THE CURIOUS ELECTRIC CO.

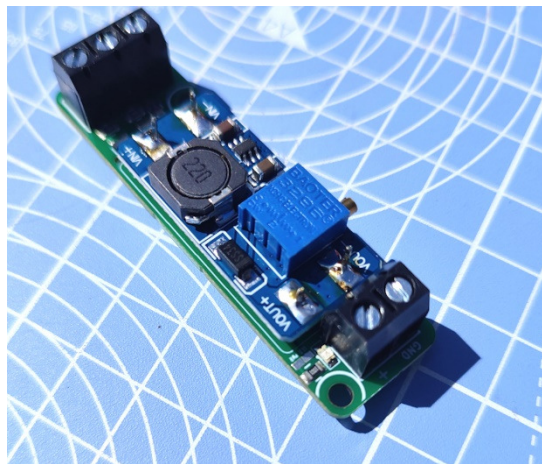# DC-DC Controller

Instructions

Date:	11/07/2023	Version:	1.0	By:	Matt Little

Have you needed to power a small sensor with 12 or 24V but only had 3.3V or 5V available?
Maybe you need to really reduce your power consumption and running the sensor all the time will consume too much power?
Then this simple logic-controller DC-DC step-up converter might be useful for you!

The step-up converter is an off-the-shelf DC-DC converter board using the MT3608. This can take an input voltage of 2-24V DC and supply an output voltage up to 28V DC. Up to 2A can be supplied (but not recommended for any length of time).
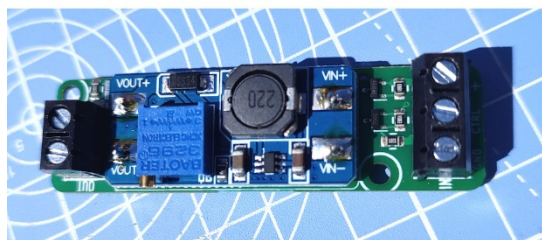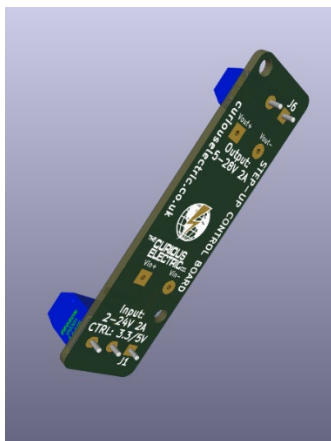
While this converter is useful, what if you only want to check your sensor every 10 mins or hour? Keeping the sensor powered up with a DC-DC converter will just waste energy, which might be in short supply from a battery-based system. So, we added a MOSFET based logic-controlled switch. You apply 3.3V - 5V to the control input and it will switch on the DC-DC converter. Your device can wake up, check your sensor, then go back to sleep and save lots of energy.

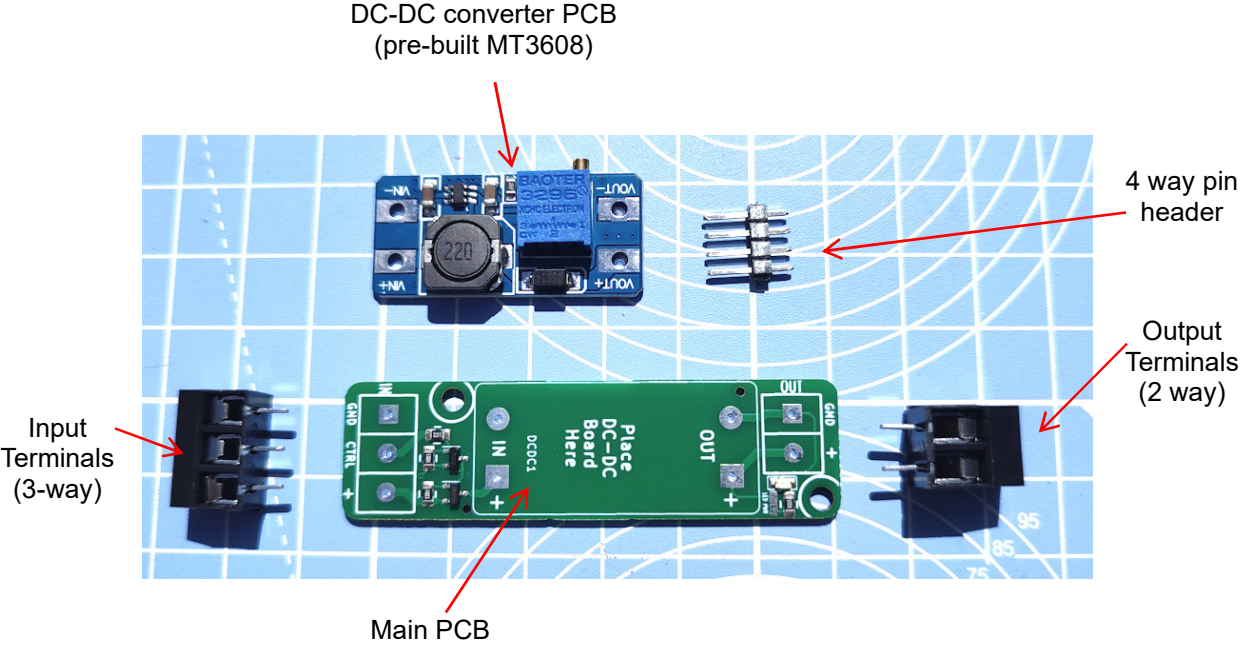We have used this circuit for a weather monitoring station.

This is a reasonably simple kit which requires a small amount of soldering.
It should take under 1 hour to build.
Not suitable for under 12 years old.

Parts included:

DC-DC converter PCB
(pre-built MT3608)

4 way pin
header

Output
Terminals
(2 way)

Input
Terminals
(3-way)

Main PCB

PCB Parts List:

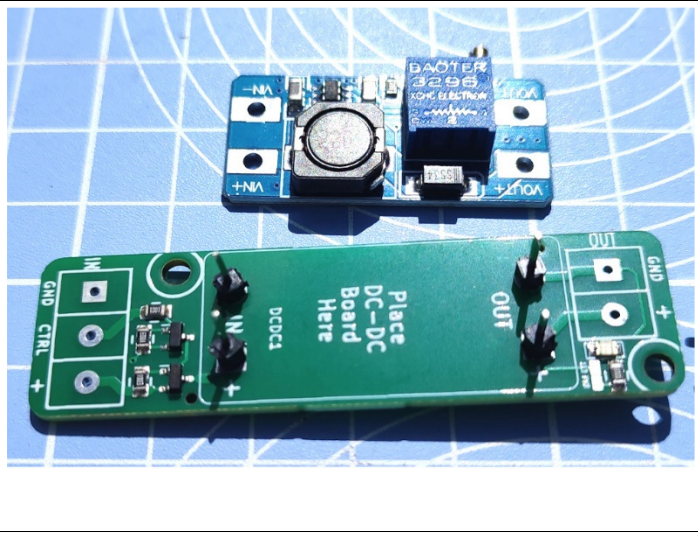| Ref	Item	Quantity
PCB	Main PCB with pre-assembled SMD	1
DCDC	DC-DC converter PCB pre-built MT3608	1
IN	3-way terminal block	1
OUT	2-way terminal block	1
PIN	4-way pin header	1

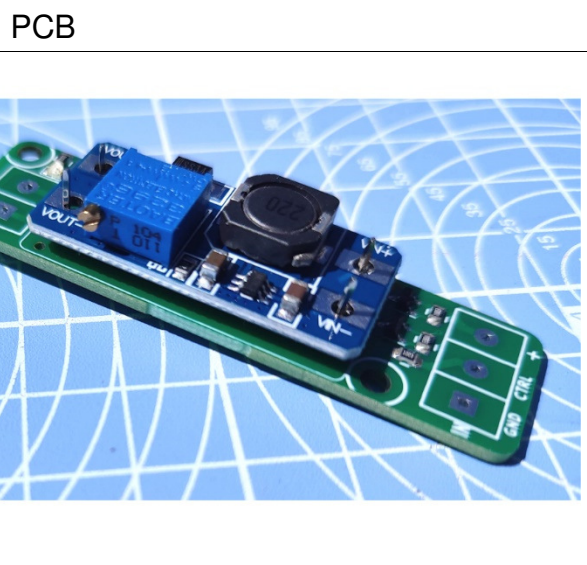## Tools required:

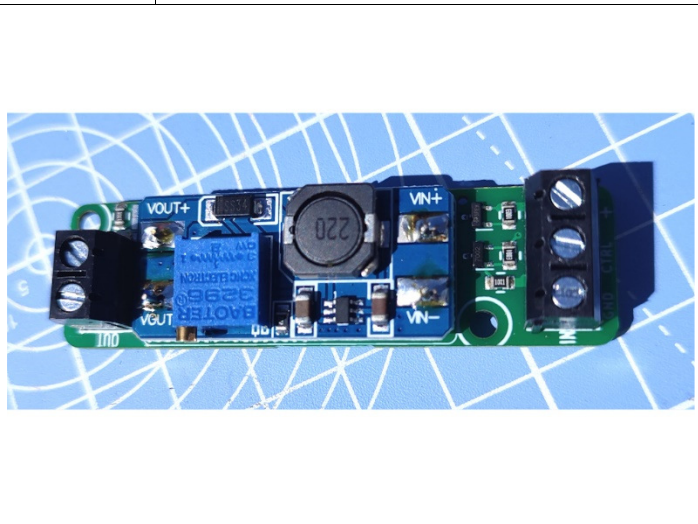Soldering Iron

Solder

Side cutters

Scissors
(not shown)

Long-nosed
Pliers

Posi-drive
Screwdriver

# Instructions:

Step: 1	Fit pins to main PCB

Cut the four head pins into single pins with a pair of side cutters.

One pin goes into each of the four holes within the DC-DC Board outline on the main PCB.

Solder the pins in place on the underside of the main PCB.

Step: 2	Solder DC-DC converter PCB to main PCB

Carefully align the DC-DC converter PCB with the pins just soldered.
Double check that it has the correct orientation – the IN + and IN – should align with VIN+ and VIN-. The OUT pins should align with the VOUT+ and VOUT-pins.

Push the DC-DC PCB down until it rests on the header pin spacers.

Solder on the top of the DC-DC PCB on each of the four pins.

Step: 3	Add the input and output terminals

Use the 2-way terminal block for the output. Check that the openings for the wires are facing away from the PCB, so that the cables can be inserted. Solder the terminal block in place.

Use the 3-way terminal black for the input. Again, check the openings face away from the PCB. Solder the terminal block in place.

Step: 4	Connect the LED (if required)

This step is optional.
The default is that there will NOT be an LED to show power is on.

If you would like an output power indicator LED, then please add a blob of solder to join the two pads circled in red and labelled "LED_PWR". This will connect the red LED onto the output power pins. This LED is quite bright and due to the DC-DC converter efficiency, consumes about 40mA from the input when switched on. This is OK for short pulses, but for any length of time then this might
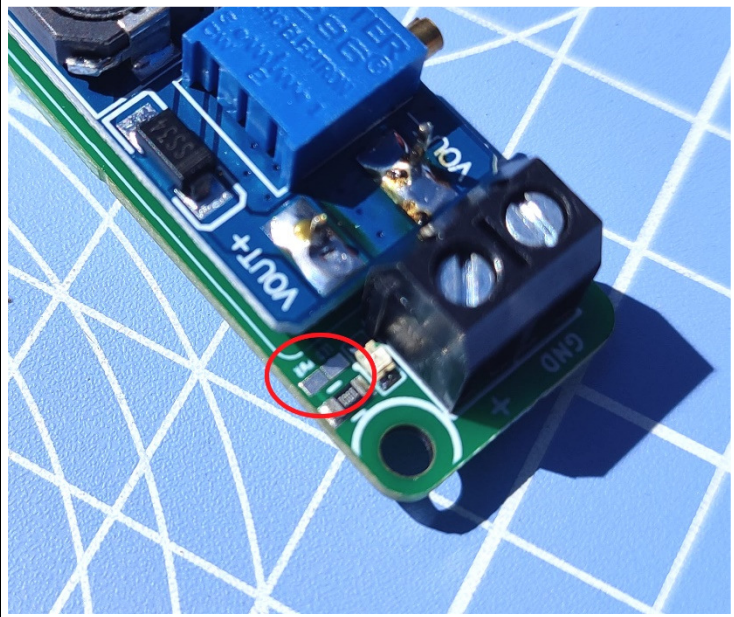
Step: 5	PCB is finished!
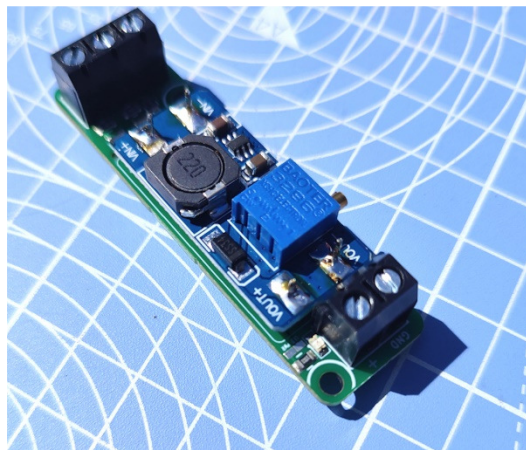
Have a nice cup of tea!

You are now ready to try it out!

Apply a voltage to the input. Use a low voltage, maybe 3.3V or 5V.

The input terminals are:
GND : 0V
CTRL : This is the control pin. You can use the input voltage here, or 3.3V or 5V logic.
+ : This is the input voltage, from 2V to 24V DC.

Without connection to the CTRL then the unit will be off.
Apply a voltage to the CTRL terminal. This will switch on the DC-DC converter, and you should read a voltage on the output pins. Use a multi-meter to read this voltage. Adjust the small variable resistor (gold-coloured knob on the blue potentiometer). This will adjust the output voltage. Adjust this until you have the correct output voltage.

Once set, I use a small amount of nail varnish to lock the gold-coloured knob in position.

If you have added the LED_PWR connection then the LED on the unit should be lit.

Testing & Fault Finding

Any issues at all then try the following:

- Check soldering.
- Check power connections.

Design Files

These can be found, along with these instructions, in the repository here:

https://github.com/curiouselectric/dc_dc_controller

Contact details:

This kit has been designed and produced by:

The Curious Electric Company
hello@curiouselectric.co.uk
www.curiouselectric.co.uk

We would like you to be happy with this kit. If you are not happy for any reason, then please contact us and we will help to sort it out.
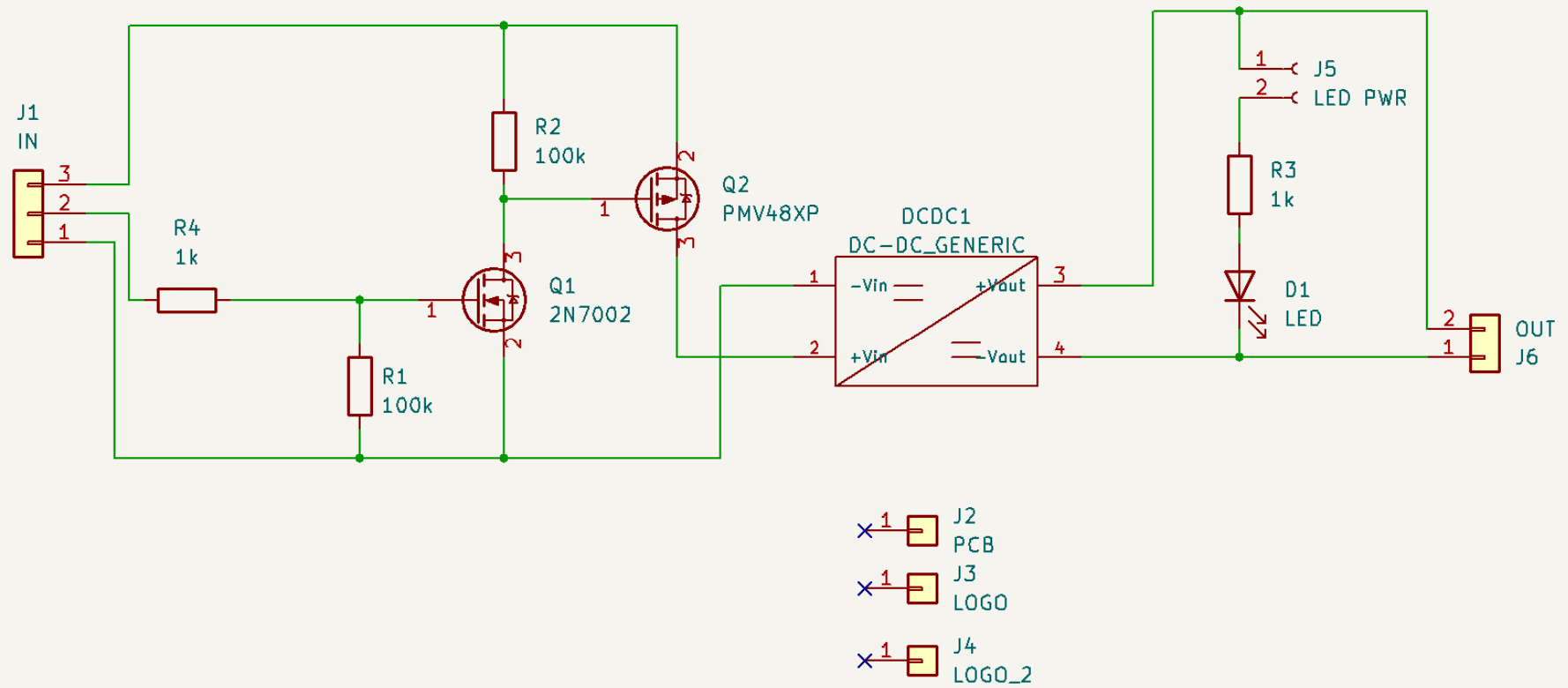
Please email **hello@curiouselectric.co.uk** with any questions or comments.
Please tweet us at **@curiouselectric**

If any parts are missing from your kit, then please email **hello@curiouselectric.co.uk** with details, including where the kit was purchased.

More information can be found via **www.curiouselectric.co.uk**

Circuit Schematic:

PCB:

Labels visible on the PCB drawing:

- 2.5mm (top left dimension)
- 2.5mm (top width)
- 65.0mm
- 48.0mm
- 14.5mm
- 2.5mm
- 18.0mm

Board 1 (left):
- GND + OUT
- OUT +
- Place DC-DC Board Here
- DCDC1
- IN +
- IN
- GND CTRL +

Board 2:
- J6
- Vout+ Vout−
- Output: 5−28V 2A
- STEP-UP CONTROL BOARD
- curiouselectric.co.uk
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- Vin+ Vin−
- Input: 2−24V 2A
- CTRL: 3.3/5V
- J1