SOFTIE

FX TYPE: Bypass

Enclosure Size: Multiple
Based on the Function F(x)® bypass
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Overview

The Softie is a port of the Function F(x) relay bypass system used in all its single bypass pedals. It was developed around 2015 by the FFX engineer specifically for the company. It has proven over the years to be an extremely reliable and efficient alternative to the traditional mechanical switching we are usually stuck with in the world of DIY. It's shipped in hundreds of pedals over the last five years and to date I am not aware of a single fault from a customer. So, it's decently rad.

What it is:
* A relatively low-cost and reliable alternate to mechanical 3PDT switching.
* Low noise, small footprint.
* Relay-based system controlled by a pre-programmed PIC to handle all the switching functions.
* A much longer shelf life than a 3PDT (momentary switches tend to rate around 100k cycles or more before failure).

What it is not:
* Cheaper or easier to use than a 3PDT.
* Completely silent (IOW without *any* sort of switching noise).
* Faster to build!

The Softie is not a completely *silent* switching system

Designing a relay switching system for effects is not a novel task. Making it 100% silent is more challenging. Some designs like the VFE and CODA systems insert a few extra parts to mute the effect output when it is switched to bypass. This can be very effective as an extra layer of noise prevention: usually at the cost of completely muting your guitar signal from anywhere to 10-30ms. The Softie does not have an output mute. Rather it switches instantly to bypass so the signal does not drop out. If you are very concerned with having *any* sort of switching noise, then I suggest going with the CODA bypass instead. The Softie is plenty quiet (esp. when compared to a 3PDT) but will produce a small "puh" in some cases when switched to bypass.

Technical assistance for your build(s) is available via the madbeanpedals forum. Please go there rather than emailing me for assistance on builds. This is because (1) I'm not always available to respond via email in a timely and continuous manner, and (2) posting technical problems and solutions in the forum creates a record from which other members may benefit.

The Softie comes in three versions

Softie1 is for 125B and 125BB type enclosures (or any enclosure that is a minimum of 1.4" in height). The Softie1 has all its parts top-mounted and allows for the bypass LED to be soldered directly to it.

Softie2 is for 1590B and1590BB type enclosures (which are typically 1.2" in height). The Softie2 is designed for the smallest footprint possible and has some components mounted on top *and* bottom. It requires a wired LED.

Softie3 is for all of the above (1590B, 1590BS, 125B, 1590BB, etc). It is profiled more like the VFE switching board so it's wider but more narrow. The Softie3 has only one bottom mounted component: the Relay.

NOTE: For Softie3 you need to use low profile electrolytic 10uF caps. These are in the Mouser cart linked on the BOM page. smallbear also has them.

Whereas the Softie1 and 2 are meant to be applicable to all DIY builds, the Softie3 is designed with mbp projects in mind and the I/O pads line up exactly with mbp PCBs.

When ordering a Softie, you can choose which version you want. All versions included a pre-programmed PIC for relay control and are the same exact circuit. **This code is proprietary to Function F(x) and cannot be distributed to mbp customers.**

Connections (Softie1 &2)

DCI, DCO: These are the power connections. <u>The Softie must be wired directly to the DC jack for lowest noise operation.</u> Do not wire it to the decoupled power on your circuit. DCI goes to the DC jack. DCO is a pass through for convenience and can be connected to the power on your circuit. Note on the Softie2 these are labeled DC1 and DC2 because consistency is for accountants and not musicians.

J1/J2: Input and Output jacks, resp.

IN/OUT: Effect input and output, resp.

GND: Ground. If you are using the DCO (DC2) to pass through power to your circuit you do not need to connect the GND pad: it's redundant.

LED: These pads are used to connect your bypass LED. On the Softie1, it can be soldered directly to the PCB, if you like. On the Softie2, the LED must be wired.
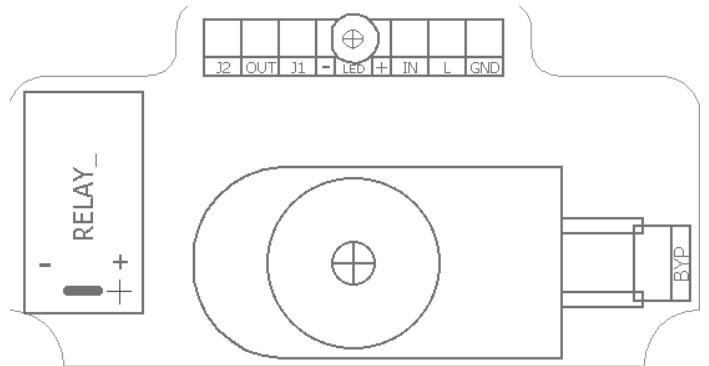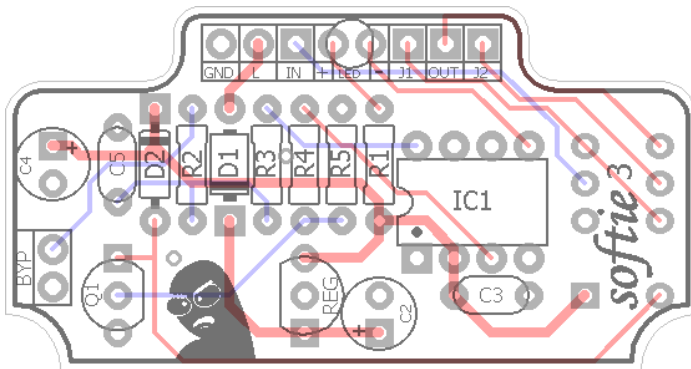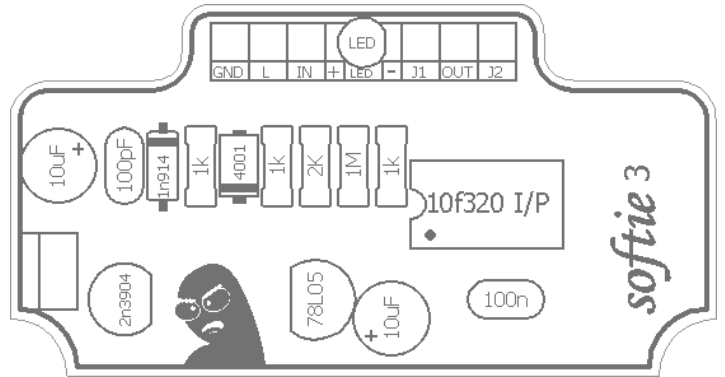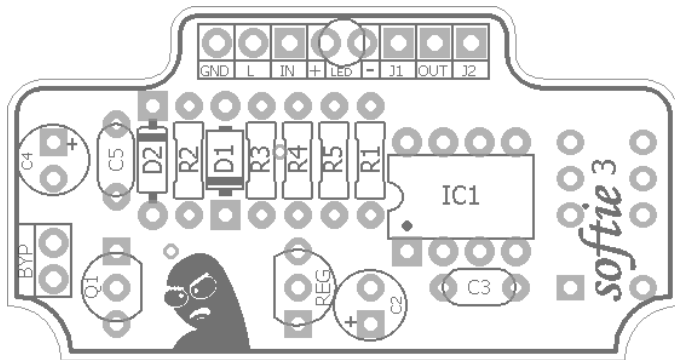
BYP: The two pads are wired to your momentary switch. They can be wired to either of the lugs as there is no preference.
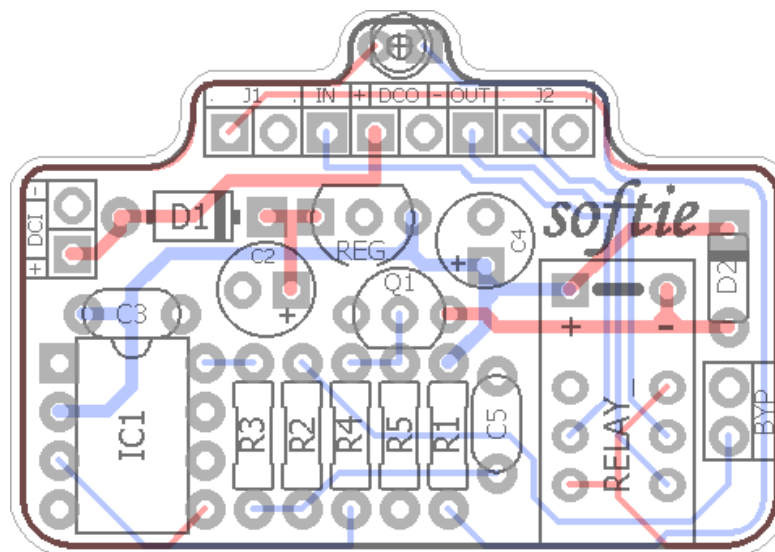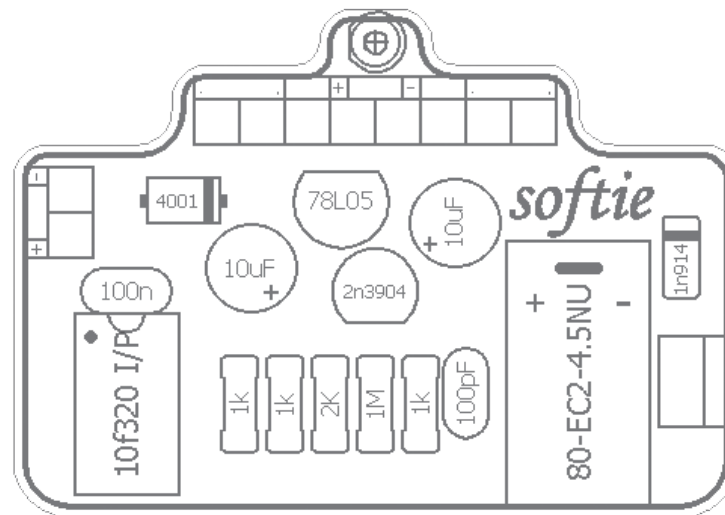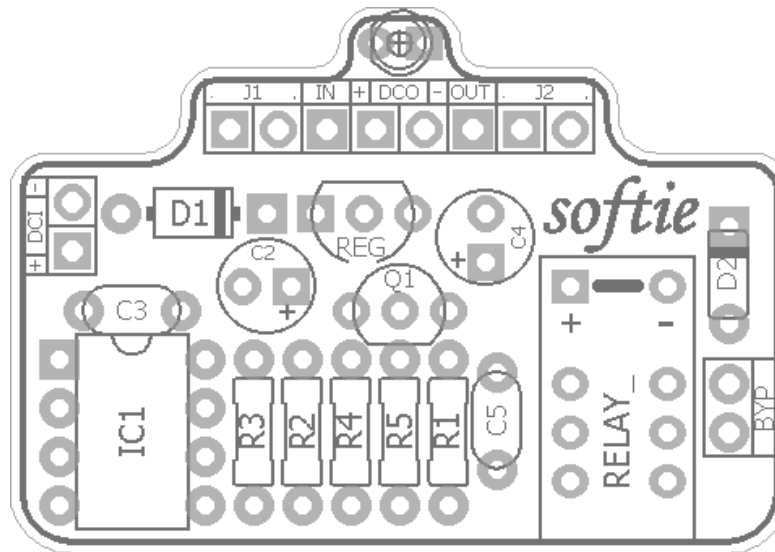
All parts are soldered to the top of the Softie1 PCB.
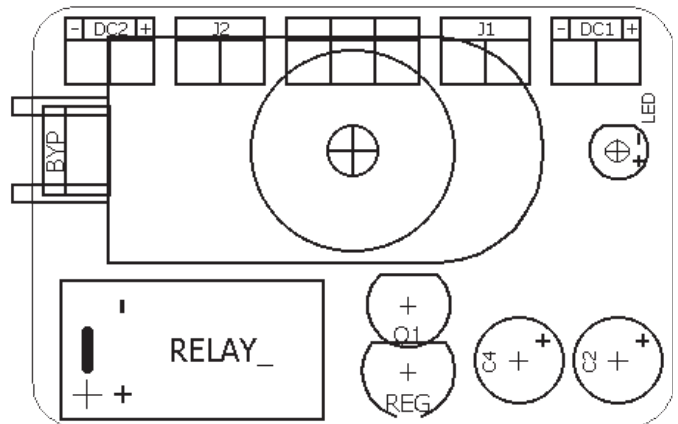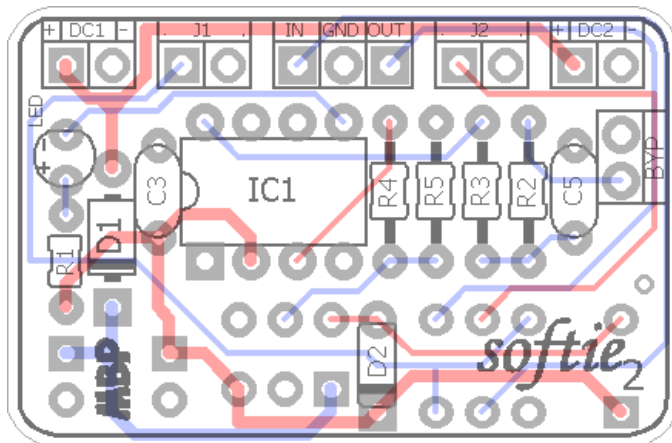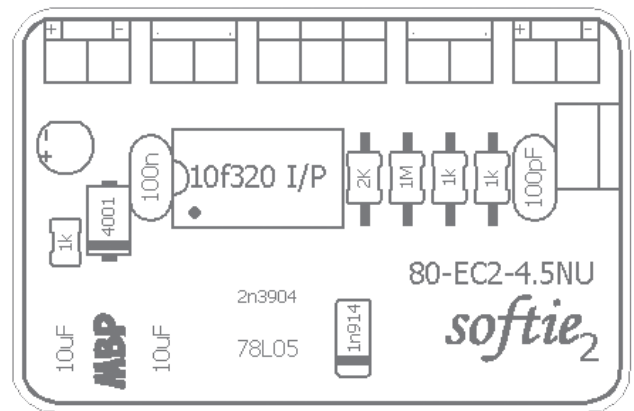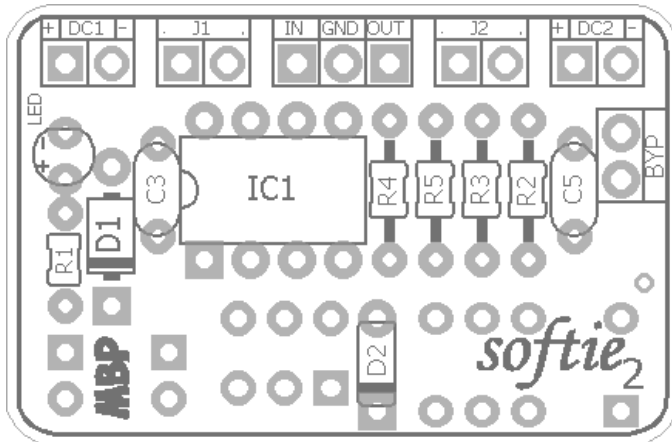
On the Softie2, the Relay, Q1, REG, C2 and C4 are soldered to the bottom of the PCB.

On the Softie3 only the Relay is soldered on the bottom of the PCB.

Value	QTY	Type	Rating
1k	3	Metal Film	1/8W
2K	1	Metal Film	1/8W
1M	1	Metal Film	1/8W
100pF	1	MLCC	50v
100n	1	MLCC	50v
10uF	2	Electrolytic	25v
1n914	1		
1N4001	1		
2N3904	1		
LM78L05	1		
Relay	1	80-EC2-4.5NU	
PIC	1	10f320-I/P	
Switch	1	Momentary NO	

If you purchased the kit version of the Softie, all the parts listed above are included. Note that an LED is not on that list so you will need to provide your own (this tends to be a more personal choice for builders).

If the kit is not available for purchase, I have created a Mouser cart for most of the items. It can be found here:

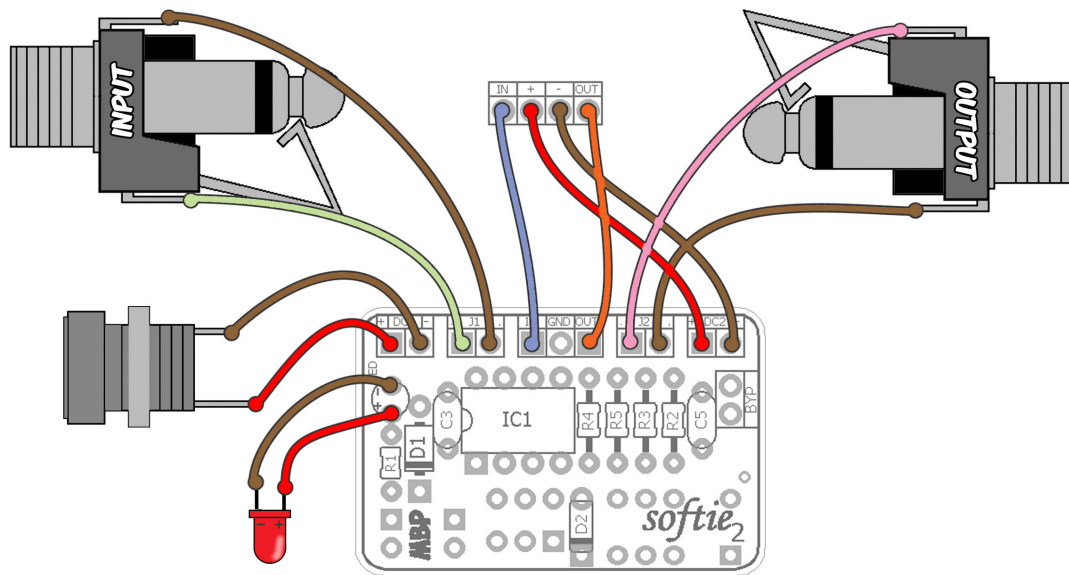https://www.mouser.com/ProjectManager/ProjectDetail.aspx?AccessID=afb99a169a

2021 Update: Mouser now has a MOQ of 200 for resistors, so you may want to get your resistors elsewhere.

The PIC is not included in the Mouser cart. It is pre-programmed and comes with every PCB purchase. The momentary switch is also not in the Mouser cart. The correct switch is a normally open SPST. You can find those here:

https://lovemyswitches.com/spst-momentary-foot-switch-normally-open-soft-touch/

http://smallbear-electronics.mybigcommerce.com/momentary-spst-no-soft-touch/

This is a typical setup for a lot of DIY projects. The PCB connections are for effect input and output as well as +, - (9v or whatever) power. The BYP pads are soldered directly to the SPST momentary switch.
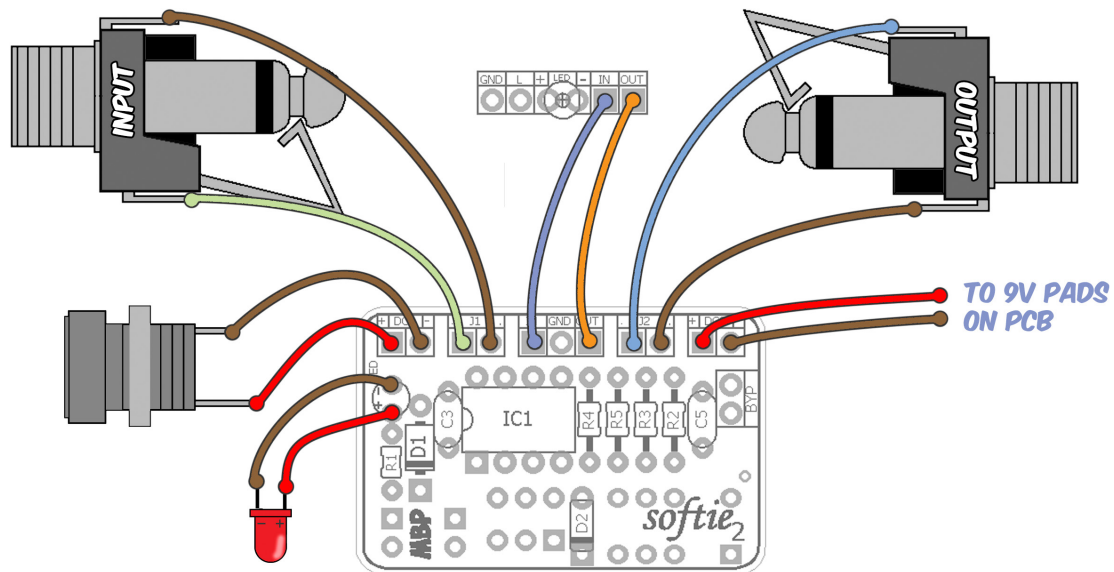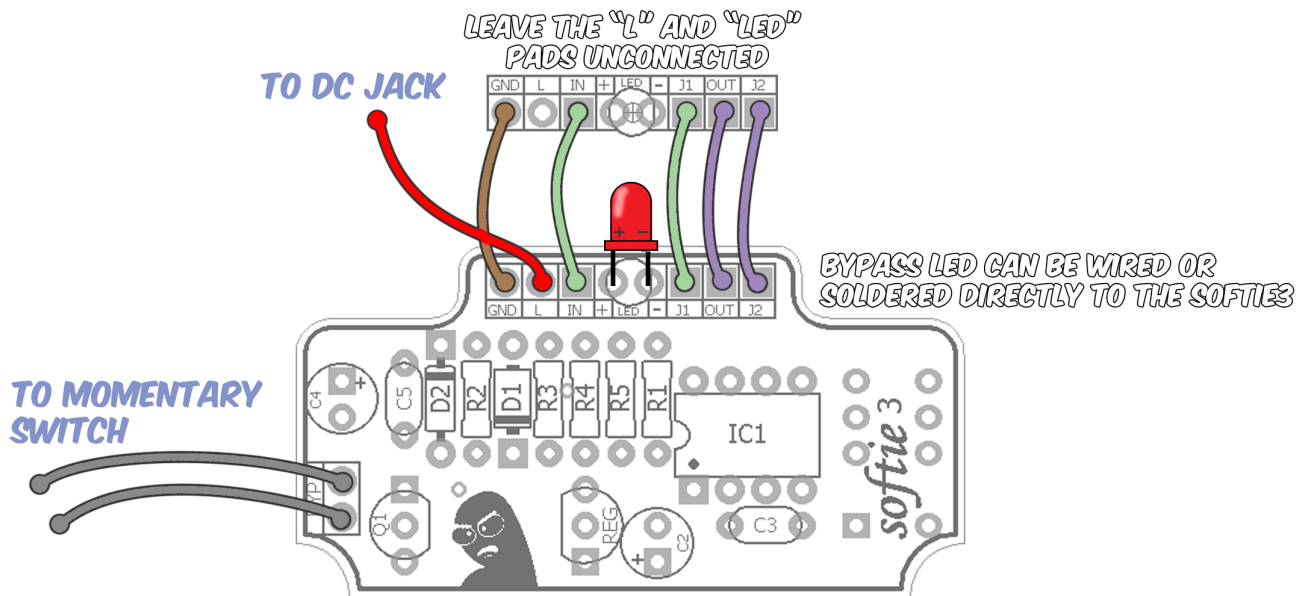
This setup shows a common I/O setup for mbp projects These are used most often in 1590B type builds, or any build that does not have connections for input and output jacks on the project PCB. The GND, L and LED pads on the project PCB are left unconnected.
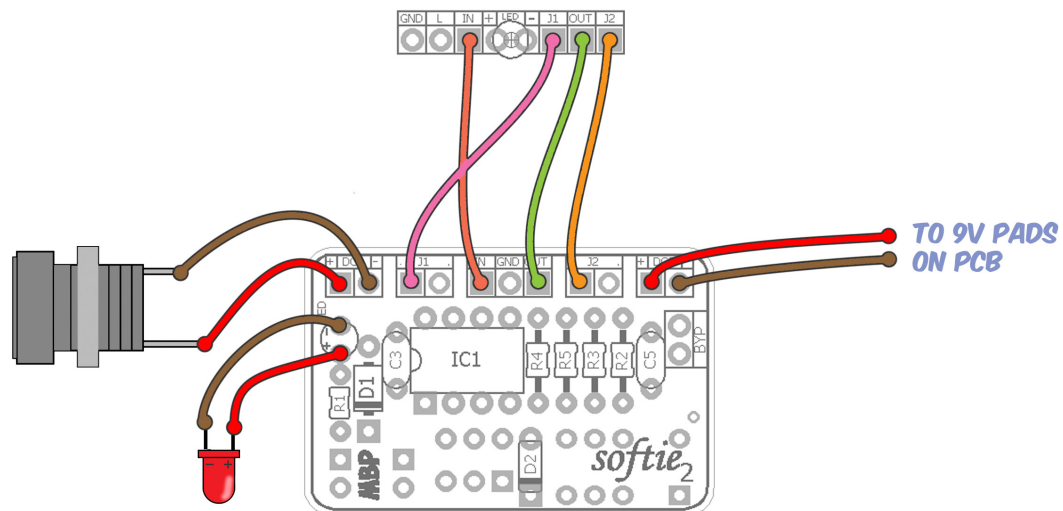
These connections are used in mbp projects that have input and output jack connections on the PCB. This doesn't show the jack connections themselves - only the necessary connections between the Softie and the project PCB. Again, the GND, L and LED pads are unconnected.

The Softie1 wiring is going to much the same thing as the three examples show. The wires will be in different places but they all connect the same way.

LEAVE THE "L" AND "LED" PADS UNCONNECTED

TO DC JACK

BYPASS LED CAN BE WIRED OR SOLDERED DIRECTLY TO THE SOFTIE3

TO MOMENTARY SWITCH

The Softie3 has more direct connections to mbp style projects. This diagram shows how it is wired to the typcial I/O connections found on most mbp boards. Again, the power should be connected from the Softie3 directly to your DC Jack. This ensures that the Softie3 power is isolated from the audio power.
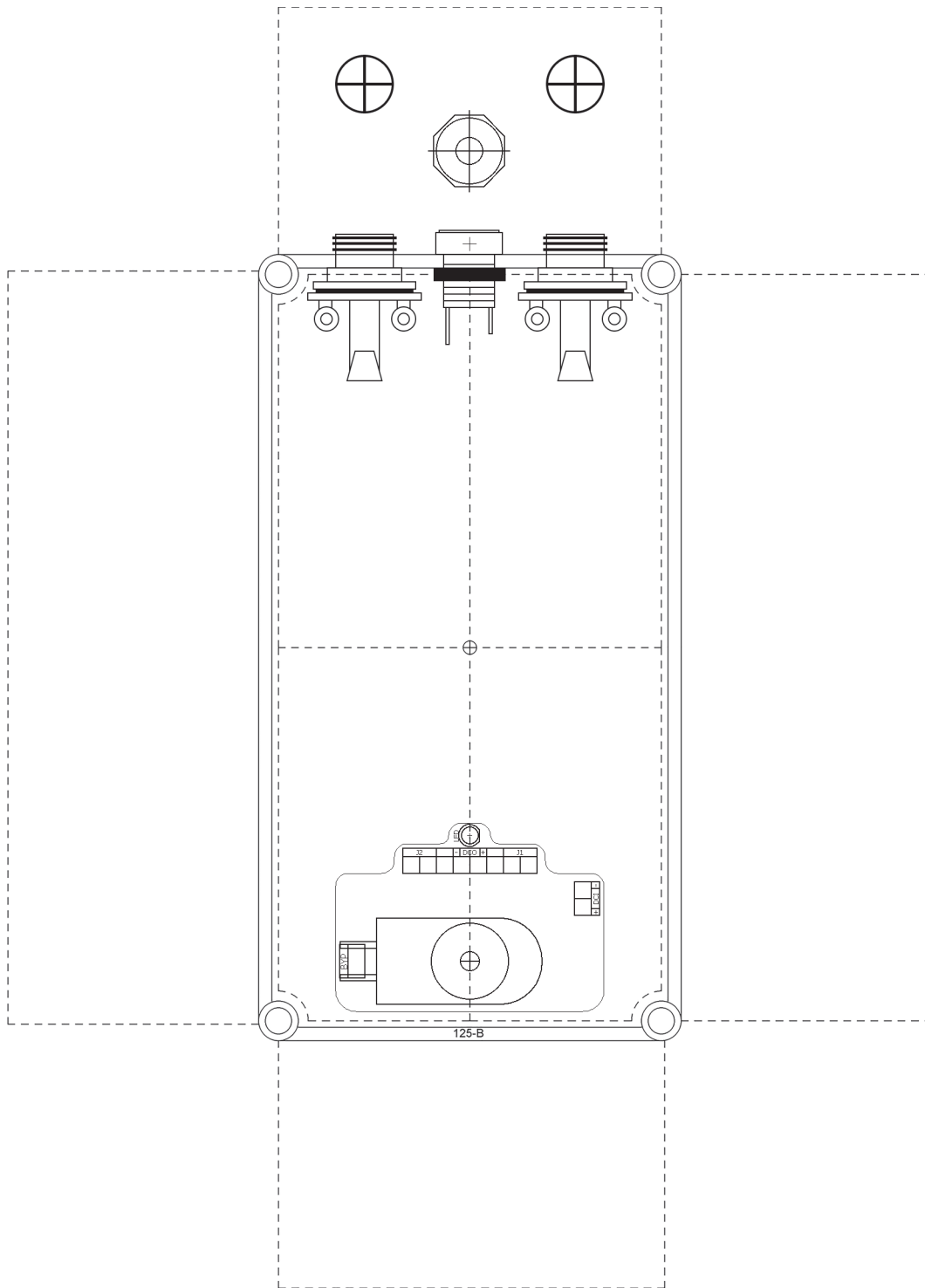
The Softie1 is 1.6"W x 1.125"H (accounting for the LED at the top of the PCB).
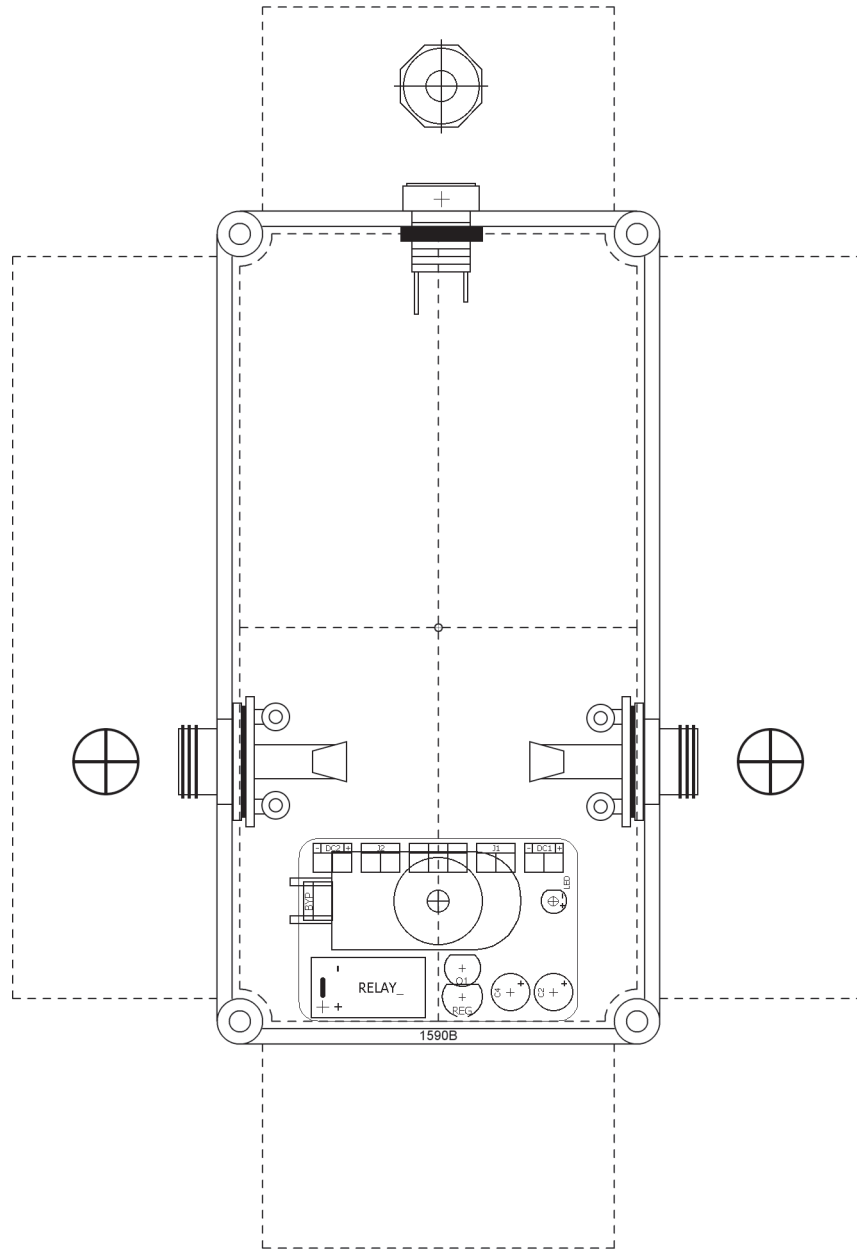
The Softie2 is 1.45"W x 0.95"H.
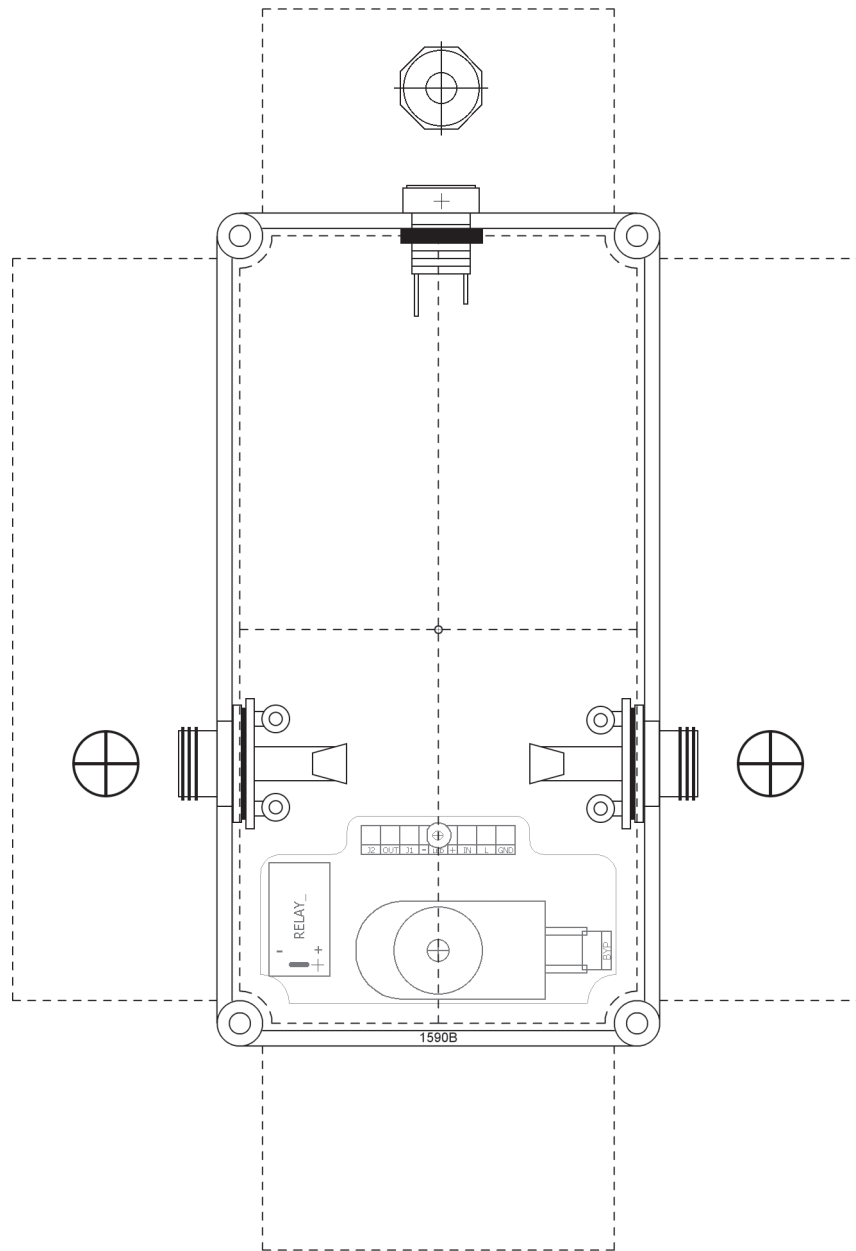
The Softie3 is 1.85"W x 0.975"H.
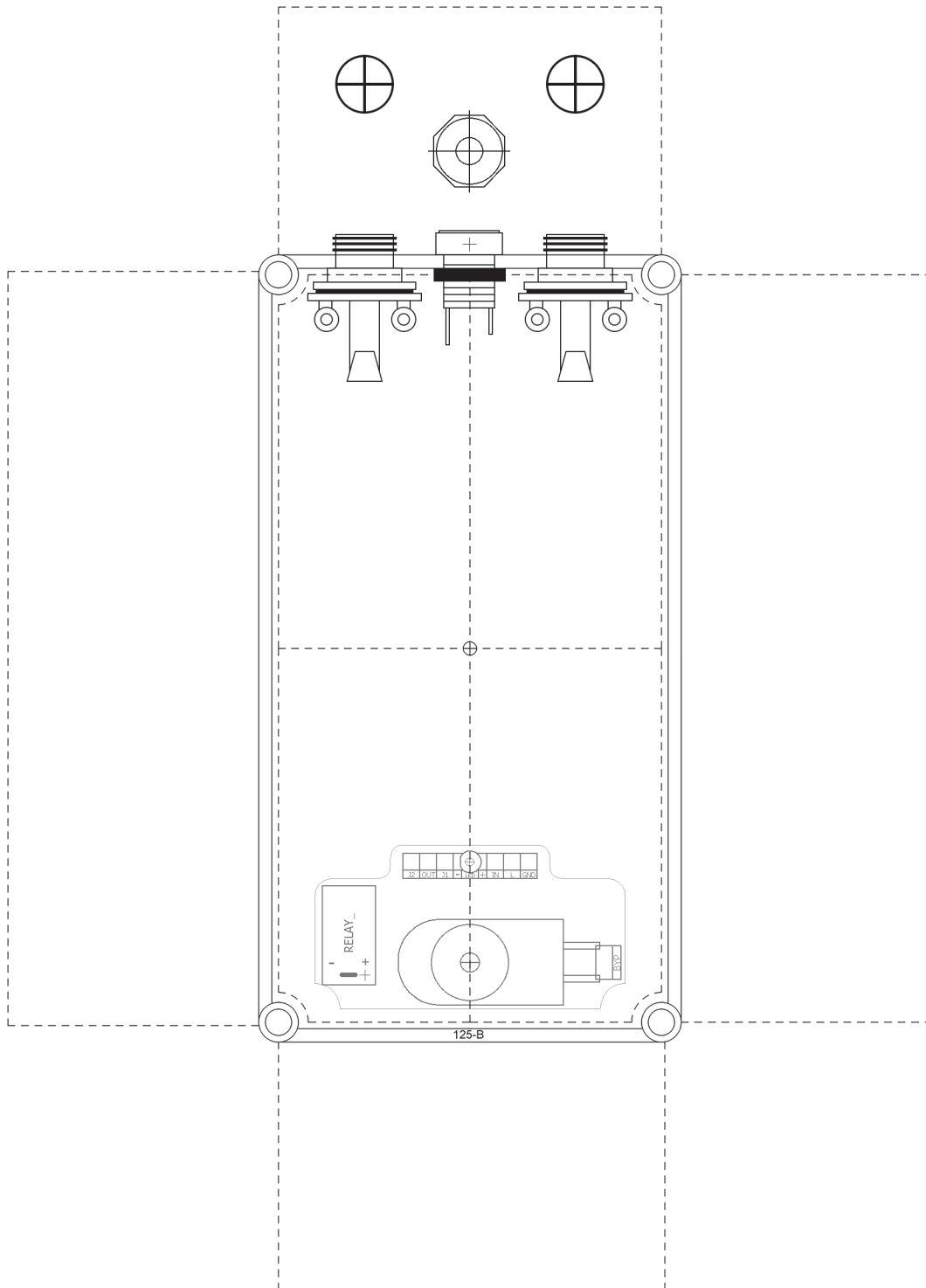
The Softie3 is 1.85"W x 0.975"H.

Effect Mode			Bypass Mode	
2n3904	**DC**		**2n3904**	**DC**
C	ignore		C	4.98
B	0.8		B	0
E	0		E	0
78L05	**DC**		**78L05**	**DC**
In	8.79		In	8.79
G	0		G	0
Out	4.98		Out	4.98
PIC	**DC**		**PIC**	**DC**
1	ignore		1	ignore
2	4.98		2	4.98
3	4.84		3	0
4	2.4mV		4	1.5mV
5	53mV		5	4.98
6	ignore		6	ignore
7	0		7	0
8	4.93		8	4.96

Current Draw

- About 6mA in bypass mode
- In Effect mode the total current draw will depend on what effect you are using it with but expect the Softie to add 30mA or more.
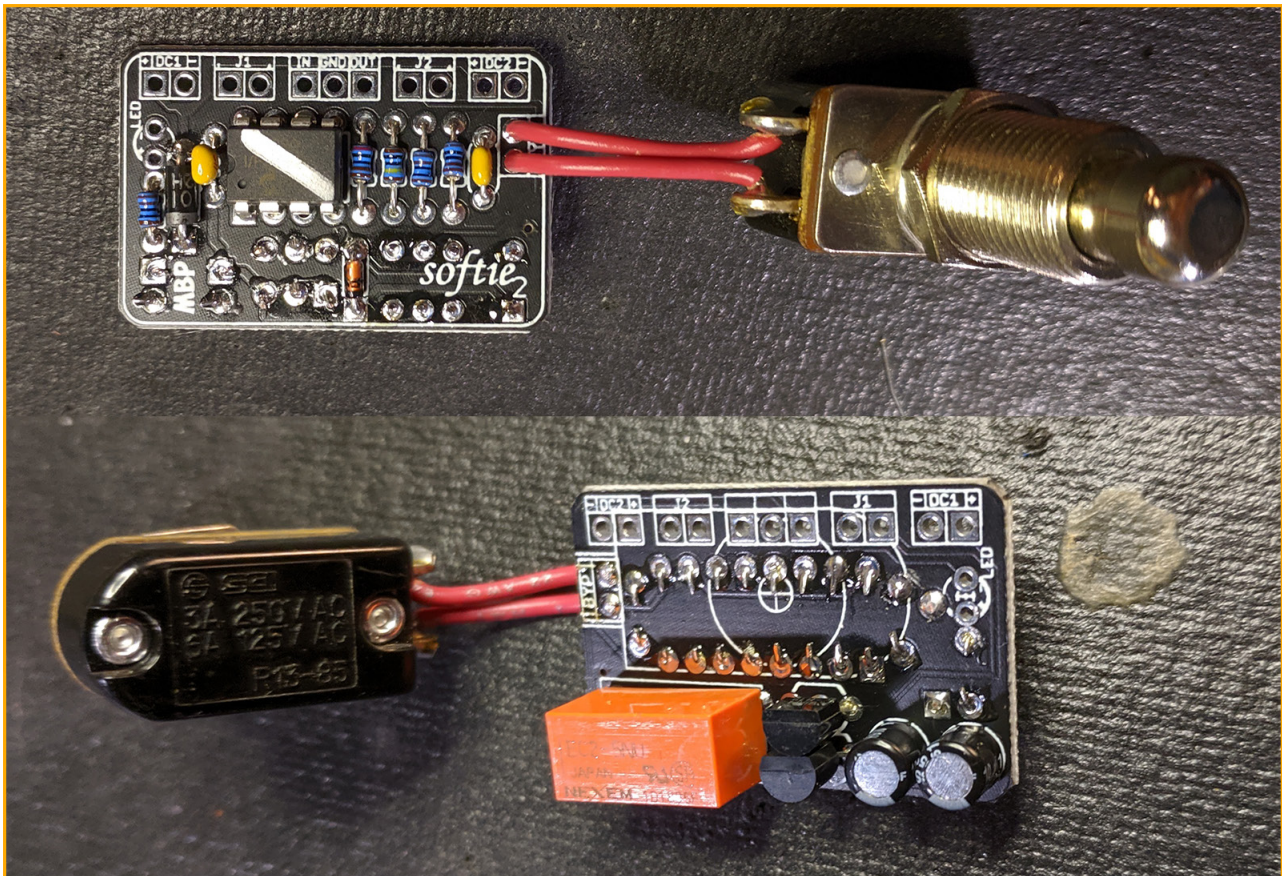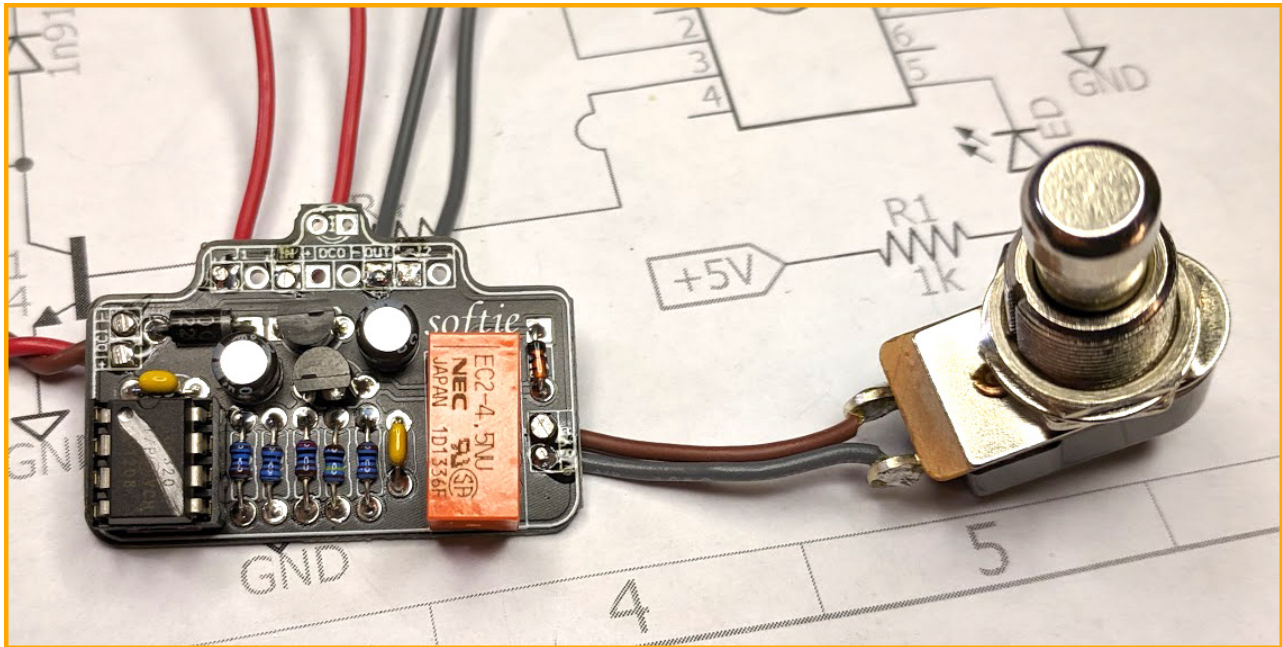
For either build, you can use some 3M double sided Foam tape to affix the PCB to the switch. You could also use regular double sided tape (maybe two layers). Alternatively, you could use solid core wire to solder the switch and PCB together to keep it locked down, but this can sometimes be a PITA. Just make sure your build works first!

Note the parts that are on the bottom of the Softie2: relay, the transistor and regulator, and two electrolytic caps. Also, do not use a socket for the PIC on the Softie2. It must be soldered directly to the PCB.
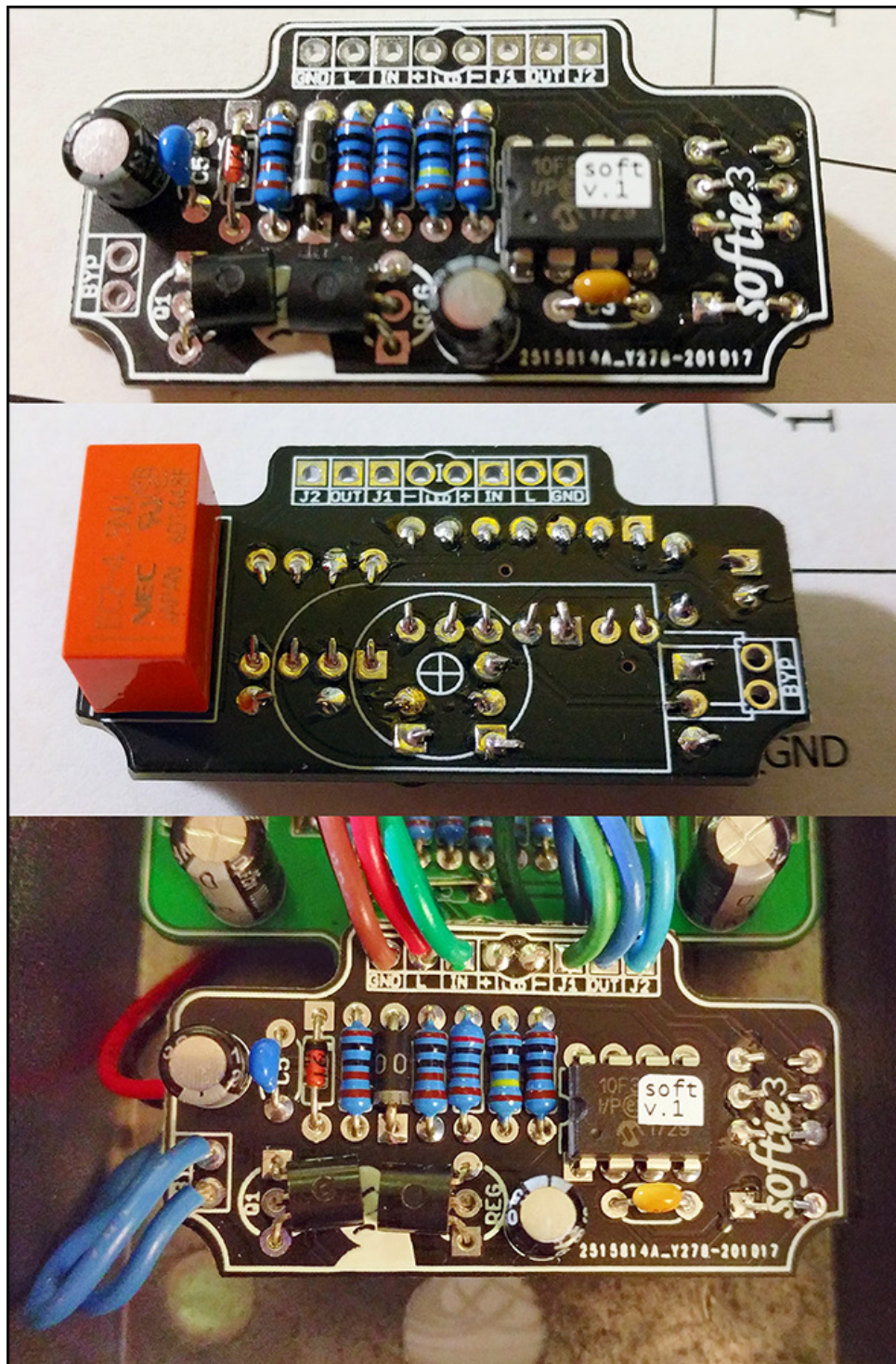
If you are using the Softie3 in a 1590B enclosure, fold the two transistors down a bit like I've done here. This gives proper clearance on the enclosure lid.

Softie(s)

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