Hifisonix

Improved Soft Start + DC Blocker

aka

iSSDCB

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September 2023

www.hifisonix.com

PCB's are available at www.hifisonix.com for this project

This project uses through hole leaded components only

Kindly see the safety disclaimer on page 2 – this PCB has live mains voltages present.

WARNING DISCLAIMER

This project is intended for experienced DIY constructors.

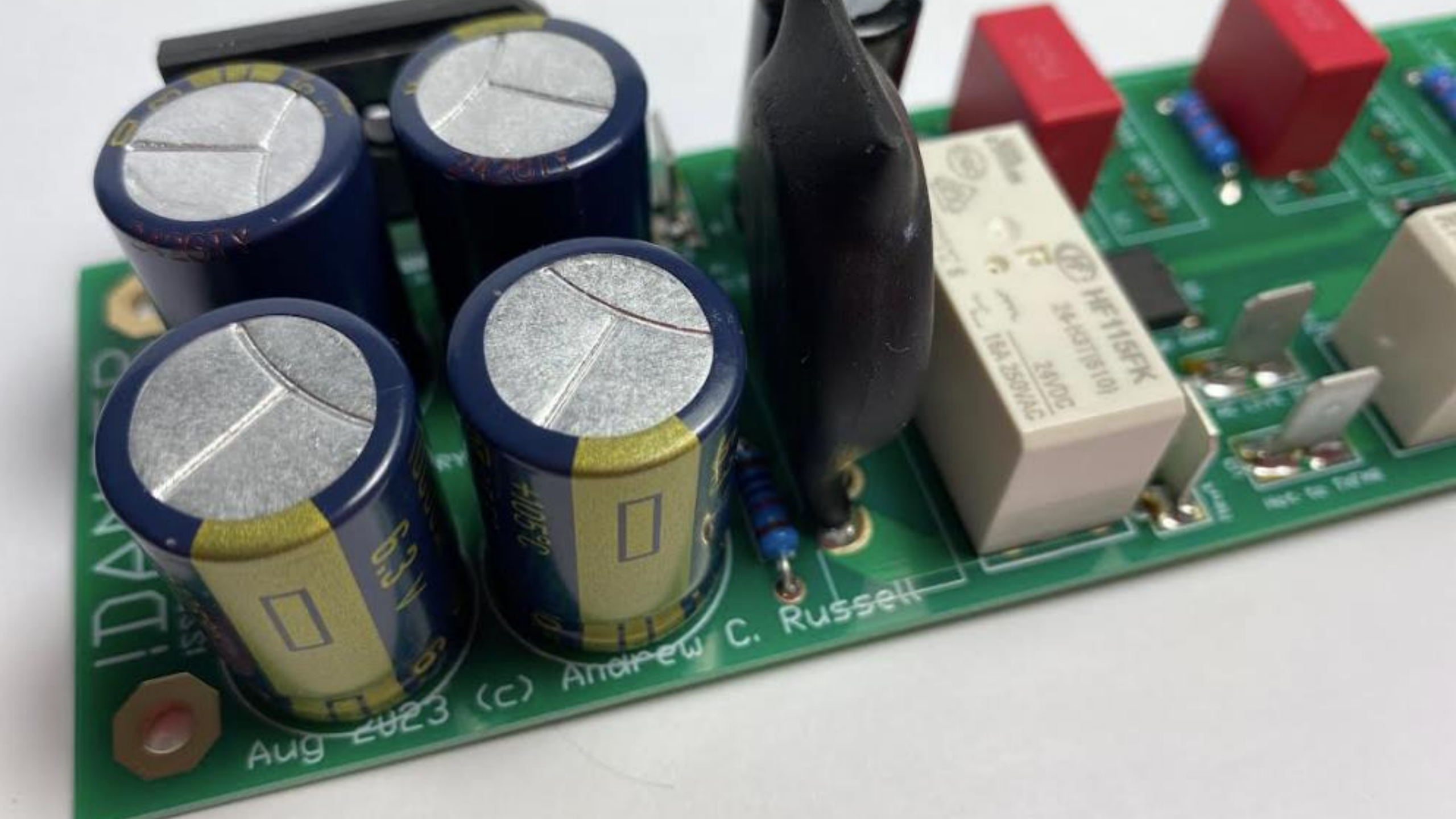
This project involves wiring up mains voltages.

Do NOT attempt this project unless you are completely aware of the dangers of mains voltages and fully understand mains voltage wiring safety practises and conventions.

A wiring mistake can be lethal. Do not take any risks.

Seek professional advice if you are not sure.

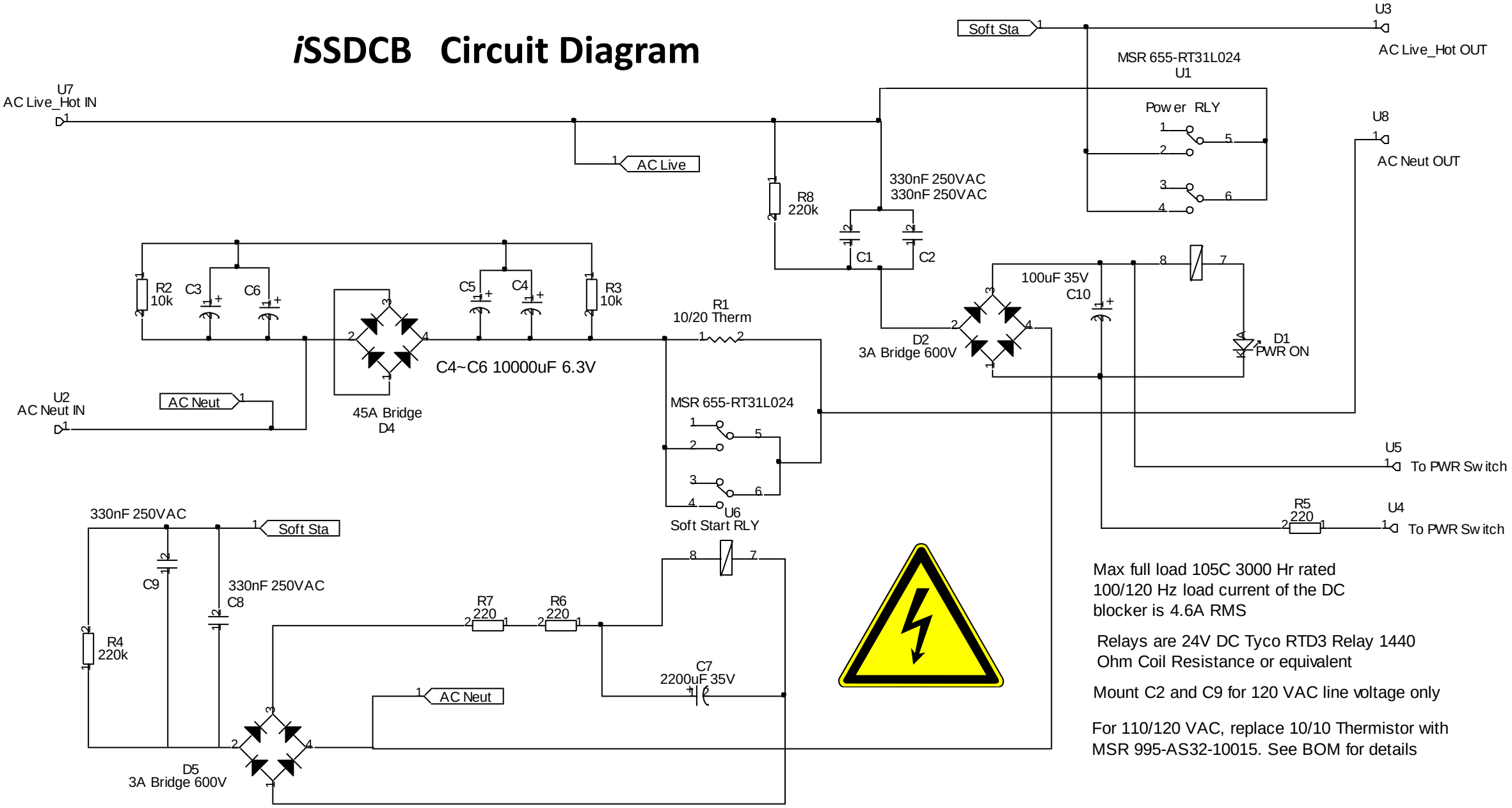
Always adhere strictly to the electrical regulations in your country.


Aug 2023 (c) Andrew C. Russell

*i*SSDCB - Notes

- ***Greatly simplified design and wiring*** - see slide 10
- The *iSSDCB* uses a low current mains voltage rated switch for ON/OFF power control, allowing a wide range of attractive vandal proof switches to be used
- Full AC mains load current draw of up to 4.6 Amps RMS (ie 2x the original SSDCB)
- In the OFF condition, the standby power of the *i*SSDCB is c. 0.2W
- The soft start function provides inrush current limiting of c. 10A for the specified Ametherm thermistors for 120VAC and 240 VAC
- The soft start inrush delay is c. 2-3 seconds
- Up to 1.5V DC arising from plus and minus mains cycle imbalance is blocked, removing transformer 'growling'.
- An on-board LED indicates when the *i*SSDCB is active with the thermistor bypassed and the mains power ON at the output
- Small compact PCB

*i*SSDCB Circuit Diagram



Max full load 105C 3000 Hr rated 100/120 Hz load current of the DC blocker is 4.6A RMS

Relays are 24V DC Tyco RTD3 Relay 1440 Ohm Coil Resistance or equivalent

Mount C2 and C9 for 120 VAC line voltage only

For 110/120 VAC, replace 10/10 Thermistor with MSR 995-AS32-10015. See BOM for details

*i*SSDCB - Notes

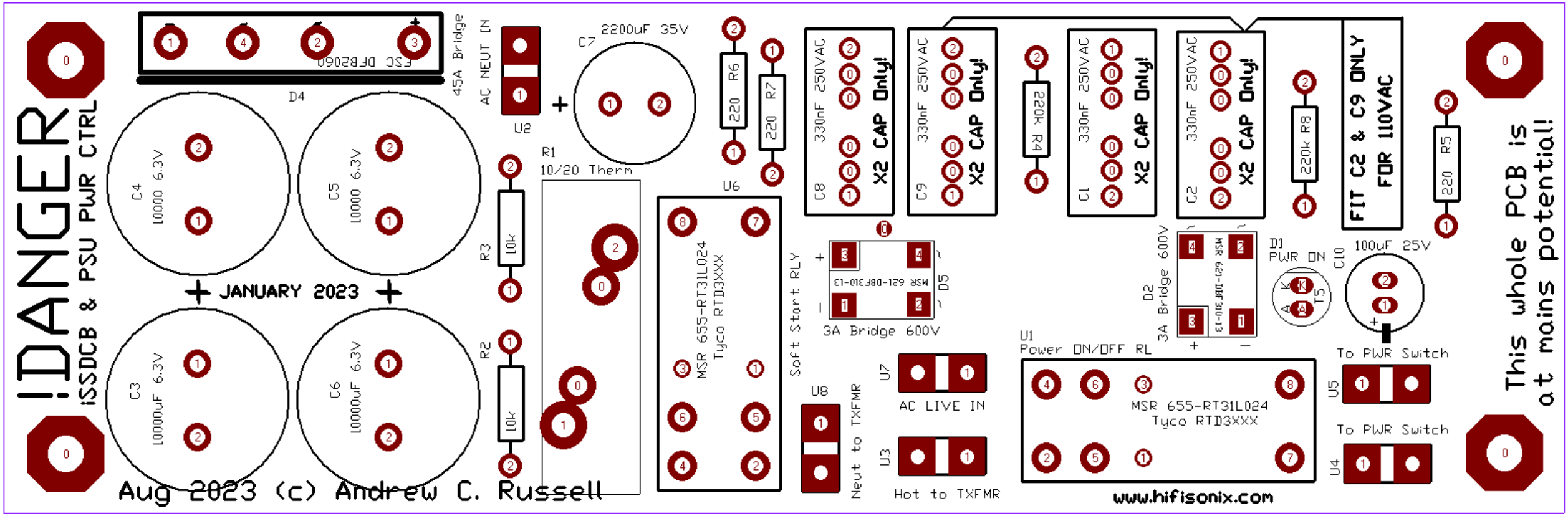
- The DC blocking bypass capacitors (Panasonic part # EEUFC0J103S) have a 105C 3000 hour rating of 2.3A (50/60 Hz). Since 2 are used in parallel, the total full load mains side rating is 4.6A
- For the mains power switch, any mains voltage rated switch with a DC switching rating of 30mA DC or better will work. A good example is RS part number 123-6086 (TE Connectivity AV1911E324Q04) or equivalent.
- Wire the *normally closed contacts* on the mains control switch to U4 and U5. When the switch is closed, the output will be OFF. When the switch contacts open, the output will be ON
- Derive the DC power for the switch indicator LED from the rectified and smoothed DC on the transformer secondary side – ie from the amplifier DC power supply
- The indicator LED is rated at 24V and on the model I used, the LED current draw was 20mA. Make sure you use a suitable dropper resistor in series with the indicator LED to keep the LED indicator current within ratings (this will be switch specific – so check carefully)
- For 120VAC operation, C2 and C9 must be fitted; do not fit them for 240VAC operation

*i*SSDCB – Safety Notes

- **The whole of the *i*SSDCB is at mains potential. Exercise extreme care when assembling, testing and using this board!**
- **The tops of *all* the electrolytic capacitors C3-C6, C10 and C7 are at mains potential. Cover with heat shrink or tape**
- **All connections to and from the *i*SSDCB must be made with insulated push on 6.3mm tab connectors**
- **Ensure the *i*SSDCB PCB is mounted at least 10mm off the housing using 10mm nylon hex standoffs**
- **Ensure that the amplifier housing is connected directly to safety earth (safety ground in the USA).**
- ***Never ever use the iSSDCB on unearthed equipment***

*i*SSDCB – Component Overlay

Caution! The whole PCB is at mains potential



Mounting hole centres are 148mm x 40mm and overall PCB size is 161 mm x 53 mm

How to Test the *i*SSDCB before Installation

1. Switch your DVM to Ohms mode and measure between U7 (AC Live_Hot In) and U2 (AC Neut IN), making sure it measures open circuit and there are no shorts
2. Switch your DVM to diode test mode and measure between U2 (AC Neut IN) and U8 (AC Neut OUT) terminals. The reading will start at a very low value and gradually ramp up to between 0.9 and 1.2 indicating 2 diode drops
3. Reverse the leads and repeat the measurement. The reading will initially start high and then ramp down through 0 and then back up to 0.9 to 1.2
4. Switch to Ohms mode, measure from U7 (AC Live_Hot In) to U3 (Hot to TXFMR) and confirm it is open circuit and there are no shorts
5. Measure from U3 (Hot to TXFMR) to U8 (Neut to TXFMR) and confirm it is open circuit and there are no shorts

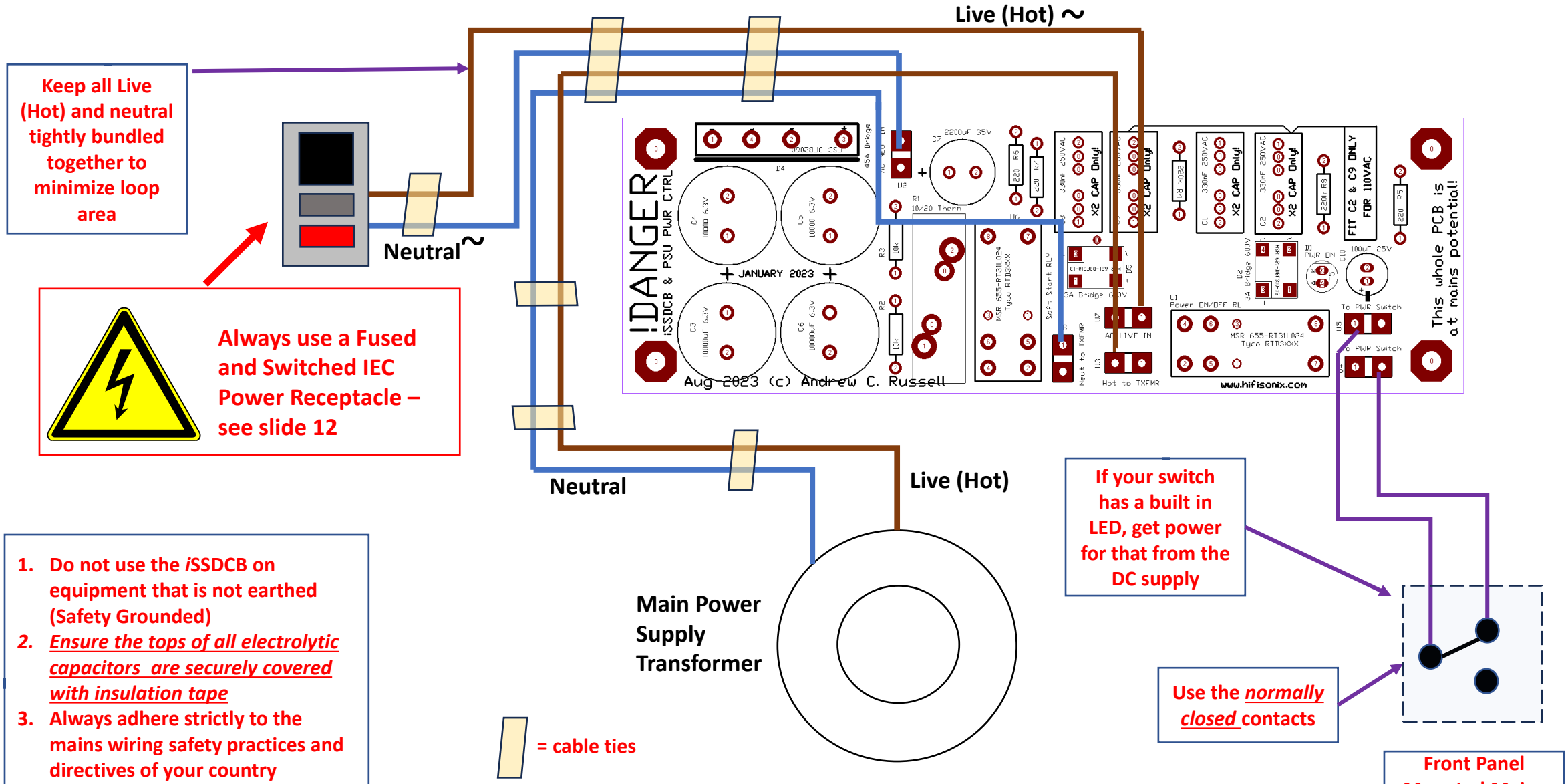
If all tests have passed, you can proceed to wire the *i*SSDCB into the mains primary side. Follow the safety guidelines on slide 6 carefully.

Important Notes

- Once your *i*SSDCB is wired in, make sure when you apply power, you can hear the bypass relay click in 2-3 seconds after you depress the ON/OFF switch.
- If you don’t hear it click in, it may mean that the thermistor is still in circuit, in which case it is likely to run warm to hot depending upon the load.
- In this case you will need to check your PCB assembly and then also check that with power applied to the board, you have 18-30V DC across the relay coil of U6

Exercise extreme caution! The PCB and components on it are all at mains potential!

How to wire up the *i*SSDCB



1. Do not use the *i*SSDCB on equipment that is not earthed (Safety Grounded)
2. ***Ensure the tops of all electrolytic capacitors are securely covered with insulation tape***
3. Always adhere strictly to the mains wiring safety practices and directives of your country

It is highly recommended that you use a fused, switched IEC receptacle (aka ‘kettle plug socket’) to bring power into your amplifier. Make sure the live (hot) is wired through the integrated switch and a solid earth connection is taken from the IEC receptacle earth to your amplifier chassis. A good example is the Bulgin receptacle on the right

Bulgin C14 Panel Mount IEC Connector Male, 10A, 250 V, Fuse Size 5 x 20mm

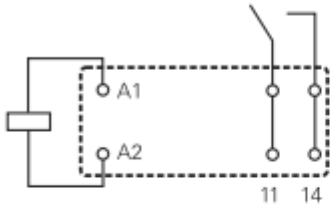
RS Stock No.: **352-1803** | Mfr. Part No.: **BVA01/Z0000/02** | Brand: Bulgin

Relay Detail – dimensions and pin-outs

Make sure the relays you use conform to these dimensions and layout

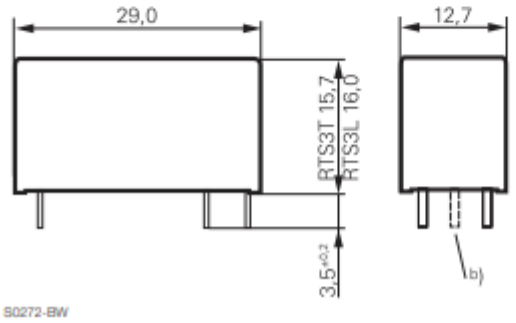
Terminal assignment
Bottom view on solder pins

monostable version

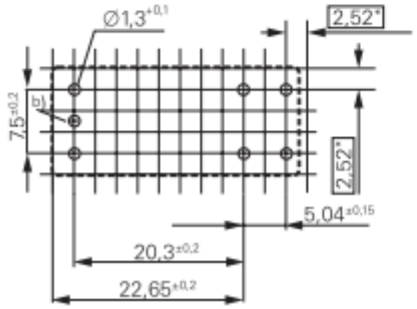


Dimensions / PCB layout

version without test tab

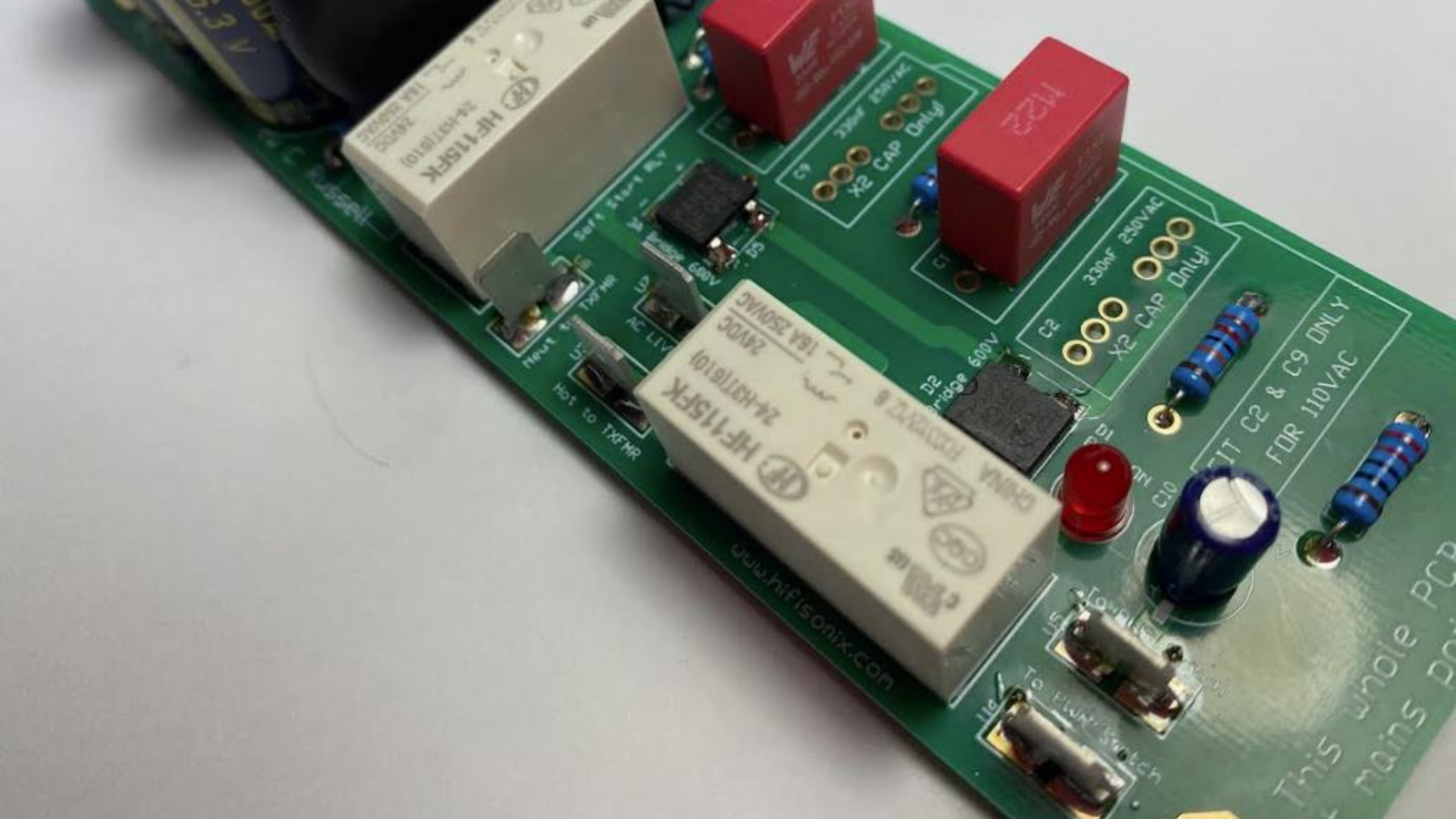


16A, pinning 5mm



Examples of Anti-Vandal Switches

Ensure the switch is latching and has change-over contacts – i.e. common, normally open and normally closed.
The whole switch must be rated for AC mains use in order to met the mains insulation regulations.
The switch contacts must have a DC current rating of 30mA – 50 mA preferable


HF115FK
24-H3T(610)
24VDC
16A 250VAC
CHINA
Soft Start RLY
Bridge 600V
D2
D5
C9
X2 CAP Only!
330nF 250VAC
C2
330nF 250VAC
X2 CAP Only!
FIT C2 & C9 ONLY
FOR 110VAC
C10
Hot to TXFMR
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