Mini Power supply 33v 5A script
By KRALYN

Greetings everyone. if you've been following my channel for a while, Then you might have noticed That I never have a proper lab bench power supply.
In the past, I've been using cheap dc-to-dc converters as a power supply. These converters Lacks any form of the current regulation. As a result, when doing prototyping, if there is a fault within the circuit, connecting it to power would likely destroy it.
I've been looking into buying a proper lab bench power supply, but they're usually expensive, very heavy and lacks features such as setting power limits and saving settings.

So in this video, I will show you how to make a mini-lab bench power supply, Which weighs just 650 grams, thus it is extremely easy to carry around.
And unlike other power supplies, this power supply also features direct DC input. Which you can connect to any DC source that is less than 50 volts. This is great If you want to charge your phone or laptop in the field, Or to increase the maximum voltage and power of the power supply.

Without further Ado, let's get into the material list.

First of all, you'll need a case for your project. In my instance, I designed and printed a custom case for all the components. But if you do have a 3D printer, I also included a version of the case, which you can laser cut or hand-cut out of 1/8 in MDF or acrylic. An engineering drawing is also available. You could even make the case all of any random box you find as long as all the components can fit in it. But this is not recommended. As for always, all the components, files links, and the script are in the description.

The core component of this power supply is the UC Tronics 50v 5A step down converter, which can accurately regulate voltage, current, and power.

And we are going to pair this step-down converter with a 110 volt AC to 36 volts 5 amp DC power supply.

The power to the cooling fan, we are going to be using the small voltage stop down converter.

The cooling is done through this 12 volt 80 by 10 mm fan.

Other additional components you are going to need will be a 3-pin AC power cord.

2 of these 3 position rocking switches.

Now for the connectors for input and output. The first connector you'll need is the female banana post connector.
Not only they can fit banana plugs, but they can also be screw terminals for easy connection of wires. These are the only connectors you'll need, the rest are optional.

The other connectors are two 5 mm DC female Jacks, A female USB connector, and two XT60 female connectors.

You will also need wires that are at least 20 gauges

If you plan on using a screw terminal for DC input, then you will also need a 5A Schottky diode so you don’t fry the power supply due to reverse polarity.

Optionally, you can use two 3mm LEDs as indicators, and four rubber feet for stabilization.

To put the 3D printed version of this powerbank together, we are going to use m3 flathead screws.

And this is the overall electrical schematic, it is quite a simple schematic, just make sure you don’t mix up the input side from the output side.

The first step is to prepare the AC cable. If you strip the end of it, there should be three wires. In the USA, the black is Live AKA the one you should not touch. The white is neutral, and green is ground. Please refer to your countrie’s wire color codes as connecting them wronly can destory the circuit and pose a risk of electricution.

Before hooking the wires in premantly into the power supply, we need to first make sure that circuit works correcly. This is done by hooking up the live and neutral to the screw terminal; polarity does not matter for now. And checking if there is voltage on the output. During this process, do not touch the circuit until the power is disconnected and the LED turns completely off.

After testing the circuit, we can move on to making the case. First, get the two 90 degree cable guard, and press in an 8 by 3 mm magnet. The magnet is optional, as it helps the cable guard to stay in the closed position when the power supply is in use.

Secure both cable guards in place on each side with m3 by 8 screws.

If you put in the magnets, screw a m3 by 3 screw on to each side of the case. This way the magnets can snap into place.

Optinally, you can print a 3D print a mesh, and glue it to the inner sides of the case for an extra layer of safety, but in hinesignt, this is really not needed.

Next, Push the rocker switch onto the back of the case, I used a two pin switch as that is all that's needed. But you can also use a 3 pin rocking switch.

Next, push in the AC cord into the hole next to it.
Solder the live wire to the switch.

To make the power indicator LED, desolder the LED on the 36V supply and solder on a 3mm one with wire extentions.

Then, desolder the screw terminal on the AC side, keep the connector as we need it later for DC input.

Now get the 3D printed base and place on the AC to DC converter in this orietation, and secure it inplace with 3 screws. Do not put any screw on the hole marked the ground symbol.

Next get the mini step down converter, this is whats going to be used to power the fan.

The fan indicator LED is made by extending the onboard LED with wires.

To set the voltage, connect it to a voltage source larger than 13V and turn the potentiometer until the output voltage is 12V.

Then Secure the step down converter in place with two screws.

The next step is to configure the DC input side. For my power supply, I used the screw terminal, XT60 connector, and DC jack to keep as many input options as possible. But you choose to omit any of these connectors.

In any case, connect all of them in parallel, and dont forget to add a Schottkey diode facing into the postive input, so you don’t fry the power supply by reverse voltage.

Next, join the ground wire from the DC input into the power supply and the DC-DC step down converter. this way, the fan would be on no matter the power source.

Now it's time to configure the output side of the power supply, just add all the connector you want, and solder them all in parallel. Then glue them in place.

Before adding the lid, solder a switch to the output of the DC DC power supply. This is done so that the fan can be turned off. You can omit the switch if you want the fan to stay on all the time.

Now get the lid and push in a three position rocking switch. And solder the positive output from the DC side to the top terminal of the switch.
Next, screw in a wire into the positive output of the AC to DC converter and solder the other side to the bottom terminal of the switch.

For the middle terminal, Join a wire with the input of the step down converter and solder it to that.

The next step is to screw in the banana terminals, and mount the fan to the top of the lid. Then solder its wires to the output of the step down converter.

To configure the AC side, solder the Live wire to the switch and solder the output of the switch to the board.
Connect the neutral wire straight to the board.
And Finally, connect the ground wire to the screw hole that has the ground symbol next to it, and screw in the final screw to secure the board in place.

Before putting the lid on, glue the DC jack and switch in their respective hole.
And finally, take the input wires and output wires, and screw them into the step down converter.

Before securing the case together, plug the converter into the wall and test the power supply to make sure everything is working correctly.

It looks like everything is working, so now we can secure the case together with 8 m3 screws, and slide in the Step-Down converter.

For stability, you can take these rubber feet, and stick them on the four bottom corners.

And optionally, glue on the 3D printed labels, cable stabilizer, and cable lock.

Finally, I added rings and brackets for aesthetics.

And with that, the power supply is complete.

Just unwrap the cable, and plug it into the wall. Through the menus, you can accurately set output voltage, current, and power.

This power supply can be used to prototype electronics, charge batteries and capacitors, and power various electronics.

And that is the conclusion of this project. If you enjoyed this project. Please Give this video a like and consider subscribing to my channel for more DIY projects like this. If you would like to support this channel, you may leave a tip on my Thingiverse account. Thank you all very much and thanks for watching.

Description:

This video will show you how to make a small yet functional lab bench power supply, with the added feature of being able to power it from any DC power source anywhere between 3 and 50V.

Warning: Working with 110V or 220V is extremely dangerous without proper knowledge. Please consult a professional if unsure. I am not responsible for injuries or damages caused by this power supply during build or use.

Documentation and script: Comming in 24hr

3D print, laser-cut, and engineering drawings: coming in 24hr

If you need a 3D printer, here is a really good one for only $220(Ender 3):
https://amzn.to/30QC9rj

Part links:
(Amazon Links are affiliate, they support the channel with NO EXTRA cost at your end)
AC-DC 36V 5A 180W Switching Power Supply:
Amazon: https://amzn.to/2Zhea7i
eBay:https://www.ebay.com/itm/High-Power-AC-DC-Converter-110V-220V-230V-to-36V-5A-180W-Switching-Power-Supply/123275121813
UC Tronics 50V 5A step down converter:
Amazon: https://amzn.to/323GRBI
eBay:https://www.ebay.com/itm/US-New-DP-50V5A-LCD-Step-down-Programmable-Power-Supply-Module/163479717491
Banana Plug female:
Amazon: https://amzn.to/2ZqJQCn
eBay:https://www.ebay.com/itm/10Pcs-Speaker-Terminal-Binding-Post-For-4mm-Banana-Plug-Socket-Female-Connector/142631918119
3 Pin On off On switch:
Amazon: https://amzn.to/324MQWR
eBayhttps://www.ebay.com/itm/5-pcs-SPDT-On-Off-On-Mini-Black-3-Pin-Rocker-Switch-AC-6A-250V-10A-125V-IJ/233252195805
5.5mm female DC jack:
Amazon: https://amzn.to/2ZvNWcs
eBay:https://www.ebay.com/itm/DC-In-Line-Plug-Socket-Jack-Connector-Male-Female-1-3-1-7-2-1-2-5mm/251223174617?hash=item3a7e116dd9:m:m6UVVk-aDKXi0xEVzW-ReoQ
80x10mm 12v Fan:
Amazon: https://amzn.to/2ZqKAYb
eBay:https://www.ebay.com/itm/12V-DC-80x10mm-Brushless-2-Pin-Cooling-Fan-LED-Heatsink-Marine-PC-CPU/193044009715?hash=item2cf251d2f3:g:GfAAAOSwU0hcVyha
Other parts are salvaged from old electronics.

Music used:

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endless summer by Del. https://soundcloud.com/del-sound