.com/2011/06/19/eevblog-180-soldering-tutorial-part-1-tools/
http://www.eevblog.com/2011/07/02/eevblog-183-soldering-tutorial-part-2/

2. Switcher3 vs Switcher2

Switcher-3 is the full version with 3 outputs: +19V, -19V and +55V.

Switcher-2 is almost the same but with 2 outputs only: +19V, -19V.

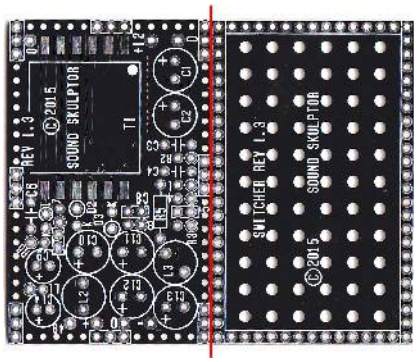
This document describes the build of a Switcher-3. To build a switcher-2, simply omit C6 (ceramic), C9, C14 (electrolytics), R6, L1 (axial inductor) and D1.

3. PCB split

Split the multiple PCB along the red line on the picture.

This will separate the main PCB from the shielding cover.

Clean up the break line with very thin sand paper.



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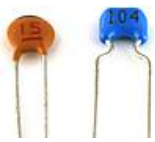
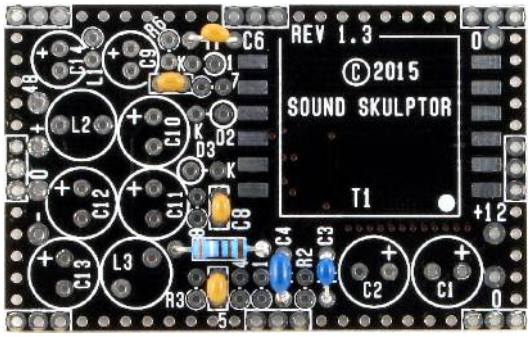


4. R5 and Ceramic capacitors



Add R5.
Add C3, C4, C5, C6, C7, C8.

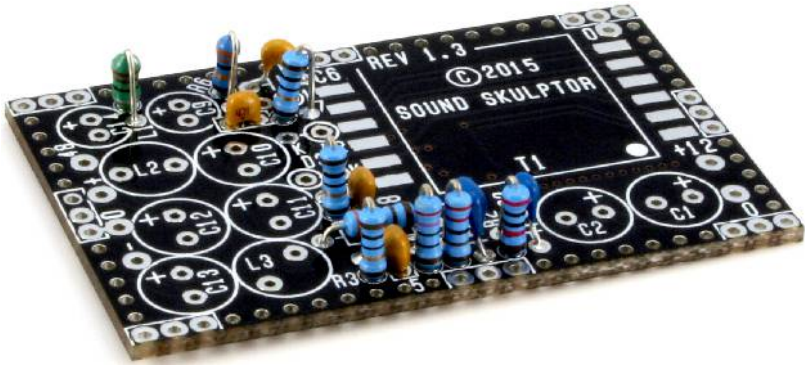
5. Resistors

Add R1 to R4, R6 to R8.
These resistors are installed vertically.

Warning : It is very important to check the resistors value with a DMM because the colour code can be ambiguous. For example 1K (brown-black-black-brown-brown) can be confused with 110R (brown-brewn-black-black-brown).

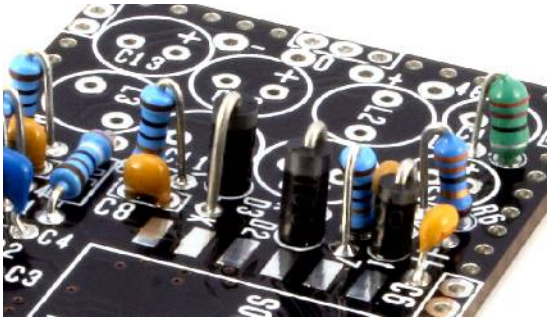
6. Axial Inductor

Add L1, vertically like the resistors.

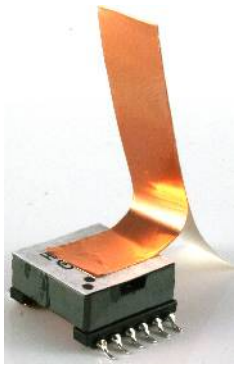


7. Diodes

Add D1, D2 and D3. The diodes are placed vertically, cathode on top. Bend the cathode lead (marked by a ring on the diode body).
Warning : Make sure to respect the direction of the diodes. The cathode side is marked by a K on the PCB.



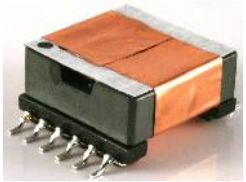
8. Copper shorted turn

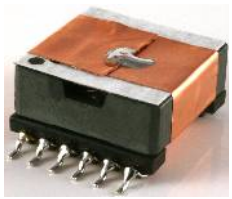


In order to reduce the transformer radiations we will add a copper foil turn around the outside of the transformer.

Start by redrawing the dot on the top of the transformer, a little further in the corner because the original will be hidden by the foil.

Partially remove the backing tape from the adhesive copper foil and place it on the top of the transformer, as shown on the picture. Make a full while removing the backing tape. Solder the two ends to electrically close the loop.





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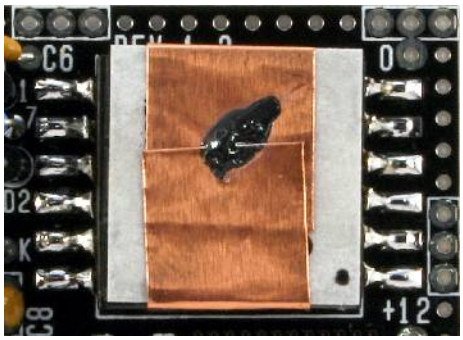
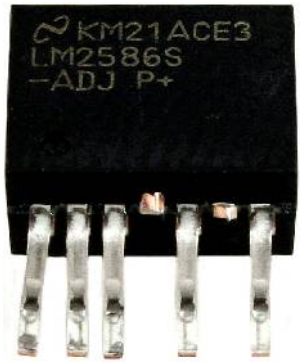
9. Transformer soldering



Apply a small quantity of solder on one of the transformer PCB pads.
Position the transformer, making sure the dot is in the correct place and reflow the pad solder to lock the transformer. Adjust until all the transformer pins are all well centred on their respective pad. Solder one pin on the opposite row. When the position is correct, solder all the pins.

10. LM2586

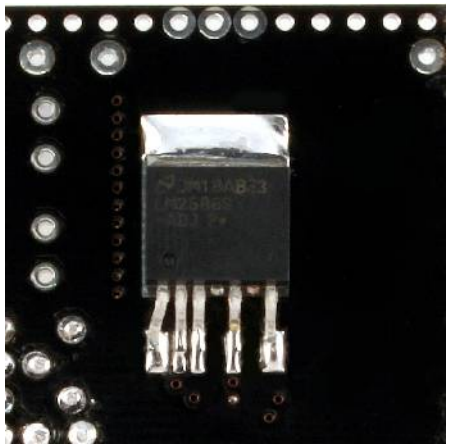


The LM2586 is soldered on the back side of the PCB.
It is a surface mount component with relatively close pins. In order to make the soldering process easier, we are going to cheat a little:

Lift pins 4 and 6 (counting from the left) and cut them off.
And gently bend pin 1 towards the left.

This gives us a good enough iron access to each pin.

11. Soldering the LM2586



Put a small quantity of solder on the rightmost pad. Place the IC and reflow the solder, adjusting the position until all the pins are centred on their respective pad.

Once in position, solder the other pins.

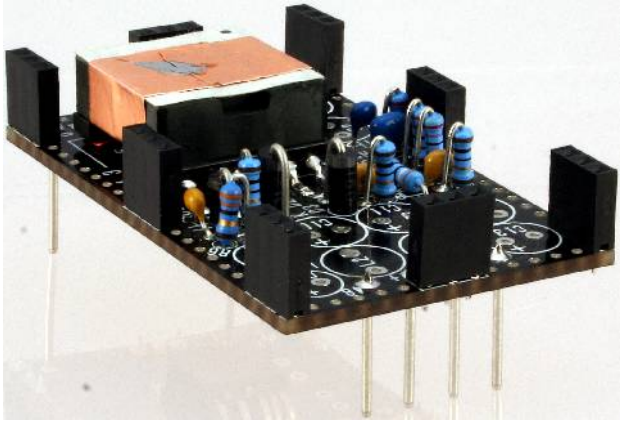
Do not forget that a bad solder joint is almost always caused by too much solder.

Last thing is to solder the IC top tab to the PCB. Start by heating the metal tab until the solder flows and goes down to the PCB.

12. Connecting pins

Insert the 7 long pins from the solder side and solder. It is necessary to put a little pressure on the pins to insert them all the way down.

13. Pins sockets



Solder the eight 3 pins sockets around the PCB. Solder one pin first, check the position then solder the other pins.

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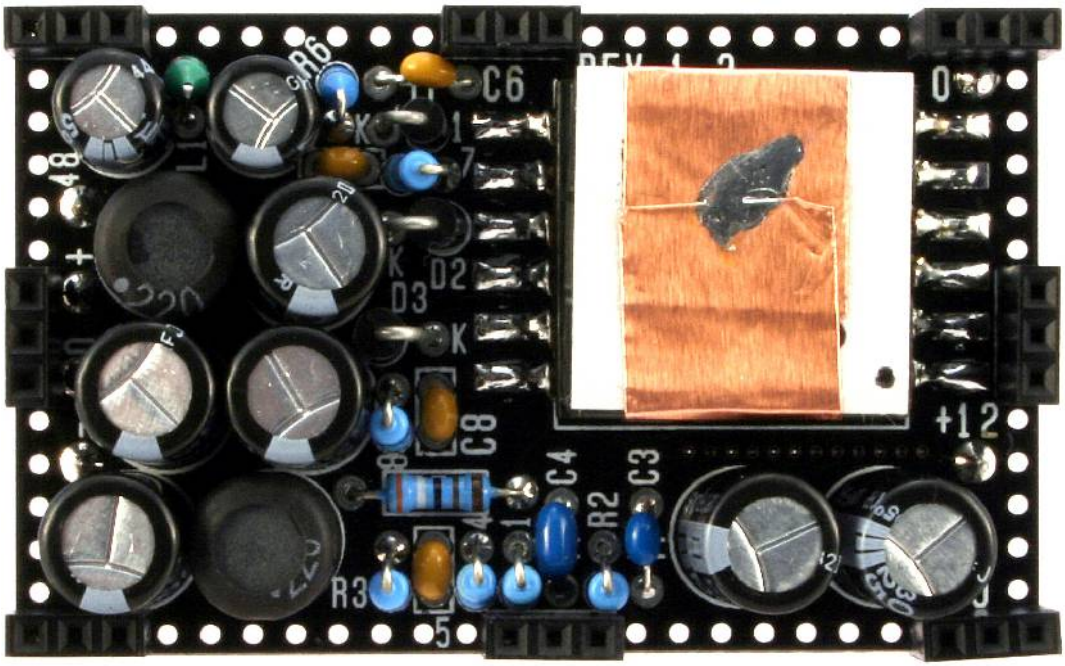
14. Radial inductors

Add L2, L3.
Warning : Take care not touching the connecting pins with your iron. It can be a good idea to protect them with some wire insulating sleeve.

15. Electrolytic capacitors

Add C1, C2, C9 to C13, C14.
Solder one lead first, adjust verticality then solder the second lead.
Warning : The +lead must go into the +hole. Do not reverse (they may explode !)
Warning : Make sure the caps are inserted as low as possible because they define the height of the module.
Warning : Take care not touching the connecting pins with your iron. It can be a good idea to protect them with some wire insulating sleeve.



16. Shield (1)

Split the first 40 pins header into one row of 24 pins and one row of 13 pins. Repeat with the other 40 pins header.
Warning : Double check your count before cutting.

17. Shield (2)

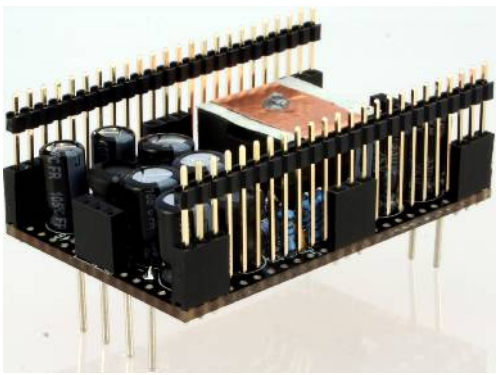
Insert delicately the 24 pins rows into the 3 pins socket on the switcher PCB, taking care not to bend any pin.

Place the lid on top and solder the pins to the lid.

Remove the lid.

Gently rub the plastic ends of the 13 pins headers on thin sand paper in order to make them fit the space between the long headers.

Insert them in position, place the lid on top and solder.



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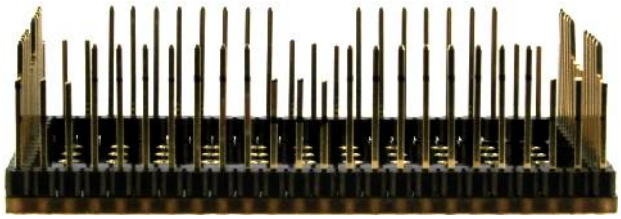
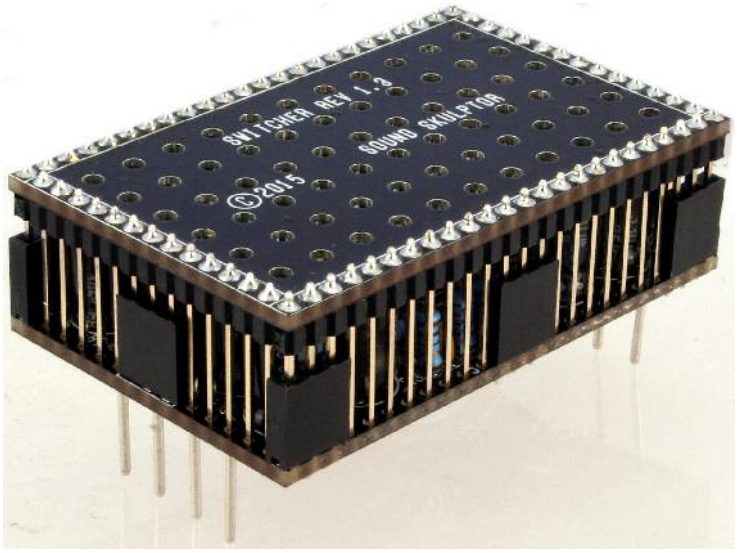
18. Shield (3)

With a pen, mark the pins that go into a socket then shorten these pins by 4mm.





19. Switcher Quick testing

The switcher can be tested directly in the final device but it is a good idea to check it alone if you can. What you need is a 12V DC source and a voltmeter.
Connect the 12V source between the (+12) and (0V) supply pins (near transformer) and connect the voltmeter between the (0) and (+) pins on the output side.
After powering, you should read
+19 to 20Volts on the (+) pin,
-19 to -20Volts on the (-) pin,
+55V to 60V on the (48) pin.