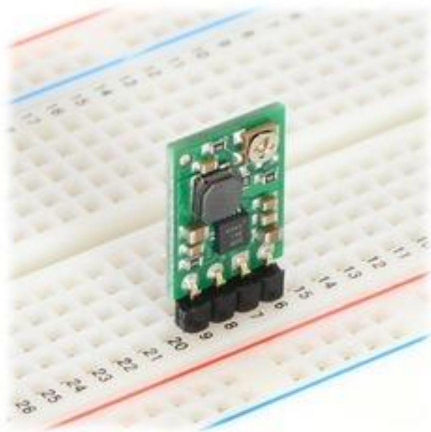
POLOLU 5V STEP-UP VOLTAGE REGULATOR

U1V11F5

USER'S GUIDE

CONNECTIONS

The boost regulator has four connections: shutdown (SHDN), input voltage (VIN), ground (GND), and output voltage (VOUT).



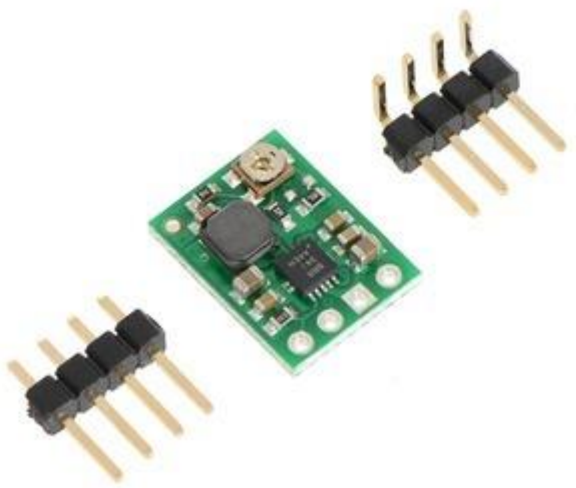
The SHDN can be driven low (typically under 0.4 V) to power down the regulator and turn off power to the load (unlike most boost regulators, the input power does not pass through to the output when the board is disabled). This pin is internally pulled up to VIN through an 100 kΩ resistor, so it can be left disconnected or connected directly to VIN if you do not need to use the disable feature. The disable threshold is a function of the input voltage as follows:

- For VIN < 0.8 V, SHDN voltage must be below 0.1×VIN to disable the regulator and above 0.9×VIN to enable it.
- For 0.8 V ≤ VIN ≤ 1.5 V, SHDN voltage must be below 0.2×VIN to disable the regulator and above 0.8×VIN to enable it.

- For VIN > 1.5 V, SHDN voltage must be below 0.4 V to disable the regulator and above 1.2 V to enable it.

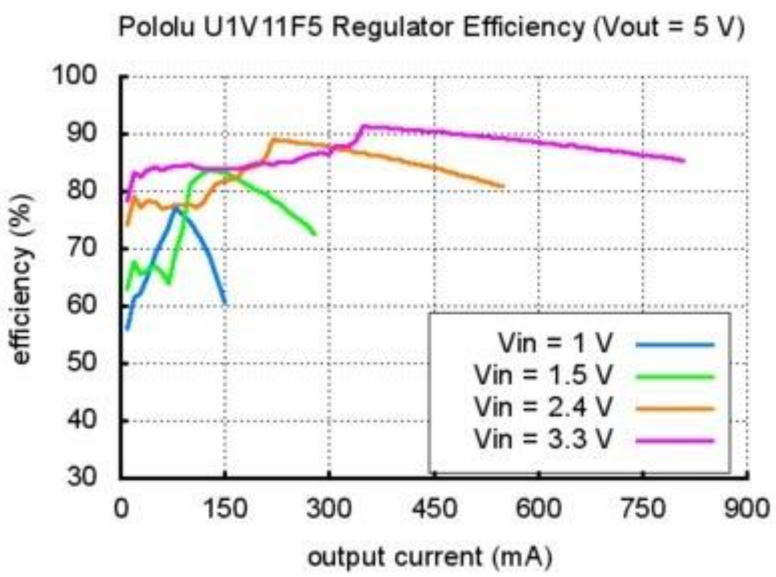
The input voltage, VIN, must be at least 0.5 V for the regulator to turn on. However, once the regulator is on, the input voltage can drop as low as 0.3 V and the set output voltage will be maintained on VOUT. Unlike standard boost regulators, this regulator has an additional linear down-regulation mode that allows it to convert input voltages as high as 5.5 V down to lower output voltages for small to moderate sized loads (for example, in our tests, this regulator was able to supply 300 mA while converting an input of 5.5 V down to 1.8 V). When the input voltage exceeds the output voltage, the regulator automatically switches to this down-regulation mode. The input voltage should not exceed 5.5 V. Please be wary of destructive LC spikes that might cause the input voltage to surpass 5.5 V (see below for more information).

The four connections are labeled on the back side of the PCB, and they are arranged with a 0.1″ spacing along the edge of the board for compatibility with solderless breadboards, connectors, and other prototyping arrangements that use a 0.1″ grid. You can solder wires directly to the board or solder in either the 4×1 straight male header strip or the 4×1 right-angle male header strip that is included.



TYPICAL EFFICIENCY AND OUTPUT CURRENT

The efficiency of a voltage regulator, defined as (Power out)/(Power in), is an important measure of its performance, especially when battery life or heat are concerns. As shown in the graphs below, this switching regulator typically has an efficiency of 70 to 90%.



The maximum achievable output current is approximately proportional to the ratio of the input voltage to the output voltage. If the *input* current exceeds the switch current limit (typically somewhere between 1.2 and 1.5 A), the output voltage will begin to drop. Additionally, the maximum output current can depend on other factors, including the ambient temperature, air flow, and heat sinking.

LC VOLTAGE SPIKES

When connecting voltage to electronic circuits, the initial rush of current can cause damaging voltage spikes that are much higher than the input voltage. In our tests with typical power leads (~30″ test clips), input voltages above 4.5 V caused voltage spikes that could potentially damage the regulator. You can suppress such spikes by soldering a 33 µF or larger electrolytic capacitor close to the regulator between VIN and GND.