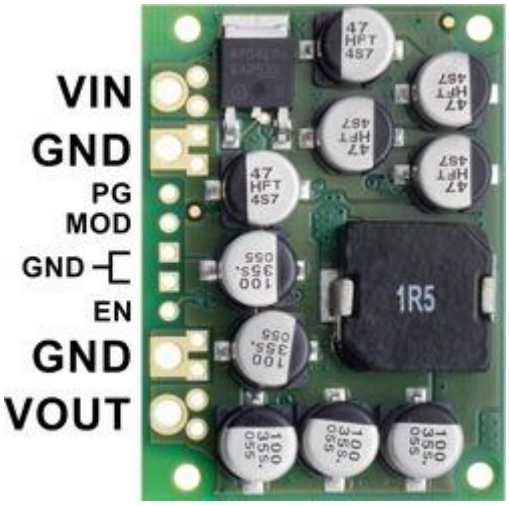
POLOLU 3.3V, 15A STEP-DOWN VOLTAGE REGULATOR D24V150F3

USER'S GUIDE

CONNECTIONS

These buck regulators have six connections: input voltage (VIN), output voltage (VOUT), enable (EN), power good (PG), mode (MOD), and ground (GND).



The input voltage, VIN, powers the regulator. Voltages between 4.5 V and 40 V can be applied to VIN, but for versions of the regulator that have an output voltage higher than 4.5 V, the effective lower limit of VIN is VOUT plus the regulator's dropout voltage, which varies approximately linearly with the load (see below for a graph of dropout voltages as a function of the load).

The output voltage, VOUT, is fixed and depends on the regulator version: the D24V150F3 version outputs 3.3 V, the D24V150F5 version outputs 5 V, the D24V150F6 version outputs 6 V, the D24V150F7 version outputs 7.5 V, the D24V150F9 version outputs 9 V, and the D24V150F12 version outputs 12 V.

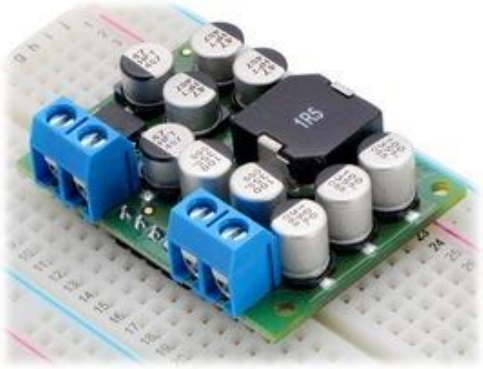
The regulator's enable input, EN, is pulled high (to 5 V) internally, which enables the regulator by default. The EN pin can be driven low (under 1 V) to disable the output and put the board into a low-power state. The quiescent current draw in this sleep mode is dominated by the current in an internal pull-up resistor and the reverse-voltage protection circuit, which altogether will draw between 5 µA and 10 µA per volt on VIN when EN is held low. To bring the board out of this low-power state, the EN pin should be pulled above 2 V. If you do not need this feature, you can leave the EN pin disconnected.

The "power good" indicator, PG, is an open-drain output that goes low when the regulator's output falls below around 85% of the nominal voltage, including when the enable pin is held low, or rises above around 115% of the nominal voltage. Otherwise, the PG pin is high-impedance, so an external pull-up resistor is required to use this pin. The mode input, MOD, is pulled low internally, which selects fixed-frequency operation by default. This pin can be driven high (above 2 V, but not exceeding 5 V) to override fixed-frequency operation to reduce quiescent current (and therefore to increase efficiency) at light loads (on the order of a few milliamps). This reduced-power feature is available when the input voltage is substantially higher than the output voltage (see the item-specific details section at the bottom of this page for more information).

Pololu Step-Down Voltage Regulator D24V150Fx

with included hardware.

The connections are labeled on the back side of the PCB, and the board offers several options for making electrical connections. The three sets of smaller through-holes are arranged with a 0.1″ spacing for compatibility with solderless breadboards, connectors, and other prototyping arrangements that use a 0.1″ grid; you can solder pieces of the included 13×1 straight male header strip into these smaller holes. Alternatively, you can solder the included 2-pin 5mm-pitch terminal blocks to the two pairs of larger holes. For the most compact installation, you can solder wires directly to the board.



Pololu Step-Down Voltage Regulator D24V150Fx in a breadboard, assembled with terminal blocks and male headers.

Pololu Step-Down Voltage Regulator D24V150Fx showing wires soldered directly to the board.

The board has four 0.086″ mounting holes intended for #2 or M2 screws. The mounting holes are in the four corners of the board and are separated by 1.53″ horizontally and 1″ vertically. For all the board dimensions, see the dimension diagram (307k pdf).

TYPICAL EFFICIENCY AND OUTPUT CURRENT

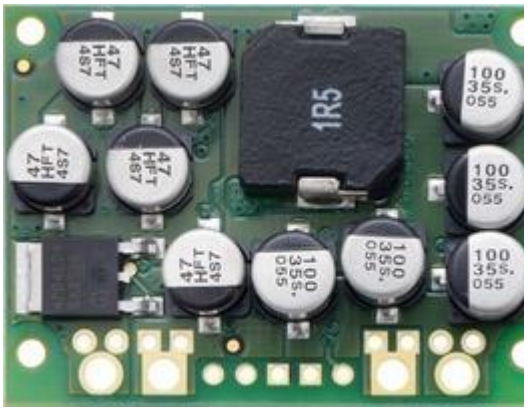
The efficiency of a voltage regulator, defined as (Power out)/ (Power in), is an important measure of its performance, especially when battery life or heat are concerns. This family of switching regulators typically has an efficiency of 80% to 95%, though the actual efficiency in a given system depends on input voltage, output voltage, and output current. See the efficiency graph near the bottom of this page for more information.

The maximum achievable continuous output current is typically between 5 A and 20 A, but this depends on many factors, including the ambient temperature, air flow, heat sinking, and the input and output voltage. See the continuous output current graph near the bottom of this page for more information. The maximum instantaneous current is limited to approximately 32 A.

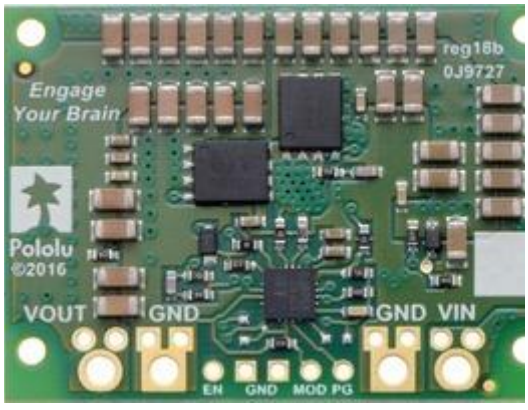
TYPICAL DROPOUT VOLTAGE

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. See the "Details" section below for more information on the dropout voltage for this specific regulator version.

DETAILS FOR ITEM #2880

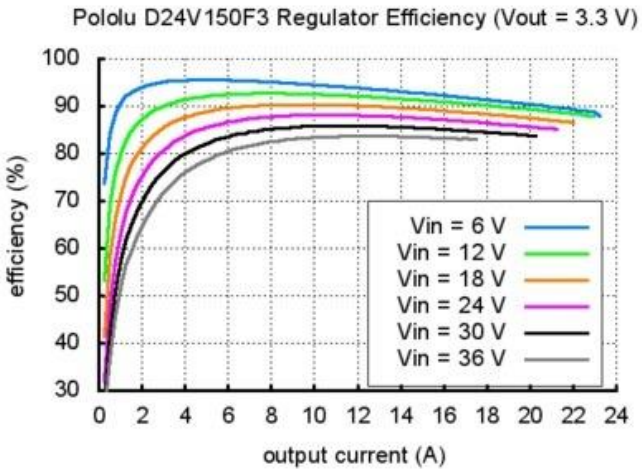


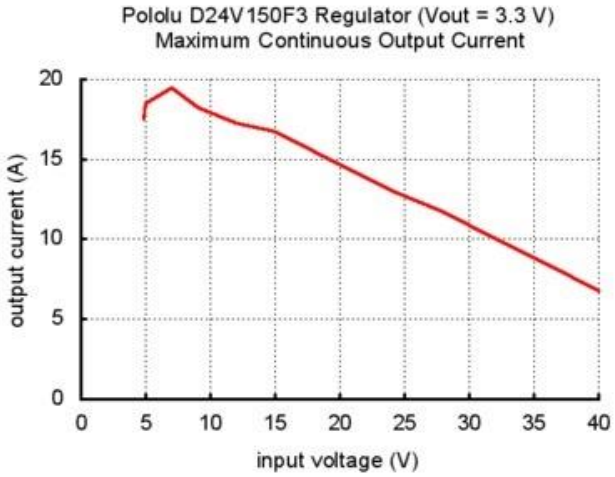
Pololu 3.3V, 15A Step-Down Voltage Regulator D24V150F3, top view.



Pololu 3.3V, 15A Step-Down Voltage Regulator D24V150F3, bottom view.

The graphs below show the typical efficiency and maximum continuous current 3.3 V D24V150F3 regulator:





Dropout voltage is not relevant for this 3.3 V regulator because the 4.5 V minimum operating voltage already leaves sufficient margin to allow for a 3.3 V output, regardless of load.

POWER-SAVE MODE FOR THE 3.3V VERSION

For this 3.3 V regulator version, the power-save mode is available for input voltages above 9 V. See the *Connections* section above for details on the MOD pin, which is used to activate this mode.