

## Protecting your PWM-OC circuit against transient voltage spikes on the power supply rails

for rev. 0808 and earlier

Transients are caused by the inductance of the load or even the wiring between the power supply and the circuit. If it is not practical to keep these wires short, then there are some steps you can take to prevent transients on the power lines. Square wave pulses combined with some inductance can lead to high voltage spikes occurring each time the pulse switches off.

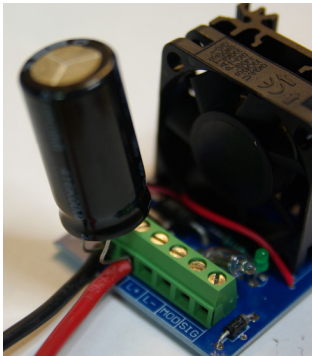
The output side of the PWM-OC range of circuits is fully protected against even large and repeated transients. Sometimes under some conditions you may find that transient voltages will appear on your power rails. This can damage the PWM-OC units in various ways

The input voltage for the V+ connector should not exceed 15V. Above this voltage the IC's may be damaged.

There are several methods that can help prevent spike from entering the V+ connector which are outlined below. You can use one or a combination of any of these methods.

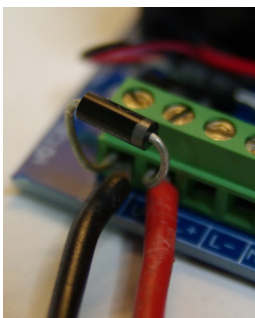
Many power supplies will have built in protection, but if you run the units from a battery, you should implement one or more of the following protection techniques.

### Smoothing Capacitor



Simply placing a large capacitor between V+ and GND right at the terminals on the circuit can dampen some smaller transients. The capacitance needed would depend on your loading conditions, with more capacitance being needed for higher currents. 1000uF would be typical for a PWM-OC10A

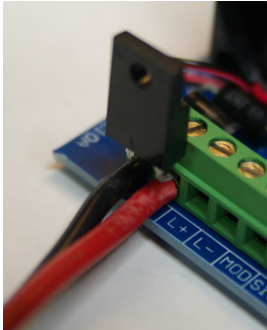
### Zener Diode



A zener diode is a type of diode which can be used to regulate a voltage. When a higher voltage is present, it will conduct more current to ground which dissipates the transient. The energy in the transient is converted into heat so it is necessary to use a suitable zener diode. The 1N5352B is ideal.

The diode should be placed in the reverse biased position between the V+ and GND connector as close as possible to the board. This means the end marked with the stripe (cathode) should connect to V+.

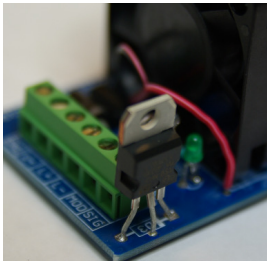
### Schottky Diode



This is a very fast acting diode that would serve to short out any transients with a reverse voltage. An FF30U60STU would be ideal.

The diode should be placed in the reverse biased position between the V+ and GND connector as close as possible to the board. This means the cathode should connect to V+

### Voltage regulator



A 12V voltage regulator such as the 7812 can be fitted to the PWM-OC boards. The regulator should replace the small diode in the corner of the PCB near to the terminal blocks.

The input pin of the regulator should connect to where the anode of the diode was, while the output pin goes to the cathode position.

Note that these regulators will not tolerate large transients so you should also fit a zener diode as described above.

If you prefer, we can preinstall any of these components for you. Just email us to let us know your requirements.