

Explaining the Schematic

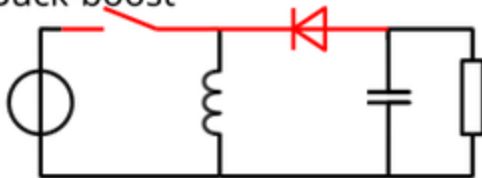
The ESP01 - FT232RL Connections

Pretty straightforward, straight from the video link provided.

The Buck-Boost Converter

Why did I choose a Buck-Boost converter even though the question asked only for a buck converter? I dk, I was mildly annoyed by the fact that the 3.7V Li-Ion battery can discharge to a voltage less than 3.3V, making the ESP01 work sub-optimally. (Perfectionism, maybe?)

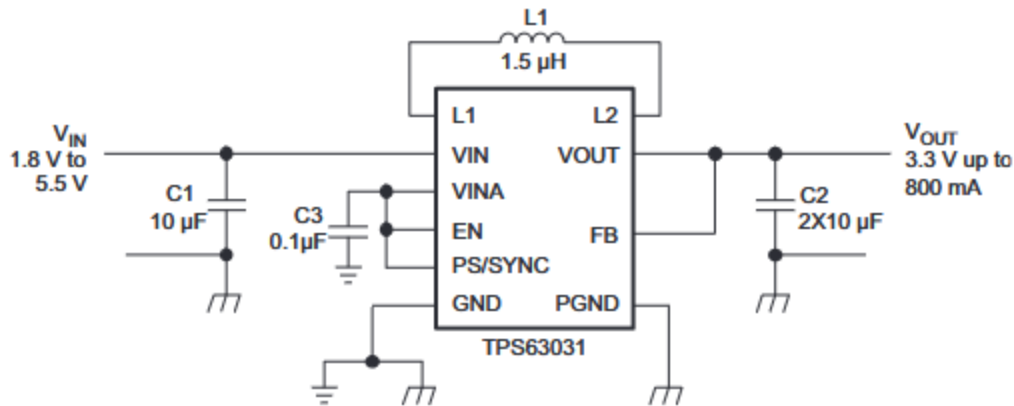
Buck-boost



This is the general design of a buck-boost converter. The highlighted red part is replaced by an IC (TPS63031). Why this specific IC? Because a person on [stack exchange](#) said so.

Luckily, the TPS63031 [datasheet](#) provides a direct application of our needs.

Typical Application Schematic



"The TPS6303x devices provide a power supply solution for products powered by either a two-cell or three-cell alkaline, NiCd or NiMH battery, or a **one-cell Li-ion** or Li-polymer battery."

-from the datasheet

The switch of the buck-boost converter is switched on and off very quickly with some duty cycle (exactly like a PWM signal) using the IC. The IC has other built in functionalities as well, like power saving mode and clock syncing capabilities.

To be honest, I do not understand how the schematic given in the datasheet works completely, but here are the things I've understood (hopefully correctly):

- PGND and GND are kept separate due to electromagnetic interferences in PGND with high currents. These effects should not affect the sensitive digital ground of the components
- VINA is an analog VIN and is internally connected to VIN by a resistor. EN and PS/SYNC are connected to VINA since VINA is a measure of how high VIN is. If VIN is low enough, Power Saving mode can be turned on for more efficiency.

If $V_{IN} \rightarrow 0$, then EN will also become zero, turning off the IC (sleep mode kinda, avoiding unnecessary power consumption).

- The FB (Feedback) pin constantly checks V_{OUT} and compares it with 3.3V and adjusts the PWM output to be given accordingly.