

Explaining the Schematic

The ESP01 Connections

Pretty straightforward, straight from the video link provided and from last year's XLR8 Connections.

Another thing to remember is that I have added a switch, which needs to be turned on while programming using UART. This is because the switch connects the GPIO0 pin to ground, which is required to set the bootloader mode.

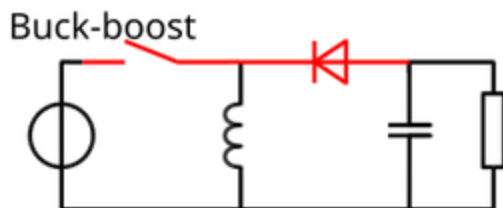
If we set GPIO0 low, however, the boot ROM inside the ESP8266 takes over and it begins communicating over the UART. Using this boot ROM we can push our programs to the flash memory.

-from [here](#)

Turn this switch off whenever not programming, otherwise the circuit wont work.

The Buck-Boost Converter

Why did I choose a Buck-Boost converter even though the question asked only for a buck converter? Idk, 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?)

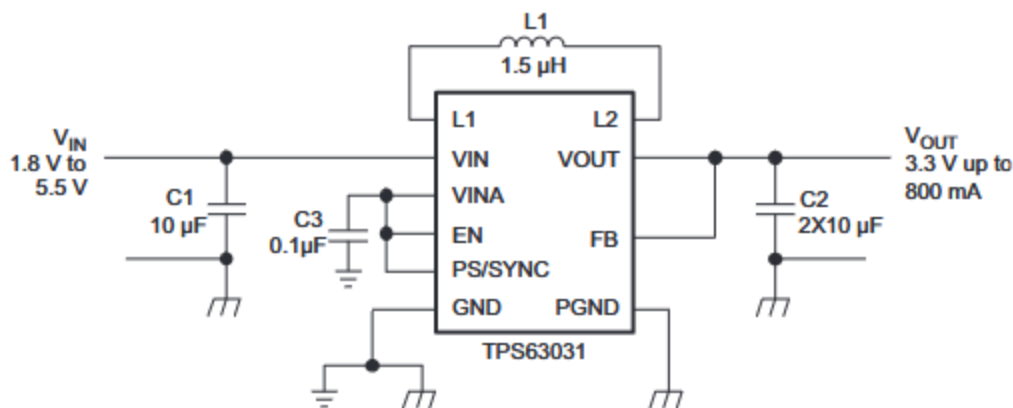


This is the general design of a buck-boost converter. The highlighted red part is

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 VOUT and compares it with 3.3V and adjusts the PWM output to be given accordingly.