

## Voltage Regulators

The voltage regulator is a 3 PIN component; looks like a transistor, which takes a higher input voltage and produces a lower, but stable output DC voltage. A stabilised DC voltage supply is essential for microcontroller circuitry to operate reliably.

For additional theory see the following link on [voltage regulation](#).

### Basic Voltage Regulator Configuration

Most voltage regulators require a capacitance on both the input and output pins. The value is dependent on the level of smoothing required.

The 7805 is a good and very readily available regulator, it is however not very efficient and requires a much higher input voltage for correct regulation it requires up to 2.5 Volts more than the output voltage. This may not be a problem when running off a desk power supply, but when on battery it's a problem as the regulator also consumes more current draining the battery faster.

For this reason, Low Dropout Regulators are better suited to applications where the system will run off battery. LDR refers to the voltage drop across the regulator required before you achieve your output regulated voltage. The lower the value, the better it is for the regulator.

Some examples are: []

**TIP:** When selecting your capacitor, make sure that the voltage rating is at least 1.5 X the input voltage. It makes for good fireworks if the capacitor is incorrectly rated, not so good for the project though.

### Configuring the ProtoDev Voltage Supply

The ProtoDev uses two voltage regulators one to provide 5VDC and the other to 3v3. These

two devices are operational concurrently and the user selects which voltage they require for the project by enabling the correct jumpers.

**TIP:** If using an F Type PIC 5vdc is a good voltage. If using a K, 3v3 or 5 and if a LF or J then 3v3 only.

### Setting the Jumpers

The jumper's headers a setup so that just by closing the right two pins you have the voltage you need.

The jumper header provides power to two areas 1) the PIC and other components, 2) to the prototyping area. These two areas can be supplied the same or different power supplies.

### Power Output

The 7805 is capable of providing up to 1 Amp, which gives you a potential 5 Watts. When drawing this much current from the regulator, heat will be generated which if it's left undissipated can over heat and burn out the regulator. If you notice smoke, it's probably already too late.

The best way to deal with this is to have a heat sink mounted to the regulator to help with the heat dissipation.

### Voltage Output Usage

The voltage output remains stable provided that the load on the output is not excessive. If it is, the output voltage may drop.

### Short Circuit

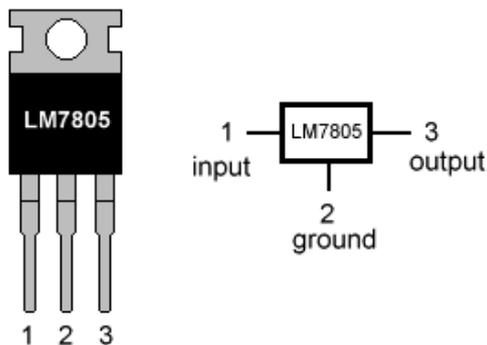
A short circuit takes place when the supply voltage is connected directly to ground with no significant resistance to create a voltage drop. This is not good for your circuit as at that point the maximum current is drawn causing the voltage regulator to overheat and burn out – unless you step in and stop it! Short circuiting is quite common and happens

inadvertently but if you keep an eye out you can usually spot the oops before too much damage is done.

### The 780X Series

Shown below is the 7805 which is one device in the 780X series. The PIN out is the same across the range making the device simple and effective to use.

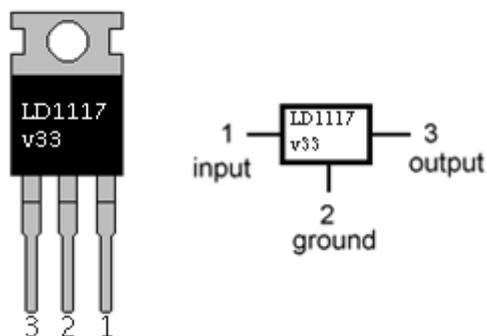
**LM7805 PINOUT DIAGRAM**



### LD1117xx Series

This series of regulator comes in similar packages to the LM7805, the TO220 package. The LM7805 is not pin compatible with the LD1117 Series. The use of this device enables 3v3 on the same PCB.

**LD1117v33 PIN Out Diagram**



### Power Configuration



The power configuration requires that 1 set of jumper pins be closed. Shown on the image below, closing the jumper shown will enable the PCB to run at 5 Vdc.

3v3 can be selected by moving the jumpers one down.

### Wall Mount AC to DC Power Supply

An inexpensive way to get power to your PCB is by using one of the wall mount type power supplies shown below.

The power device allows the user to select the required voltage. For use with the ProtoDev PCBs the best setting is 9 Volts or closest to that setting. Not all devices have the same voltage selection points, so select the one the best serves.



Ideally, a proper desk top power supply is worth investing some money in. They can be obtained from most electronic stores and suppliers.

[E]