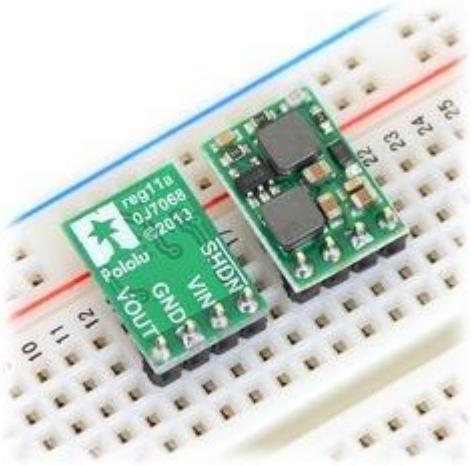
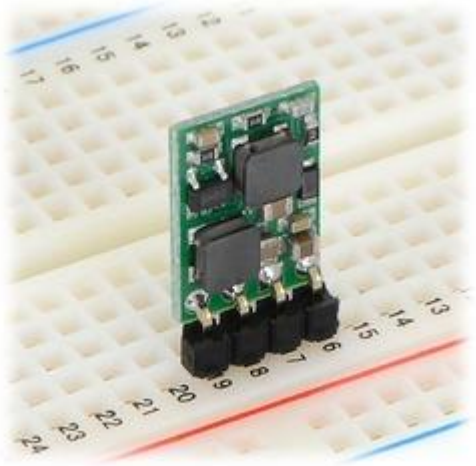
POLOLU 9V STEP-UP/STEP-DOWN VOLTAGE REGULATOR S10V3F9

USER'S GUIDE

CONNECTIONS

This step-up/step-down regulator has four connections: shutdown (SHDN), input voltage (VIN), ground (GND), and output voltage (VOUT).





The SHDN pin can be driven low (under 0.4 V) to power down the regulator. The quiescent current in this shutdown mode is dominated by the current in the 10 kΩ pull-up resistor from SHDN to VIN. With SHDN held low, this resistor will draw 0.1 mA per volt on VIN (for example, the shutdown current with a 5 V input will be 0.5 mA). This pin should only ever be driven low or left floating; this can be accomplished with a physical switch that toggles it between ground and disconnected, or electrically with something like a transistor controlled by an I/O line.

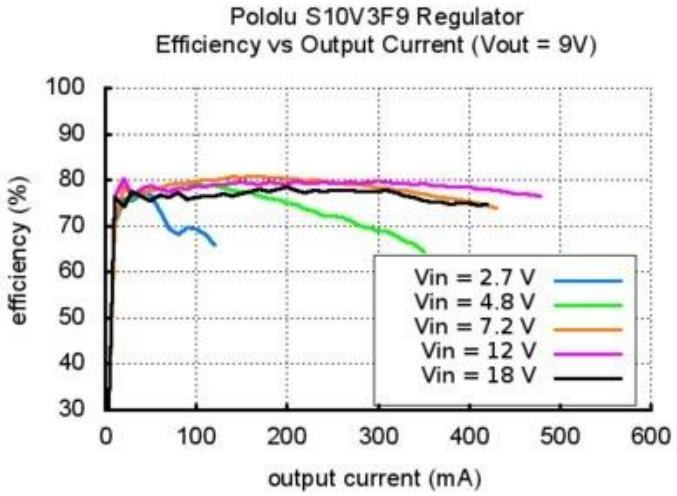
The input voltage should be between 2.5 V and 18 V. Lower inputs can shut down the voltage regulator; higher inputs can destroy the regulator, so you should ensure that

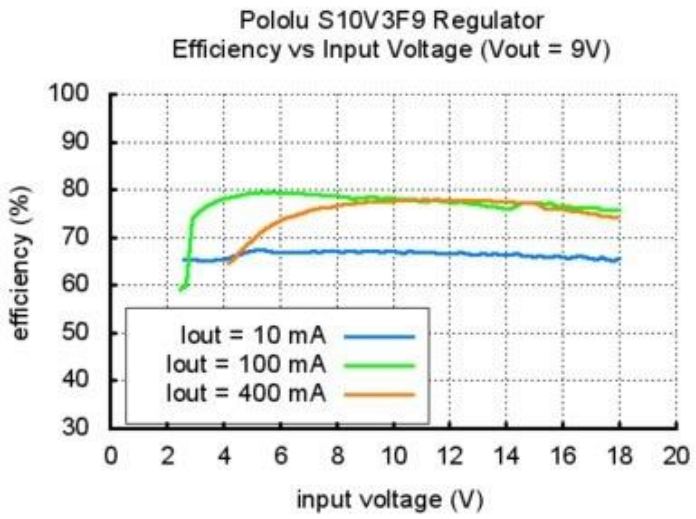
noise on your input is not excessive and be wary of destructive LC spikes (see below for more information).

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 standard solderless breadboards and perfboards and connectors 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.

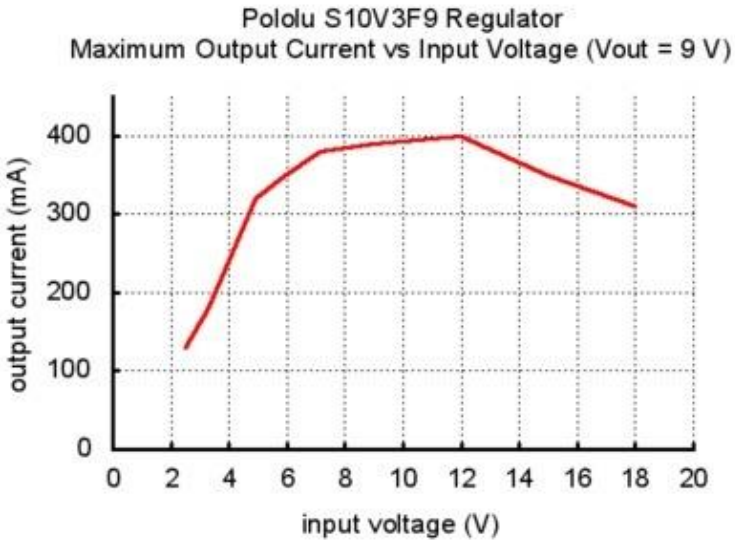
TYPICAL EFFICIENCY AND OUTPUT CURRENT

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 80%.





The maximum achievable output current of the board varies with the input voltage but also depends on other factors, including the ambient temperature, air flow, and heat sinking. The graph below shows output currents at which this voltage regulator's over-temperature protection typically kicks in after a few seconds. These currents represent the limit of the regulator's capability and cannot be sustained for long periods, so the continuous currents that the regulator can provide are typically lower.



LC VOLTAGE SPIKES

When connecting voltage to electronic circuits, the initial rush of current can cause voltage spikes that are much higher than the input voltage. If these spikes exceed the regulator's maximum voltage, the regulator can be destroyed. In our tests with typical power leads (~30" test clips), input voltages above 11 V caused spikes over 18 V. You can suppress such spikes by soldering a 33 µF or larger electrolytic capacitor close to the regulator between VIN and GND.