

Pololu 9V, 1A Step-Down Voltage Regulator D24V10F9

Typical efficiency and output current

The efficiency of a voltage regulator, defined as $(\text{Power out})/(\text{Power in})$, is an important measure of its performance, especially when battery life or heat are concerns. This family of switching regulators typically has an efficiency of 80% to 93%, though the actual efficiency in a given system depends on input voltage, output voltage, and output current. See the efficiency graph near the bottom of this page for more information.

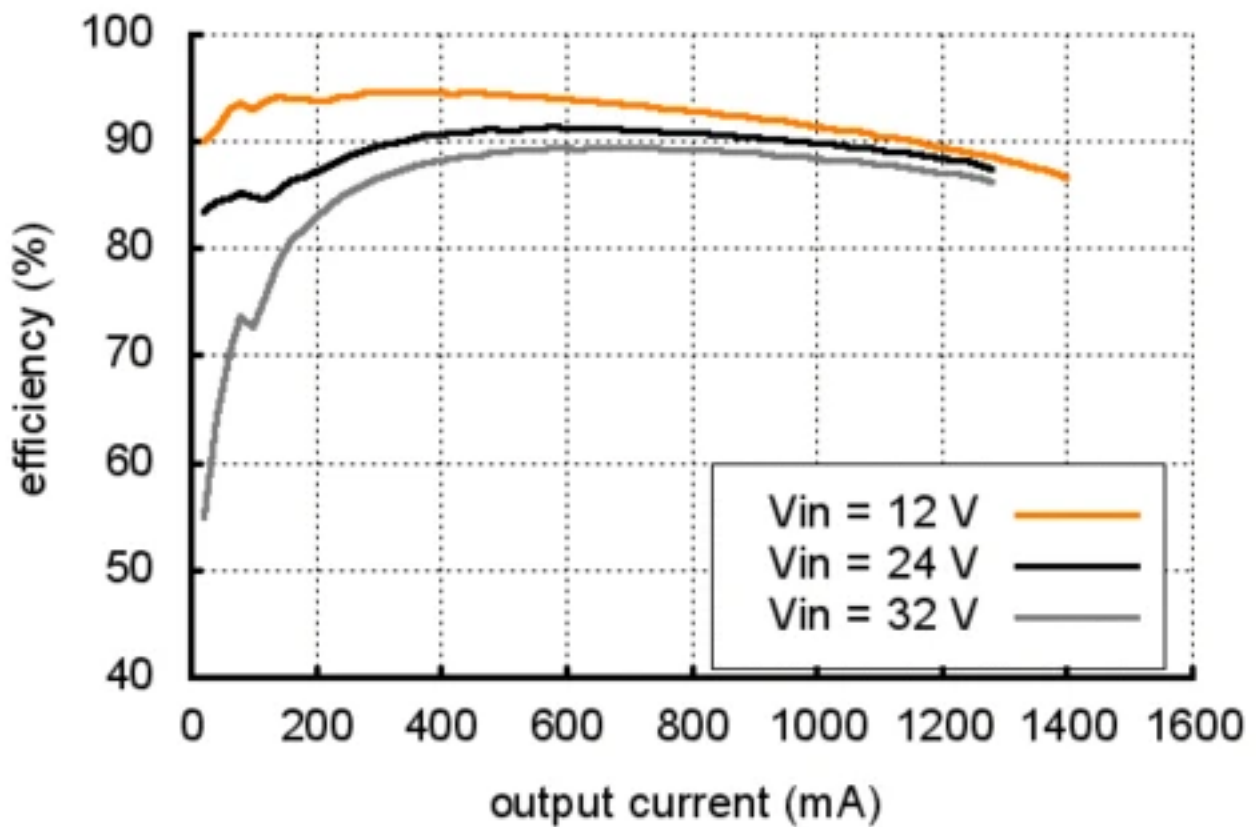
In order to achieve a high efficiency at low loads, this regulator automatically goes into a power-save mode where the switching frequency is reduced. In power-save mode, the switching frequency of the regulator changes as necessary to minimize power loss. This could make it harder to filter out noise on the output caused by switching.

Typical dropout voltage

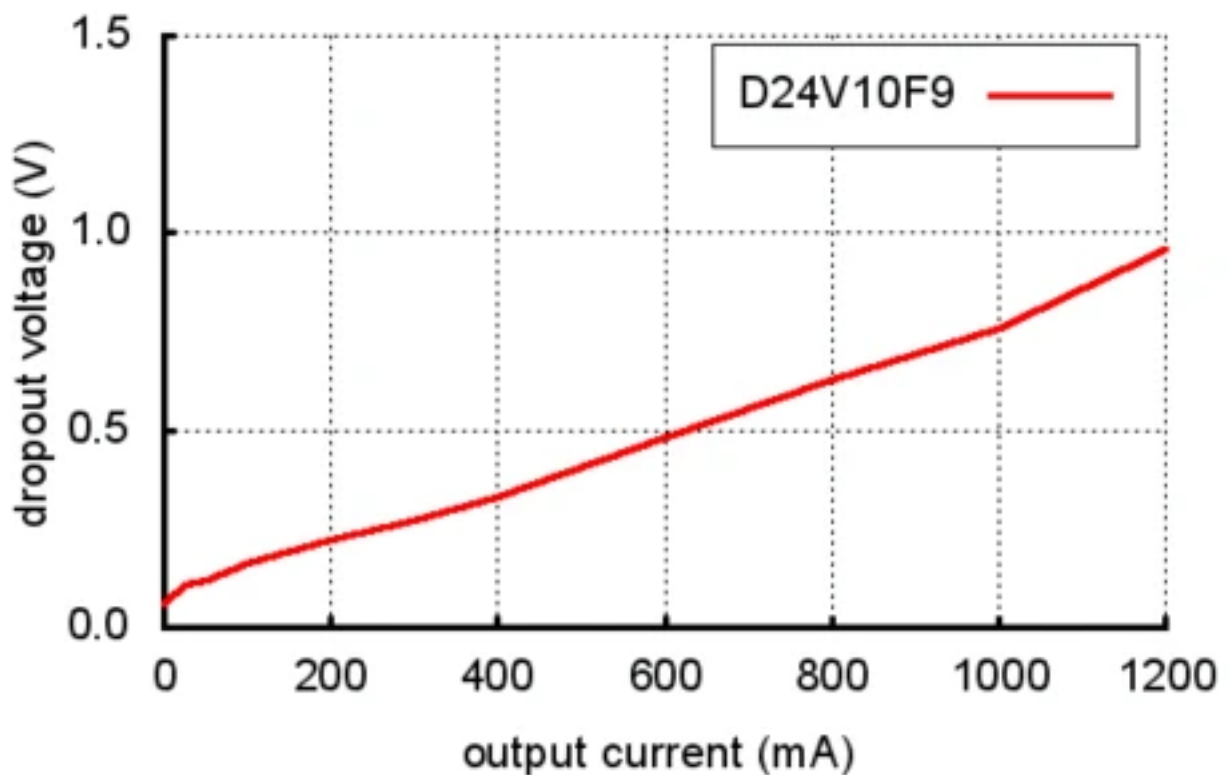
The dropout voltage of a step-down regulator is the minimum amount by which the input voltage must exceed the regulator's target output voltage in order to ensure the target output can be achieved. For example, if a 5 V regulator has a 1 V dropout voltage, the input must be at least 6 V to ensure the output is the full 5 V. Generally speaking, the dropout voltage increases as the output current increases.

The graphs below show the typical efficiency and dropout voltage of the 9 V D24V10F9 regulator as a function of the output current:

Pololu D24V10F9 Regulator Efficiency ($V_{out} = 9\text{ V}$)



Pololu D24V10F9 Regulator ($V_{out} = 9\text{ V}$)
Dropout Voltage vs Output Current



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 (36 V), the regulator can be destroyed. In our tests with typical power leads (~30" test clips), input voltages above 20 V caused spikes over 36 V.

If you are connecting more than 20 V or your power leads or supply has high inductance, we recommend soldering a 33 μ F or larger electrolytic capacitor close to the regulator between VIN and GND. The capacitor should be rated for at least 50 V.

More information about LC spikes can be found in this application note, [Understanding Destructive LC Voltage Spikes](#).