DC to DC Buck Converter [Adjustable, Efficient,5V 9A]

Buck converters are a workhorse in the world of electronics, efficiently stepping down a higher voltage DC input to a lower voltage DC output. Whether you're powering a microcontroller project or building a custom LED driver, a buck converter offers a compact and versatile solution. In this article, we'll guide you through the process of designing and building your own buck converter on PCBWay.

One Pic here

Connections

The buck regulator features six connections: input voltage (VIN), ground (GND), output voltage (VOUT), feedback (FB), ENABLE, and power good (PG).

VIN powers the regulator, accepting voltages up to 38V. VIN's lower limit is VOUT plus the dropout voltage, which varies linearly from approximately 500mV to 1.5V based on load (refer to the dropout voltage graph below).

VOUT defaults to 5V and can be adjusted lower by adding a resistor between FB and VOUT, detailed in the Decreasing the output voltage section.

By default, the regulator is enabled, with the ENABLE pin connected to reverse-protected VIN via a 100 kΩ pull-up resistor. Pulling ENABLE below 0.6V enters low-power mode, drawing 10-20 µA per volt on VIN. If unused, leave ENABLE disconnected.

PG indicates power status, going low when output voltage falls below 90% of the set value (e.g., 4.5V with 5V output). An external pull-up resistor is needed for PG operation.

**Decreasing the output voltage**

To decrease the output voltage, you can add an external resistor between the FB and VOUT pins. The relationship between the output voltage and the external resistor (R) is described by the following equations:

### Typical dropout voltage

The dropout voltage, a critical parameter for step-down regulators, represents the minimum voltage differential required between the input and output to ensure proper regulation. In practical terms, for a 5V regulator with a 1V dropout voltage, the input voltage must exceed 6V for reliable 5V output. The dropout voltage characteristics of the D24V60F5 regulator are depicted below: