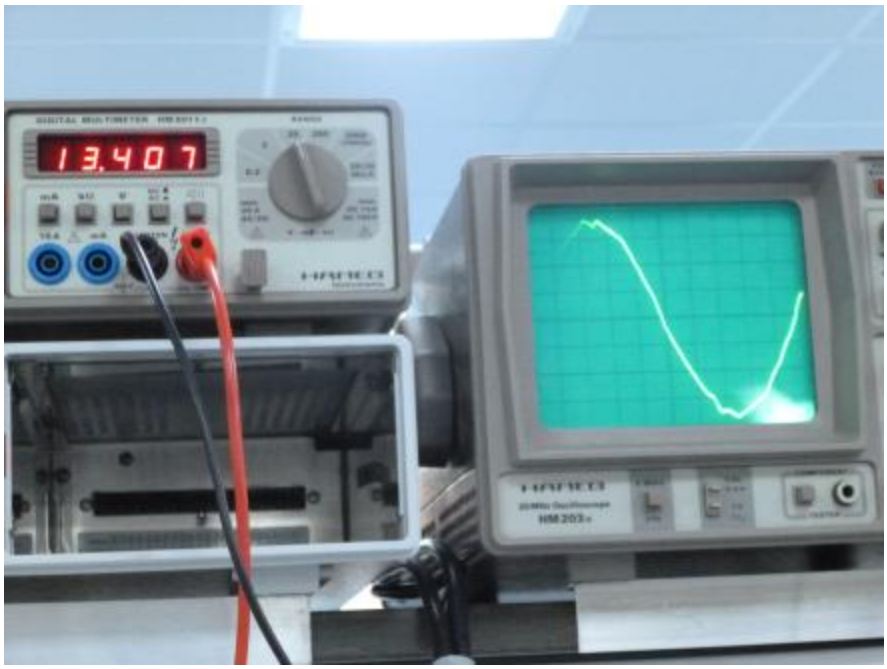
Prototyping Regulators

Following the mod of the cheap lamp, I had a 12v supply lying around. I figured a good use of it would be to make a supply board for my Raspberry Pi and other devices I may want to attach to it.



The supply actually outputs around 13.4 v or so which can be attributed to the tolerances of components used. Regardless of output being greater than 12v, I can still use it with the two different regulators I ordered from Rapid, the L7805cv 5v 1A TO-220 package regulator, and the LM723 adjustable voltage regulator in a 14-DIP package.

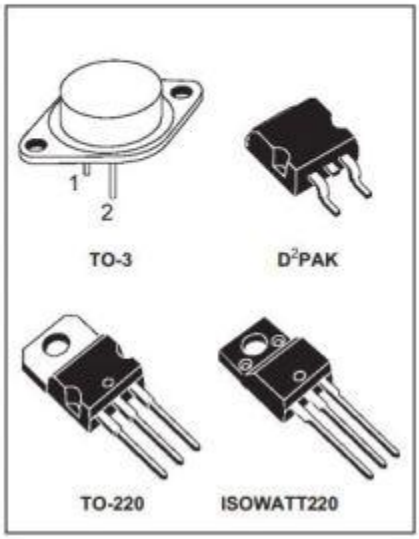
L7800 SERIES

POSITIVE VOLTAGE REGULATORS

- OUTPUT CURRENT UP TO 1.5 A
- OUTPUT VOLTAGES OF 5; 5.2; 6; 8; 8.5; 9; 12; 15; 18; 24V
- THERMAL OVERLOAD PROTECTION
- SHORT CIRCUIT PROTECTION
- OUTPUT TRANSITION SOA PROTECTION

DESCRIPTION

The L7800 series of three-terminal positive regulators is available in TO-220 ISOWATT220 TO-3 and D^2PAK packages and several fixed output voltages, making it useful in a wide range of applications. These regulators can provide local on-card regulation, eliminating the distribution problems associated with single point regulation. Each type employs internal current limiting, thermal shut-down and safe area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.



SGS-THOMSON MICROELECTRONICS

LM723

HIGH PRECISION VOLTAGE REGULATOR

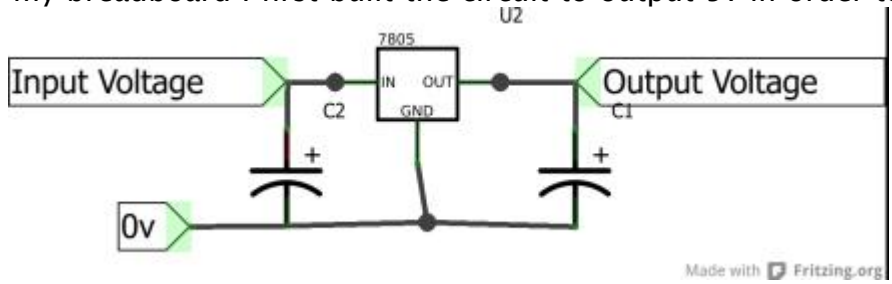
- INPUT VOLTAGE UP TO 40V
- OUTPUT VOLTAGE ADJUSTABLE FROM 2 TO 37V
- POSITIVE OR NEGATIVE SUPPLY OPERATION
- SERIES, SHUNT, SWITCHING OR FLOATING OPERATION
- OUTPUT CURRENT TO 150mA WITHOUT EXTERNAL PASS TRANSISTOR
- ADJUSTABLE CURRENT LIMITING

Both regulators have a maximum input voltage of 40v, so the 12v supply will be just fine. However the supply outputs an Alternating Current (AC) signal, this can be converted to Direct Current (DC), which is needed for most general electronics, by passing the supply through a device known as a Bridge Rectifier.

The Bridge Rectifier

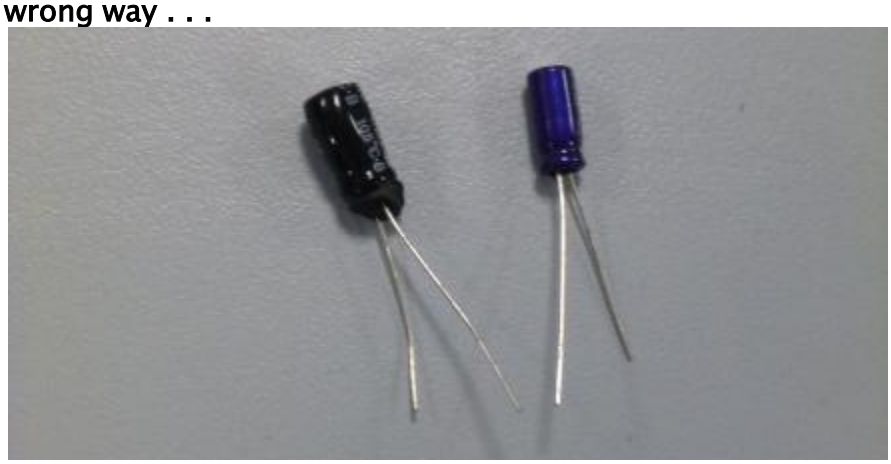
Moving On . . .

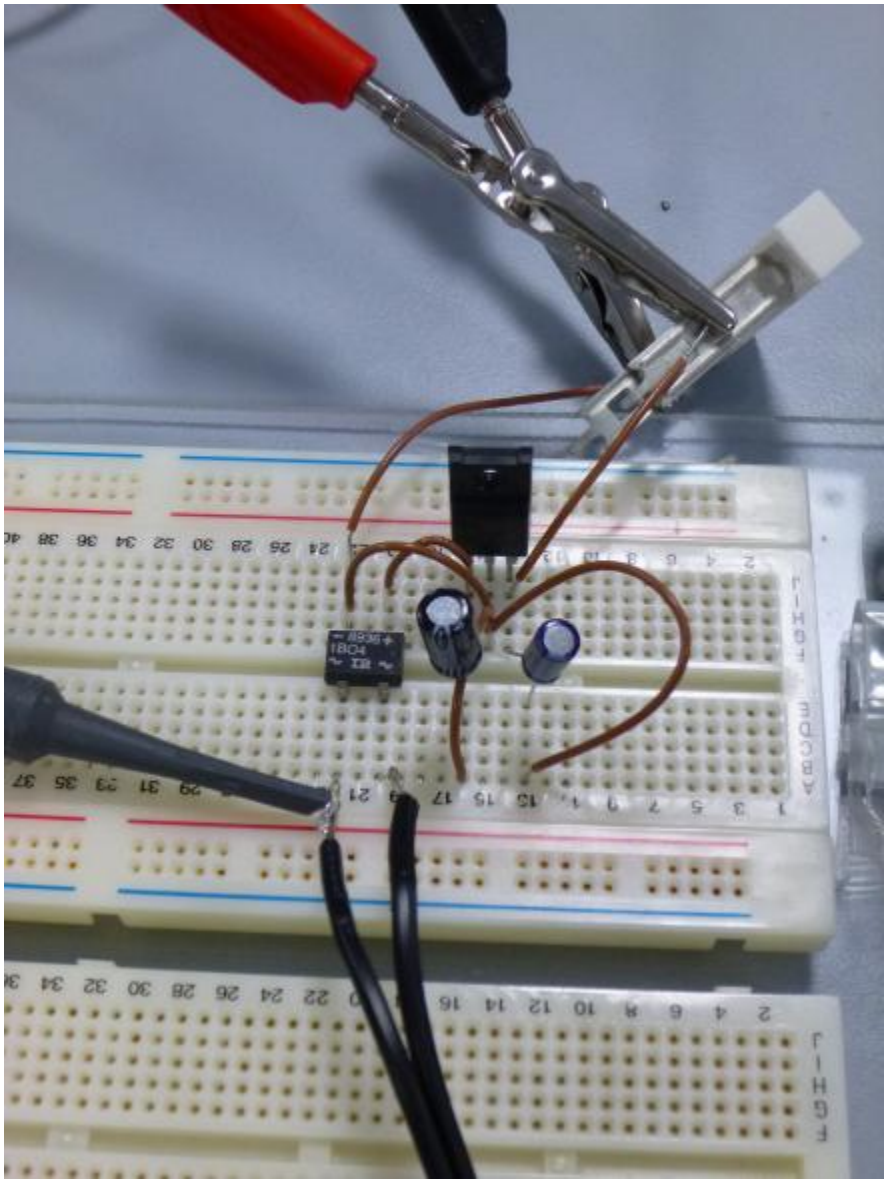
On my breadboard I first built the circuit to output 5v in order to power my Raspberry Pi.



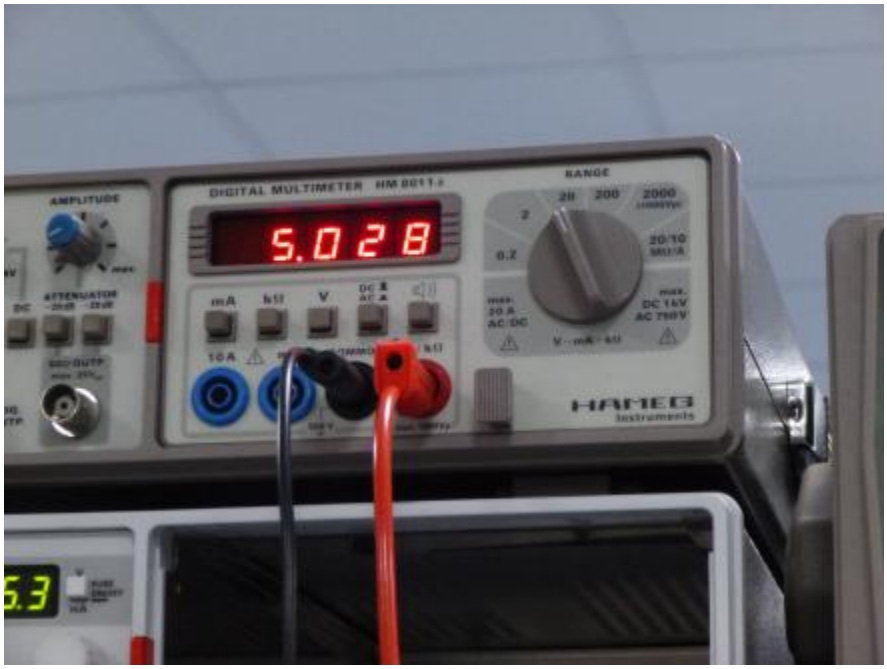
This is a standard circuit found in the datasheet however C2 has a value of 100µF and C1 is equal to 10µF.

Oopps . . . Please do remember to put the capacitors the right way round, first time I've ever done it, but it turns out these capacitors don't like 12v going in them the wrong way . . .

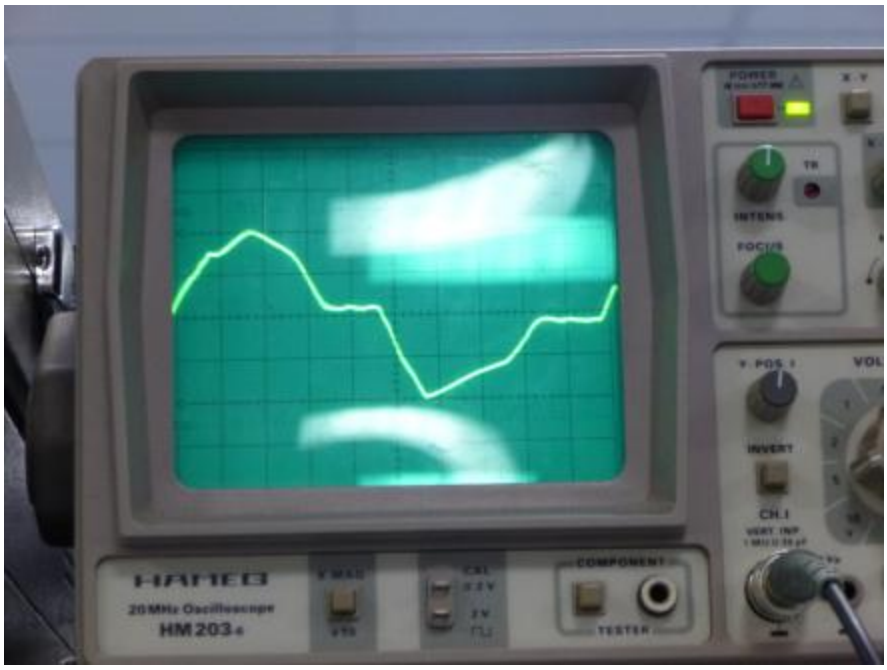




So after connecting the capacitors in the right polarity, and attaching a 7W 75Ω power resistor across the regulator's output to load it, I attached the voltmeter to measure the output.



Using the 100µF and 10µF combination proved successful and outputted a solid 5.028v, however the datasheet recommends values of 0.33µF and 0.1µF. If anyone understands the reasons for the different values please do comment below because I am very curious as to why they both work. Additionally I would be interested to know why the AC signal of the 12v supply distorts as seen below when the supply is under load.



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