

Imaginative Discoveries

VConduit Programmable Power Converting DC-DC Regulator

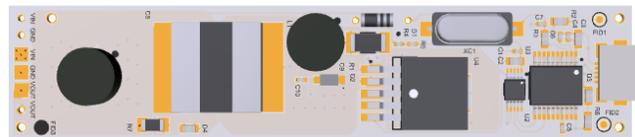
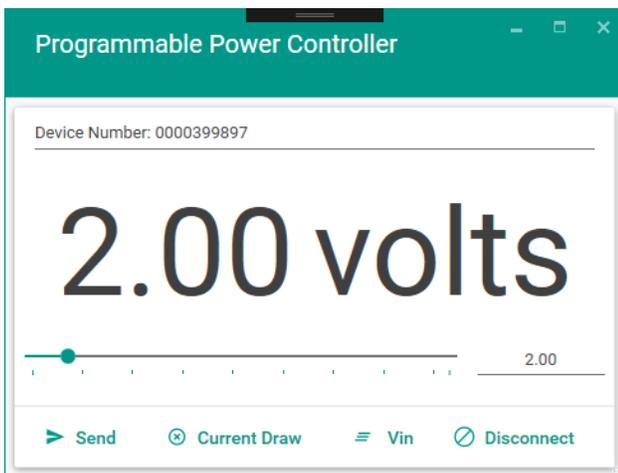
1. Overview

VConduit is a programmable power converting DC-DC regulator with extreme ease of use and high accuracy. It is a three pin device with Vin, GND, and Vout. The pins are spaced 2.54 mm (100 mil) apart as to make the package compatible with any standard breadboard or PCB prototyping board.

The board requires no external components, making its integration into any system simple. It is further simplified by allowing user control through software. This device will never require adjustments by using screw drivers or the user's hands, making it the safest regulator to adjust in live circuitry. It can be turned ON/OFF through the GUI for added controllability.

With a 4 layer PCB design all thermal concerns are dealt with. The first layer is split between Vin, Vout, GND, and signals. The second layer consists of the GND plane (ground) which also doubles as a noise filter. The third layer is occupied by the Vin plane (input voltage), and the bottom layer is in place for the Vout plane (output voltage).

It is capable of driving a 2.5-A load with exceptional line and load regulation. VConduit's adjustable output voltage ranges from 1.2-V to 25-V, while maintaining a maximum of $\pm 5\%$ Over full Line and Load conditions. Normal operation maintains $\pm 2\%$. Its input voltage can range from 5-V to 32-V. VConduit also has on board thermal and current-limit protection.



2. Pin Configuration and Functions

VConduit is fully functional and ready to use as a power supply control out of the box, no external components required.

Pin	Pin Name	I/O	Description
1	Voltage Input	I	This is the positive input supply for VConduit.
2	Ground	I/O	Circuit ground. Used for input and output.
3	Voltage Output	O	This is the positive output supply from VConduit.

3. Specifications

3.1 Operating Conditions

	Min	Max	Max With Heatsink	Unit
Input Voltage	5	32	32	V
Output Voltage	1.2	25	25	V
Output Current	0	1	2.5	A
Output Power	0	25	60	W

3.2 Absolute Maximum Ratings

	Min	Max	Max With Heatsink	Unit
Input Voltage		35	35	V
Output Power		62	65	W
Storage Temperature	-40	120	120	°C
Maximum Junction		120	120	°C

4. Operation Principles

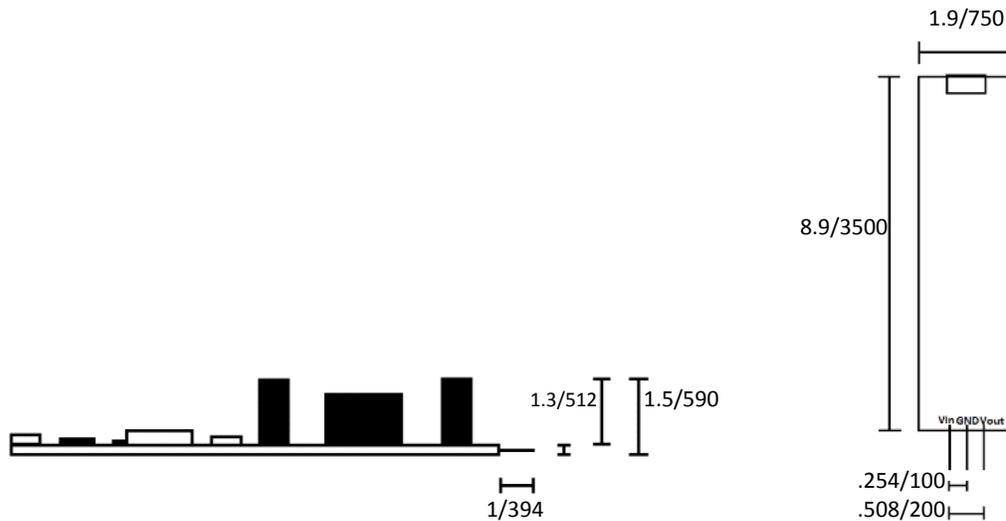
VConduit is controlled through software. The user command from PC is transferred to an on board DAC. The DACs output is the main control system for the DC-DC regulator. Unlike traditional regulator control, which changes a feedback resistance, VConduit alters feedback voltage. The following formula represents how V_{out} is controlled.

$$V_{out} = V_{fb} * (1 + \frac{47000}{2430}) - V_{dac}(\frac{47000}{2430});$$

$$V_{fb} = 1.22V \text{ to } 1.26V, 1.24V \text{ typical}$$

$$V_{DAC} = 0V \text{ to } 1.26V$$

5. Mechanical Dimensions (cm/mil)



6. Packaging

VConduit will be accompanied by a case if purchased. The case is both a protective layer and aesthetically appealing. Its usefulness ranges from applications in which durability is desired to applications which need to look more professional and complete.

7. Heatsink

In order to handle the output of 2A, a heatsink must be attached. With the use of a proper heatsink, the temperature of the unit will rise 50-60°C from ambient (the temperature will rise less when less current is drawn). If a fan is used to provide airflow across the heatsink, the temperature rise should be within 20-40°C.

There are two heatsink locations on the board. One may be placed on the DC/DC converter (Fig. 1). The other will require the exposure of copper on the bottom layer of the board (Fig. 2). Attaching the top heatsink is recommended for most users. With the top heatsink only, the temperature rise will be higher, but still suitable for most applications. The bottom heatsink is ONLY recommended for advanced users. If the bottom layer is incorrectly exposed, the board will be permanently damaged.

The accompanied case can still be used with the top heatsink attached. If the user installs the bottom heatsink, the board will not fit within the included case.

Figure 1: Top Heatsink

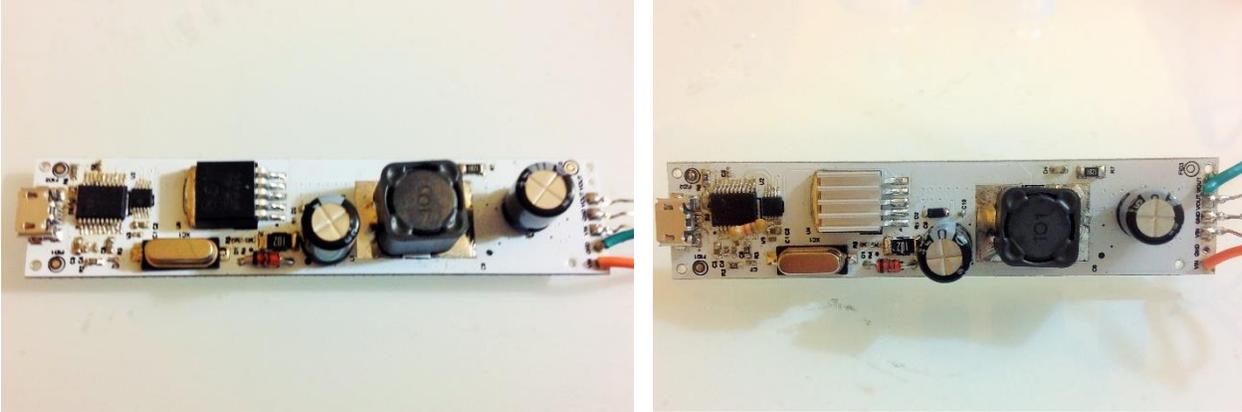
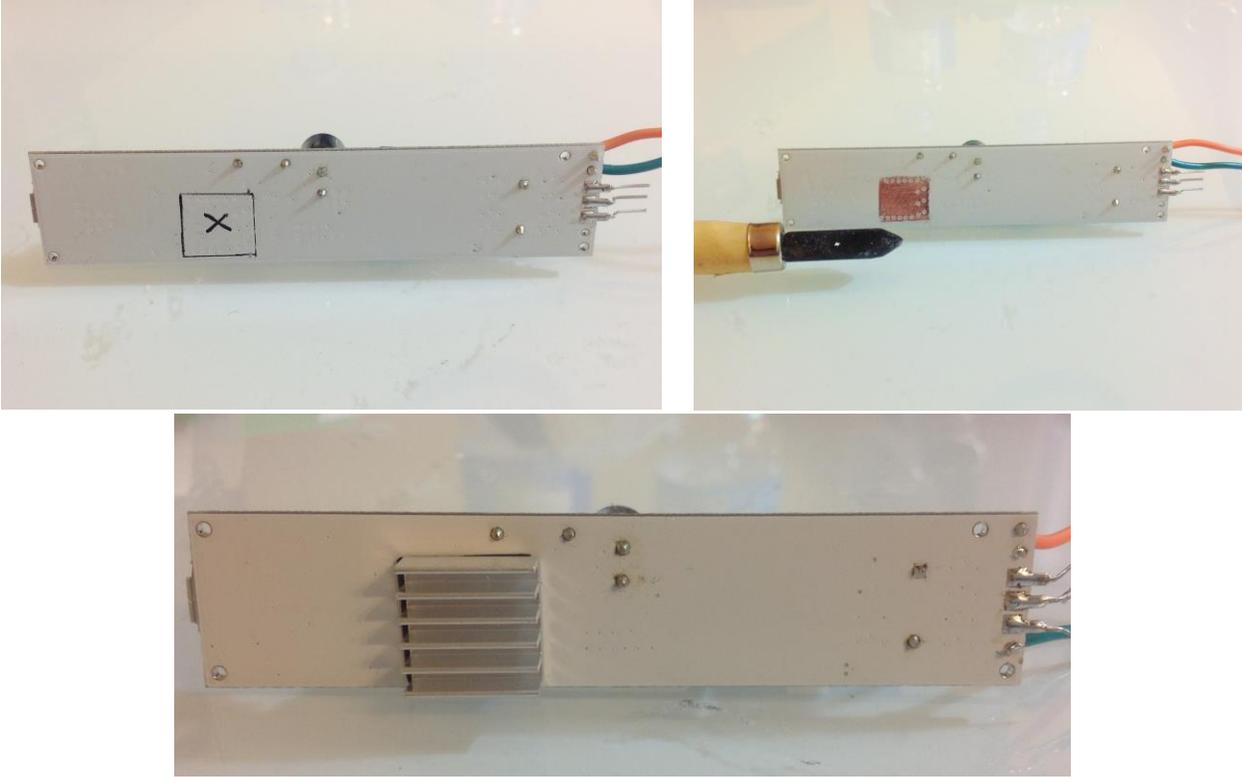


Figure 2: Bottom Heatsink



Warning: Temperature should be monitored when attempting to draw more than 1A. In some cases, a fan is also necessary for safety of the user and board.