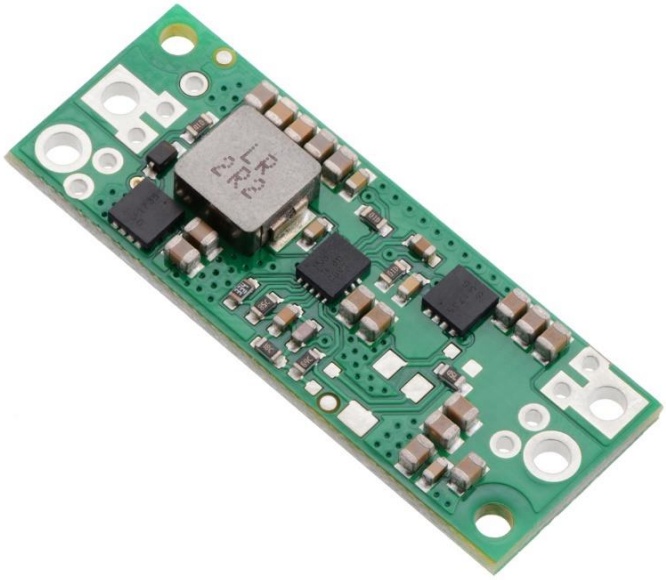
POLOLU 7.5V STEP-UP VOLTAGE REGULATOR U3V70F7

USER'S GUIDE



OVERVIEW

The U3V70x boost (step-up) voltage regulators are high-current, high-efficiency synchronous switching regulators that generate higher output voltages from input voltages as low as 2.9 V. The regulators actively limit the instantaneous input currents to 10 A, and the input current can typically be as high as 8 A for several seconds before the thermal protection activates. Input currents of around 6 A can typically be maintained for many minutes without triggering thermal shutdown, though the actual performance depends on depending on the input and output voltages as well as external factors such as ambient temperature and airflow. For boost regulators, the output current equals the input current times the efficiency times the ratio of VIN to VOUT, so the more you are boosting, the lower the maximum output current will be.

These regulators feature a variety of built-in protections, including reverse voltage protection to keep your load safe in the event power is accidentally connected backward, and unlike most boost regulators, these units offer a true shutdown option that turns off power to the load (with typical boost regulators, the input voltage will pass directly through to the output when they are disabled).

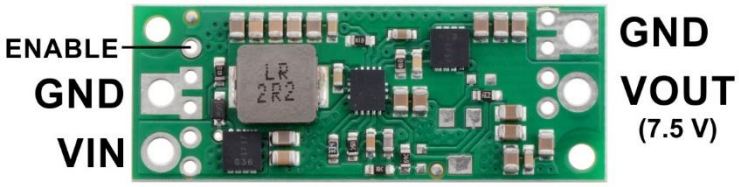
The U3V70x family includes six versions with fixed output voltages ranging from 5 V to 15 V as well as an adjustable version that can be set anywhere between 4.5 V and 20 V using a precision 12-turn potentiometer:

- U3V70F5: Fixed 5V output
- U3V70F6: Fixed 6V output
- U3V70F7: Fixed 7.5V output
- U3V70F9: Fixed 9V output
- U3V70F12: Fixed 12V output
- U3V70F15: Fixed 15V output
- U3V70A: Precision-adjustable 4.5 – 20 V output

The different versions of the board all look very similar, so the bottom silkscreen includes a blank space where you can add your own distinguishing marks or labels.

We manufacture these boards in-house at our Las Vegas facility, which gives us the flexibility to make these regulators with custom fixed output voltages between 4.5 V and 20 V.

U3V70F7 CONNECTIONS

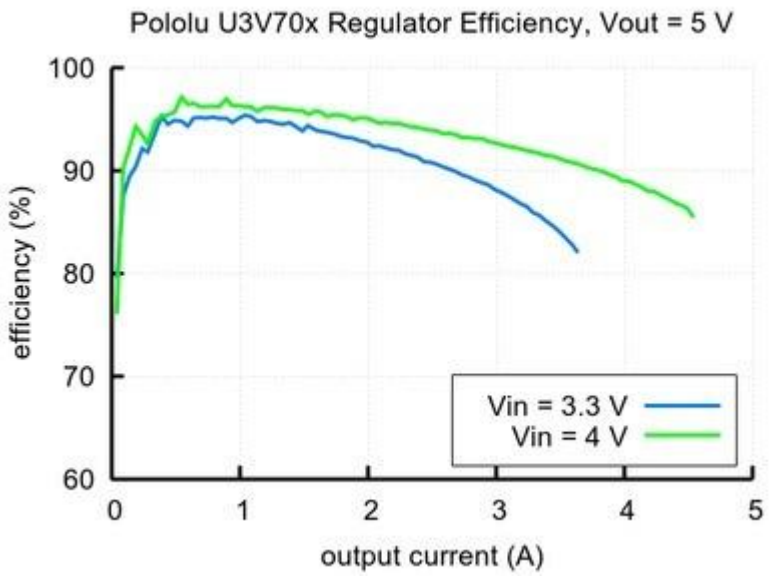


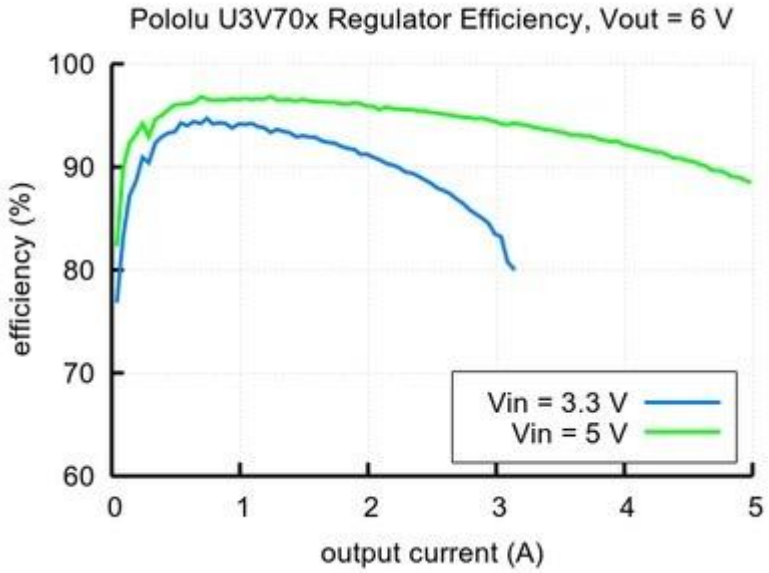
The input voltage, VIN, must be at least 2.9 V and should not exceed the output voltage, VOUT. (If VIN is higher than VOUT, the higher input voltage will show up on the output, which is potentially dangerous for your connected load and could also damage the regulator.)

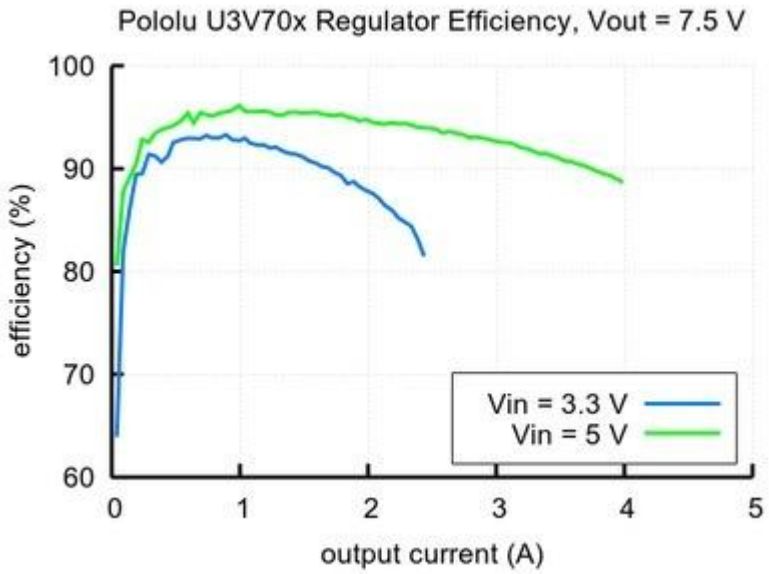
The regulator is enabled by default: a 100 kΩ pull-up resistor on the board connects the ENABLE pin to reverse-protected VIN. The ENABLE pin can be driven low (under 0.4 V) to turn off power to the load and put the board into a low-power state. The quiescent current draw in this sleep mode is dominated by the current in the pull-up resistor from ENABLE to VIN, which will draw 10 µA per volt on VIN when ENABLE is held low.

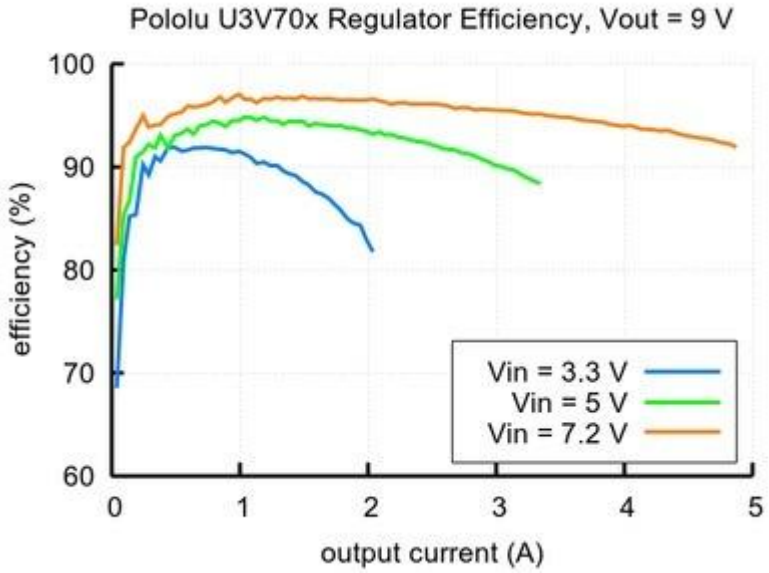
TYPICAL EFFICIENCIES AND MAXIMUM OUTPUT CURRENTS

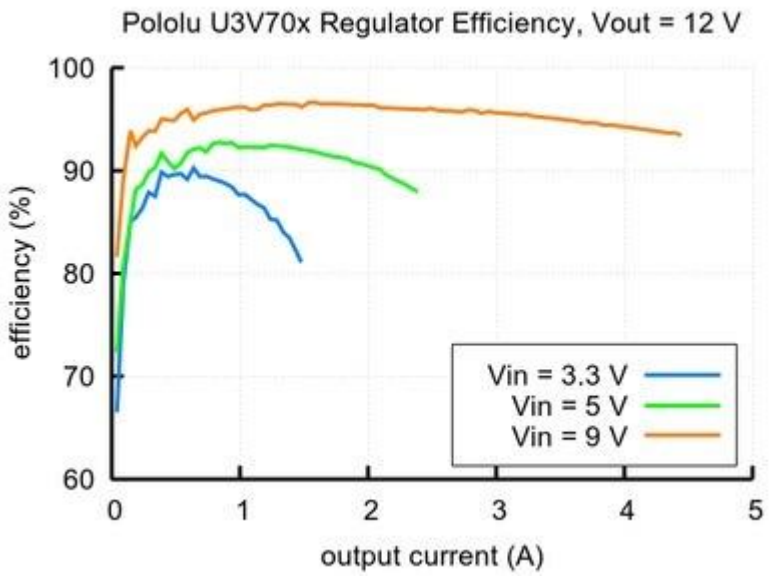
The efficiency of a voltage regulator, defined as (Power out)/(Power in), is an important measure of its performance, especially when battery life or heat are concerns. As shown in the graphs below, the U3V70x regulators have an efficiency of 80% to 95% for most combinations of input voltage, output voltage, and load.

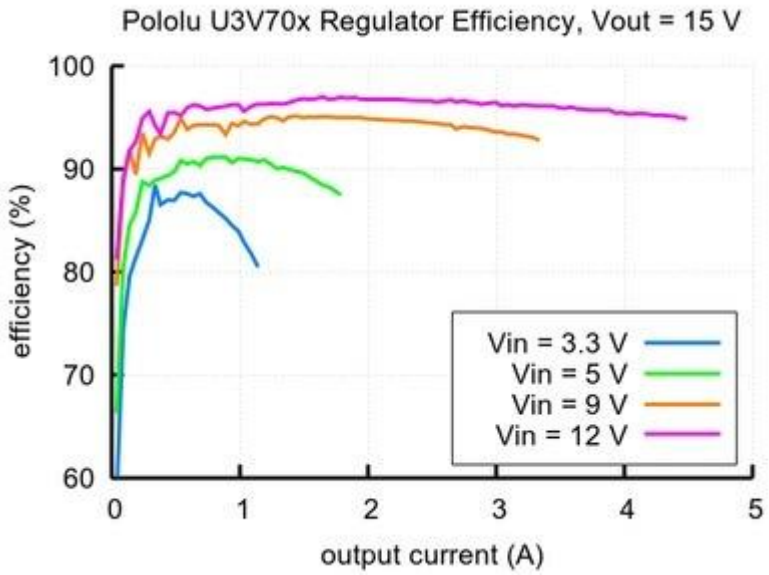

Pololu U3V70x Regulator Efficiency, Vout = 5 V
efficiency (%)
100
90
80
70
60
0
1
2
3
4
5
output current (A)
Vin = 3.3 V
Vin = 4 V


Pololu U3V70x Regulator Efficiency, Vout = 6 V
efficiency (%)
100
90
80
70
60
0
1
2
3
4
5
output current (A)
Vin = 3.3 V
Vin = 5 V

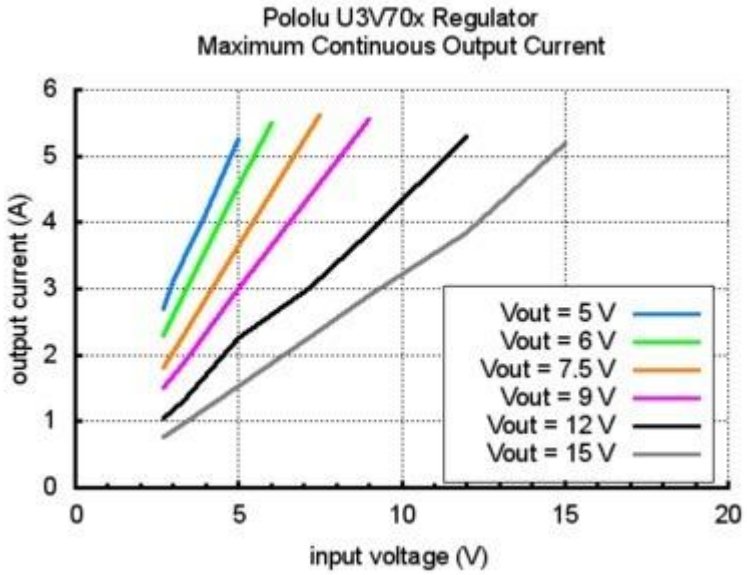

Pololu U3V70x Regulator Efficiency, Vout = 7.5 V
efficiency (%)
100
90
80
70
60
0
1
2
3
4
5
output current (A)
Vin = 3.3 V
Vin = 5 V

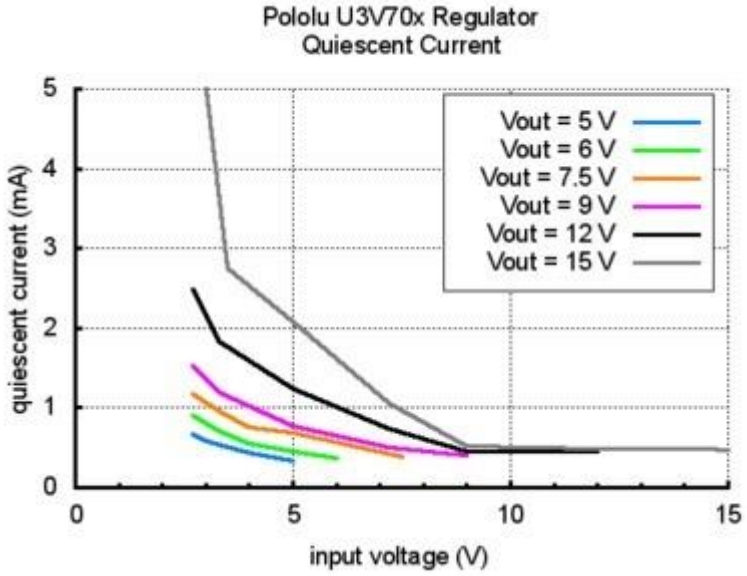

Pololu U3V70x Regulator Efficiency, Vout = 9 V
efficiency (%)
100
90
80
70
60
0
1
2
3
4
5
output current (A)
Vin = 3.3 V
Vin = 5 V
Vin = 7.2 V





The maximum achievable output current is approximately proportional to the ratio of the input voltage to the output voltage. Additionally, the maximum output current can depend on other factors, including the ambient temperature, air flow, and heat sinking. The graph below shows the typical maximum continuous output currents these regulators can deliver at room temperature with no forced airflow or heat sinking.





Typical maximum quiescent current of Step-Up Voltage Regulator U3V70x (regulator enabled, no load).

During normal operation, this product can get hot enough to burn you. Take care when handling this product or other components connected to it.